



Covid-19 in 2020

The plague year

This will be remembered as a moment when everything changed

WARREN HARDING built a campaign for the presidential election in 1920 around his new word “normalcy”. It was an appeal to Americans’ supposed urge to forget the horrors of the first world war and the Spanish flu and turn back to the certainties of the Golden Age. And yet, instead of embracing Harding’s normalcy, the Roaring Twenties became a ferment of forward-looking, risk-taking social, industrial and artistic novelty.

War had something to do with the Jazz Age’s lack of inhibition. So did the flu pandemic, which killed six times as many Americans and left survivors with an appetite to live the 1920s at speed. That spirit will also animate the 2020s. The sheer scale of the suffering from covid-19, the injustices and dangers the pandemic has revealed, and the promise of innovation mean that it will be remembered as the year when everything changed.

The pandemic has been a once-in-a-century event. SARS-CoV-2 has been found in over 70m people and possibly infected another 500m or more who were never diagnosed. It has caused 1.6m recorded deaths; many hundreds of thousands have gone unrecorded. Millions of survivors are living with the exhaustion and infirmities of “long covid”. World economic output is at least 7% lower than it would otherwise have been, the biggest slump since the second world war. Out of the ashes of all that suffering will emerge the sense that life is not to be hoarded, but lived.

Another reason to expect change—or, at least, to wish for it—is that covid-19 has served as a warning. The 80bn animals slaughtered for food and fur each year are Petri dishes for the viruses and bacteria that evolve into a lethal human pathogen every decade or so. This year the bill came

due and it was astronomical. The clear blue skies that appeared as the economy went into lockdown were a powerful symbol of how covid-19 is a fast-moving crisis within a slow-moving one that in some ways resembles. Like the pandemic, climate change is impervious to populist denials, global in the disruption it causes and will be far more costly to deal with in the future if it is neglected now.

And a third reason to expect change is that the pandemic has highlighted injustice. Children have fallen behind in their lessons—and too often gone hungry. School leavers and graduates have once again seen their prospects recede. People of all ages have endured loneliness or violence at home. Migrant workers have been cast adrift, or sent back to their villages, taking the disease with them. The suffering has been skewed by race. A 40-year-old Hispanic-American is 12 times more likely to die from covid-19 than a white American of the same age. In São Paulo black Brazilians under 20 are twice as likely to die as whites.

As the world has adapted some of these iniquities have got worse. Studies suggest that about 60% of jobs in America paying over \$100,000 can be done from home, compared with 10% of jobs paying under \$40,000. As unemployment has soared this year, the MSCI index of world stockmarkets has risen by 11%. In the worst case, the UN reckons, the pandemic could force over 200m people into extreme poverty. Their plight will be exacerbated by authoritarians and would-be tyrants who have exploited the virus to tighten their stranglehold on power.

Perhaps that is why pandemics have led to social upheaval in the past. The IMF looked at 133 countries in 2001-18 and found that unrest surged about 14 months after the onset of disease, peaking after 24 months. The more unequal a society, the more upheaval. Indeed, the fund warns of a vicious circle in which protest further increases hardship which, in turn, feeds protest.

Fortunately, covid-19 has not just brought about the need for change, it also points a way forward. That is partly because it has served as an engine of innovation. Under lockdown, e-commerce as a share of American retail sales increased as much in eight weeks as it had in the previous five years. As people worked from home, travel on the New York subway fell by over 90%. Almost overnight, businesses like this newspaper began to be run from spare rooms and kitchen tables—an experiment that would otherwise have taken years to unfold, if ever.

This disruption is in its infancy. The pandemic is proof that change is possible even in conservative industries like health care. Fuelled by cheap capital and new technology, including artificial intelligence and, possibly, quantum computing, innovation will burn through industry after industry. For example, costs at American colleges and universities have increased almost five times faster than consumer prices in the past 40 years, even as teaching has barely changed, making it tempting to disrupters. Further technological progress in renewable sources of energy, smart grids and battery storage are all vital steps on the path to replacing fossil fuels.

The coronavirus has also revealed something profound about the way societies should treat knowledge. Consider how Chinese scientists sequenced the genome of SARS-CoV-2 within weeks and shared it with the world. The new vaccines that resulted are just one stop in the light-speed progress that has elucidated where the virus came from, whom it affects, how it kills, and what might treat it.

It is a remarkable demonstration of what science can achieve. At a time when conspiracies run wild, this research stands as a rebuke to the know-nothings and zealots in dictatorships and democracies who behave as if the evidence for a claim is as nothing next to the identity of the person asserting it.

And the pandemic has led to a burst of innovative government. Those which can afford it—and some, like Brazil's, that cannot—have suppressed inequality by spending over \$10trn on covid-19, three times more in real terms than in the financial crisis. That will dramatically reset citizen's expectations about what governments can do for them.

Many people under lockdown have asked themselves what matters most in life. Governments should take that as their inspiration, focusing on policies that promote individual dignity, self-reliance and civic pride. They should recast welfare and education and take on concentrations of entrenched power so as to open up new thresholds for their citizens. Something good can come from the misery of the plague year. It should include a new social contract fit for the 21st century. ■



【首文】2020年的新冠疫情

瘟疫年

这一年一切都变了，它将被铭记

沃伦·哈定（Warren Harding）在1920年围绕一个新词“normalcy”（常态）组织自己的总统竞选。这是为了迎合当时所认为的美国人心中的渴求——忘记第一次世界大战和西班牙流感的恐怖，回归“黄金时代”的安定。然而，“咆哮的20年代”非但没有走入哈定的“常态”，反而酝酿出了一系列进取而冒险的社会、工业和艺术上的创新。

这一“爵士时代”之所以无所禁忌，与战争有一些关系。当然还有西班牙流感，它在美国造成的死亡人数是一战的六倍，幸存者因而想争分夺秒地度过1920年代。这种精神也将激活2020年代。新冠疫情破坏范围之大、昭显的不公与危险，以及它带来的创新的希望，都意味着2020年将作为改变一切的一年而被铭记。

这次疫情是百年一遇的事件。已有7000多万人感染新冠病毒，可能有五亿或更多人被感染却从未被确诊。记录在案的死亡数字是160万，还有数十万没有被正式记录。成百上千万幸存者正经受“新冠长期症状”，变得疲惫虚弱。世界经济产出比本应有的水平减少了至少7%，下滑幅度是二战以来之最。从所有这些苦难的灰烬中会产生一种意识——日子不是攒着劲儿过的，而是要过好每一天。

预计会有（或至少希望能有）改变的另一个理由是疫情给了一个警告。每年为食用和获取毛皮而宰杀的800亿头动物是病毒和细菌的培养皿，而这些病毒细菌每十年左右就会演化出一种致命的人类病原体。这份账单今年到期支付，金额是个天文数字。经济体停摆时出现的澄澈蓝天是一个强有力的表征，显示疫情是一场慢性危机中的一次急症，而两者在某些方面有相似之处。无论民粹分子如何否认，气候变化和新冠疫情一样会带来全球性的破坏，而如果现在忽视它，日后为应对它要付出高得多的代价。

改变可期的第三个原因是疫情突显了不公。有学童落下学业，还常常挨饿。离校生和毕业生再次感到前景黯淡。各种年龄段都有人在家中忍受孤独或暴力。外来劳工被迫四处漂泊或被遣送回乡，把疫病也一同带去。有些种族遭受的苦难更加深重。40岁西裔美国人死于新冠病毒的可能性是同齡美国白人的12倍。在圣保罗，20岁以下巴西黑人的新冠死亡率是白人的两倍。

随着世界调整应对危机，这些不公平现象中有一些变得更加严重。研究显示，在美国，年薪十万美元以上的工作约60%可以在家远程完成，而年薪低于四万美元的工作只有10%可以这么做。今年失业率飙升，跟踪全球股市的MSCI指数反而上涨了11%。据联合国估计，在最坏的情况下，疫情可能迫使超过两亿人陷入极端贫困。他们的困境还将因为威权统治者和蠢蠢欲动的暴君利用新冠病毒加强权力控制而加剧。

这可能就是为什么在过去大流行病导致了社会动荡。国际货币基金组织（IMF）在2001年至2018年考察了133个国家，发现在疾病发生后的第14个月左右动乱飙升，24个月后达到顶峰。社会越不平等，动乱就越频繁。实际上，IMF警告了一种恶性循环：抗争加重苦难，苦难继而又加剧抗争。

幸运的是，新冠疫情不仅带来了改变的需要，还指明了前进的方向。这一定程度上是因为它推动了创新。封城之下，电商占美国零售额的比例在八周内的增幅就等于之前五年的变化。由于人们在家工作，纽约地铁的出行量下降超过90%。几乎在一夜之间，像本刊这样的企业开始变成在家中客房和餐桌上运营——要是没有疫情，这种实验就算真会发生，也要经过很多年。

这场颠覆还处于起步阶段。疫情证明了即使是在医疗保健等保守的行业，改变也是可能的。在廉价的资本以及人工智能——或许还有量子计算——等新技术的推动下，创新的火焰将蔓延至一个又一个行业。例如，在过去40年里，美国高校在教学上几乎没有任何变化，而学费的增速却是消费价格增速的近五倍，这让它成为颠覆者的诱人目标。可再生能源、智能电网和电池储能方面的技术进步都是取代化石燃料的道路上的关键进展。

新冠病毒还揭示出有关社会该如何对待知识的一些深刻道理。想想中国的科学家是怎样在几周内就对病毒做了基因组测序并与全世界分享的。由此产生的新疫苗只是光速进展中的一站，这些进展解释了病毒来源、影响对象、致命原理以及可能的治疗方法。

这是对科学所能取得的成果的杰出示范。在阴谋论甚嚣尘上之际，这样的研究有力驳斥了独裁和民主国家中那些对待观点不看证据只看言者身份的无知者与狂热分子。

疫情引发了一连串政府创新治理。那些能承担创新开支的政府以及部分负担不起的政府（如巴西）已动用超过10万亿美元抗疫以抑制不平等现象，投入的资金按实值计算是金融危机时的三倍。这将极大地改变公民对政府能为他们做什么的期望。

在封城停摆的日子里，许多人都自问生命中最重要的是什么。各国政府应从中获得启发，把政策重点放在促进个人尊严、自立自主和公民自豪感上。它们应重塑福利和教育政策，挑战根深蒂固且集中的权力，以求为其公民开辟新的起点。瘟疫之年的苦难可以带来好的转变。其中应该包括适合21世纪的新社会契约。 ■



The World in 2021

Intelligent design

Conventional economic models do not capture the complexity of human behaviour

HAVING GONE deep into the red during the covid-19 pandemic, governments will grapple in 2021 with getting their finances back in order. After the global financial crisis of 2007-09, those in rich countries tightened their belts too much, choking the economic recovery. This time they will want to be cleverer about it. Some will be more ambitious, seeking to redesign their welfare systems: the pandemic will strengthen public support for stronger social safety-nets. And policymakers in poor countries will want to alleviate poverty and sustain economic development.

How to balance all these aims? An experiment might tell you if a particular tool works, and findings from projects on basic income, such as that run in Kenya by Give Directly, a charity, will influence governments' thinking. But experiments can be neither broad nor timely enough to help governments set a plethora of tax and subsidy rates every year. Conventional economic models do not capture the complexity of human behaviour: that people change what they do as tax rates rise, or that corrupt officials might pocket some public funds. So in 2021 governments will be tempted to throw computational power at their policymaking, using artificial intelligence (AI) to simulate the economy, and the effects of new policies.

“Agent-based” models simulate the behaviour of different types of participants in the economy by allowing them to respond to each other over time: if a public servant can get away with pocketing more money, or a taxpayer with paying less tax, then they will do so. Some simulate surprisingly realistic behaviour by using machine learning to “train” the model using vast sets of data. One such approach is Policy Priority Inference, developed by researchers in Britain and Mexico and sponsored

by the UN's development programme. Already used in Mexico, it takes governments' spending plans across a range of categories and works out, based on its simulation of corruption, inefficiencies and spillovers, whether a government is likely to hit its development goals, and where more (or less) money should be spent. More poor countries could see the appeal of such an approach.

Interest in rich countries could be piqued, too. Researchers at Salesforce, a software company, and Harvard University have used simulations to show that, much as computers can learn to play Go and develop strategies that might not occur to humans, they can also suggest combinations of tax and spending that maximise economic performance, and which bureaucrats might not have dreamed up. So why not turn to AI for fresh ideas?

None of this means that economists or bureaucrats will find themselves out of work in 2021. Interpreting the models' results requires expertise. Politicians will not cede their power to raise and lower tax rates. But policymakers and researchers keen to experiment in the aftermath of the pandemic will have an opportunity to expand their toolkits. ■



2021年的世界

智能设计

传统经济模型无法捕捉人类行为的复杂性

各国政府在新冠疫情期间已深陷赤字，它们将在2021年努力恢复财政秩序。在2007至2009年的全球金融危机过后，富裕国家的政府过度勒紧了腰带，结果抑制了经济的复苏。这次它们会想在这个环节上变得更聪明些。有些政府还要更雄心勃勃，寻求重新设计自己的社会福利系统——疫情会让公众更愿意支持更强韧的社会安全网。贫穷国家的决策者会希望减轻贫困并维持住经济发展。

如何平衡所有这些目标？做个实验或许可以告诉你特定的工具是否有效，而关于基本收入的研究项目——比如慈善组织“直接捐款”（Give Directly）在肯尼亚开展的那种——得出的发现会影响政府的思路。但是，实验可能既不够广泛又不够及时，不足以帮助政府设定每年名目繁多的税收和补贴额度。传统的经济模型无法捕捉人类行为的复杂性：比如人们会随税率上升改变自己的行为，或者腐败的官员可能将部分公共资金中饱私囊。因此，在2021年，各地政府将跃跃欲试，要在决策过程中大举投入计算能力，用人工智能（AI）来模拟整体经济和新政策的效果。

“基于主体”模型（ABM）会模拟经济体中不同类型的参与者之间的长期相互影响来预测他们的行为：如果公务员贪污或纳税人逃税可以不受责罚，那么他们就会这么做。一些模型使用机器学习，通过海量数据来“训练”模型，模拟的行为真实得令人吃惊。由英国和墨西哥的研究人员开发、联合国开发计划署赞助的“政策优先顺位推断”项目（Policy Priority Inference）就使用了这种方法。它已经在墨西哥使用，将各种类别的政府开支计划输入模型，根据它对腐败、低效和溢出效应的模拟，计算出政府是否有可能实现其发展目标，以及应该在什么方面多花钱或少花钱。更多贫穷国家可能会看到这种方法的吸引力。

富裕国家的兴趣也可能被激发起来。软件公司Salesforce和哈佛大学的研

究人员已经使用模拟实验表明，正如计算机可以学会下围棋并发展出人类可能想不到的步法战略，它们也可以提议官僚们不曾想到的、能最大化经济绩效的税收和支出混合方案。那为何不向AI要些新点子呢？

以上种种并不意味着经济学家或官员们会在2021年丢了工作。要诠释这类模型得出的结论需要专业知识。政客们不会放弃他们增税减税的权力。但是，在疫情之后热衷做实验的政策制定者和研究人员将有机会扩展他们的工具包了。■



The World in 2021

New money

Party leaders believe the country's big tech platforms have too much power

THERE IS A good chance that the digital yuan will enter circulation in 2021. It is a debut that will initially make little difference, but could, over time, change the way central banks conduct monetary policy.

The People's Bank of China has filed more than 100 patent applications for a digital currency and has overseen a range of trials, putting the e-yuan into use in a few cities and on several apps. So far the experiments have gone smoothly, and soon people will have the option of downloading a government-issued digital wallet. Unlike commercial ones such as WeChat Pay and Alipay, the official version will be equivalent to an account at the central bank with the same solidity as hard cash.

For the millions who already use a smartphone instead of a debit card, it will feel like just another payment app. Yet some talk of digital currency as a revolutionary product that could spell trouble for banks as people withdraw money from savings accounts and put it directly into their ultra-safe official e-wallets. What is more, if digital currency were ever to fully replace cash, central banks would, in theory, gain three new powers: to lower interest rates below zero with little difficulty; to issue cash directly to those most in need; and to see more precisely who has money and how it is spent.

In China the central bank is not trying to reinvent monetary policy—at least not yet. Its motivations derive from more immediate challenges. Given the rise of mobile payments, it worries that the big tech platforms have too much power. The digital yuan will offer an alternative. It will also give China a conduit for moving money across its borders without having to rely

on SWIFT, a global payments system that comes under American influence. But China's first objective is much more basic still: to check whether the technology behind the digital yuan works and whether people actually want to use it. Money has been around for some 3,000 years. This update will take time. ■



2021年的世界

新型货币

党的领导人认为本国的大型科技平台权力过大

数字人民币有很大的机会在2021年进入流通。它的首度亮相在最开始影响力不会太大，但假以时日，可能会改变央行实施货币政策的方式。

中国人民银行已经为数字货币提交了100多项专利申请，并监督了一系列试验，将电子人民币在一些城市和几款应用上投入使用。到目前为止，这些试点测试进展顺利，不久后人们就可以选择下载政府发行的数字钱包。与微信支付和支付宝这类商业应用不同，官方的电子钱包将相当于在央行开了一个账户，和现钞一样可靠。

对于已经在使用智能手机而非借记卡的成百上千万民众而言，这就好像在使用又一款支付应用。不过，有些人谈到数字货币作为一种革命性产品可能会给银行带来麻烦，因为人们会从储蓄账户中取出存款，直接放进超安全的官方电子钱包里。此外，如果数字货币有朝一日能完全取代现金，理论上央行将获得三项新权力：将利率轻松地降到零以下；直接向最需要的群体发放现金；更确切地看到谁有钱以及怎么花钱。

在中国，央行并没有在试图重塑货币政策——至少目前没有。其动机源于更近在眼前的挑战。鉴于移动支付的兴起，它担心大型科技平台的影响力过大。数字人民币将提供一个替代选项。它还将为中国提供一个资金跨境流动的渠道，而无需再依赖受美国影响的全球支付系统SWIFT。但中国的首要目标还要更基本得多：检查数字人民币背后的技术是否可行，以及人们是否真的想用它。货币已经存在了约3000年之久。这项升级需要时间。





The World in 2021

The power of green technology

Google's boss says AI and machine learning will help

AFTER DECADES of incremental steps forward, 2021 will be the most significant year yet for combating climate change. Two recent developments have made this possible.

First, as science tells us that we have a decade to reduce emissions dramatically or face the worst impacts of climate change, many of those impacts have already arrived at our door. From the historic and deadly wildfires in Australia and California, to severe flooding around the world, there is no denying that climate change is already disrupting our daily lives. At the same time, support for climate action has never been stronger—from Generation Z's solutions-oriented mindset, to political support that increasingly crosses party lines, to Europe's large-scale ambition to become the first carbon-neutral continent, society is ever more unified against the threat of climate change.

Second, we are seeing promising technologies and policies that will bring carbon-free energy within reach. Not long ago, it was hard to imagine a 24/7 carbon-free electricity supply. At its most basic level, the wind does not always blow and the sun does not shine at night. But new technologies—including better energy storage and the reduction of costs associated with wind and solar power by 70% and 89% respectively over the past ten years—are bringing 24/7 carbon-free energy closer to reality.

Another of those technologies is artificial intelligence (AI). At Google, we are working on ways to apply AI to optimise electricity consumption within our data centres. In collaboration with our sister venture, DeepMind, we have developed solutions that have reduced the amount of energy used to

cool our data centres by 30%. This approach could be used by commercial buildings, including airports and shopping malls, to do the same. AI can also be used to make wind power more predictable, which will increase the value, utilisation and adoption of renewable energy.

Meanwhile, sensors on satellites can locate large-scale emitters of carbon dioxide at a very fine-grained level. This could dramatically improve the effectiveness of the Paris climate agreement. Technology is also helping cities reduce their carbon emissions. According to the Global Covenant of Mayors, an international alliance of over 10,000 cities and local governments committed to fighting climate change, less than 20% of cities outside western Europe have the time, resources and data to meet their climate commitments. With platforms like our own Environmental Insights Explorer, cities can use anonymised, aggregated mapping data to estimate the carbon footprint of their buildings and transport, and realise their solar-energy potential—a critical step, as cities continue to contribute over 70% of the world’s greenhouse-gas emissions.

Technology is also helping communities adapt to the effects of climate change that are already apparent. As one example, we are able to use satellite data to map wildfires in real time and better predict how they might spread. In India, flood forecasting models use AI to predict when floods will hit and how deep the waters will get, helping save lives. Machine learning is also being applied to “nowcast” rainfall sooner and with more accuracy than conventional forecasting methods, helping people make safer, more informed decisions.

Driven by these promising trends and tools, companies have made bigger sustainability commitments in shorter time frames. At Google, we have eliminated our carbon legacy using high-quality offsets, and set a goal to operate on 24/7 carbon-free energy in all our data centres and campuses worldwide by 2030. Our aim is to demonstrate that a 100% carbon-free

electrical grid is not just possible but also economically viable. We hope that companies of all sizes will join us in this effort.

In addition to concrete and ambitious company commitments, the world also needs enabling policies and global frameworks to ensure we are working towards the same goals. We know it's possible: we have seen this kind of collaboration during the pandemic, as the private sector worked with governments to deliver personal protective equipment, medical devices and contact-tracing apps needed to fight the virus. Stronger public-private partnerships will be just as critical in fighting climate change.

Throughout history, every generation has confronted big challenges. Climate change will be our generation's most profound challenge—and in 2021, the world will take its biggest steps yet to meet it. ■



2021年的世界

绿色技术的力量

谷歌老板说人工智能和机器学习将带来助益

经过数十年的小步进展，2021年将是应对气候变化最重要的一年。近期的两项进展使这成为可能。

首先，正如科学告诉我们的那样，我们有十年的时间来大幅减少排放，否则将面临气候变化最严重的影响——其中许多影响已经到了我们的门前。从澳大利亚和加州历史性的致命野火，到世界各地的严重洪灾，气候变化已经在无可否认地破坏我们的日常生活。同时，对气候行动的支持从未如此强大——从Z世代以解决方案为导向的思维方式，到逐渐跨越党派的政治支持，再到欧洲要成为第一个碳中和大陆的宏大野心，全社会日益团结应对气候变化的威胁。

其次，我们看到了有前途的技术和政策，它们将使无碳能源触手可及。全天候无碳电力供应在不久前还难以想象。哪怕说最基本的，风并不是一直在吹，晚上也没有阳光。但过去十年来，新技术——包括更好的能量存储，以及与风能和太阳能相关的成本分别降低70%和89%——使全天候的无碳能源更加接近现实。

这些技术中，另一个是人工智能（AI）。在谷歌，我们正在研究应用AI来优化数据中心内部电力消耗的方法。通过与我们的姊妹企业DeepMind合作，我们开发出了解决方案，将用于冷却数据中心的能源减少了30%。包括机场和购物中心在内的商业建筑都可以使用这种方法。AI还可以使风能更可预测，这将增加可再生能源的价值、利用率和接纳度。

同时，卫星上的传感器可以非常精细地定位大规模的二氧化碳排放源。这可以大大提高《巴黎气候协定》的有效性。技术也在帮助城市减少碳排放。根据《全球市长盟约》（由致力于抗击气候变化的一万多个城市和地方政府组成的国际联盟），西欧以外只有不到20%的城市有时间、资源和

数据来履行其气候承诺。借助我们自己的环境洞察探索（Environmental Insights Explorer）之类的平台，城市可以使用匿名的汇总地图数据来估算其建筑物和交通的碳足迹，并实现其太阳能潜力——这是至关重要的一步，因为全世界70%以上的温室气体排放仍然源自城市。

技术还帮助社区适应已经显现的气候变化影响。举个例子，我们能够使用卫星数据实时绘制野火地图，并更好地预测野火的蔓延方式。在印度，洪水预报模型使用AI来预测洪水何时袭击、会达到多深，从而挽救生命。机器学习也可用于比传统的预测方法更快、更准确地“现报”降雨，从而帮助人们做出更安全、明智的决策。

在这些有潜力的趋势和工具的推动下，企业纷纷做出了在更短时间内达成更大的可持续发展目标的承诺。在谷歌，我们已经使用高质量的补偿方案消除了碳遗留问题，并设定了到2030年在全球所有谷歌数据中心和园区全天候使用无碳能源的目标。我们的目标是证明100%的无碳电网不仅可能，而且在经济上可行。我们希望各种规模的公司都能加入我们的行列。

除了企业做出具体而宏伟的承诺外，世界还需要有利的政策和全球框架来确保我们正朝着相同的目标努力。我们知道这是可能的，在疫情期间已经出现了这种合作：私营部门与政府合作提供了抵抗病毒所需的个人防护设备、医疗设备和接触者追踪应用。加强公私合作对于应对气候变化同样至关重要。

纵观历史，每一代人都面临巨大的挑战。气候变化将是我们这一代人最严峻的挑战——2021年，世界将迈出最大的步伐来应对它。■



Bartleby

Fair play

A new book argues that decency pays off in business as well as in life

NICE GUYS finish last. That pithy motto was coined by Leo Durocher, a baseball manager noted for exulting at injuring his opponents and for cheating his players at cards. In 1969 his Chicago Cubs had a big lead in the closing weeks of the season, but he so alienated his squad (and the umpires) that the team failed to make it to the World Series. In his case, nasty guys finished behind.

This is one of the tales told by David Bodanis, a writer best known for his science books, who has turned his attention to the issue of how leaders should exercise their authority. The core message in his book, “The Art of Fairness”, can be found in the subtitle: “The power of decency in a world turned mean”.

The Empire State Building was constructed in just 13 months, and that included the dismantling of the Waldorf-Astoria hotel that sat on the site. Paul Starrett, the builder, treated his workers rather well by the standards of the time, paying much attention to safety and paying employees on days when it was too windy to work. Daily wages were more than double the usual rate and hot meals were provided on site.

The concept is known as “efficiency wages”. Companies that compensate workers well and treat them fairly can attract better, more motivated staff. Unlike most construction projects, the Empire State Building had low staff turnover, and workers suggested productivity improvements such as building a miniature railway line to bring bricks to the site. But Starrett was not naively generous; he hired accountants to patrol the works, checking that all materials were accounted for, and staff attendance was recorded

four times a day.

The author contrasts Starrett's story with the tale of Eastern Air Travel, an airline built by Eddie Rickenbacker, a pioneer aviator who had granted mechanics a 40-hour week, profit-related pay and a pension. But when Frank Lorenzo took over the company in the 1980s, he cut wages, alienated the staff and pursued a policy of asset-stripping the company. The workers went on strike in protest and Eastern went bankrupt.

Another contrast cited by the author is that between Steve Ballmer, the hard-charging chief executive of Microsoft notorious for his towering rages, and his more emollient successor, Satya Nadella. Mr Ballmer so disliked Apple that he seized an iPhone from a subordinate in full view of the humiliated employee and pretended to stomp on it. On his watch Microsoft missed out on several promising business opportunities. On the day Mr Ballmer announced his departure the share price jumped by 7.5%. Under Mr Nadella, Microsoft has successfully shifted its attention to cloud-based services and even briefly regained the title of the world's most valuable listed company.

Public projects also require management skills. When Danny Boyle, a film director, was asked to organise the opening ceremony of the 2012 London Olympics, he faced the tough task of keeping the details secret when the project required thousands of volunteers. The conventional approach would have been to make the volunteers sign a non-disclosure agreement. Instead, he asked them to keep the surprise—and trusted them to do so. They did, thanks to the grown-up way he treated them. He listened to their ideas for improving parts of the ceremony and ensured (by threatening to resign) that the volunteers did not have to pay for their costumes.

Mr Boyle demonstrated one of the most important traits of good leadership, the author argues, which is a willingness to listen. This relates to a concept

known as the “power distance”. If a relationship has a high power-distance score, it is assumed that junior staff should not question their superiors’ decisions; a lower score means that senior staff are willing to listen.

Perceptions may differ sharply over whether listening takes place. A study by Johns Hopkins University found that 64% of the medical specialists interviewed felt that their operations had high levels of teamwork, whereas only 28% of their nurses agreed.

Individuals can become fixated on a particular approach to resolving a problem and ignore any advice that suggests a different tack, especially if it comes from a junior colleague. “When your underlings aren’t terrified of you, and you’re modest enough to know you’re fallible, you can set up the channels that will help you avoid fixation,” Mr Bodanis writes. It is a wise lesson. Ruling by fear may work for a while, but it is doomed to fail in the long run. Remember Durocher. ■



巴托比

再论费厄泼赖

一本新书认为，得体不仅在生活中有好报，在工作中也一样

好人垫底。这句简练的格言来自利奥·迪罗谢（Leo Durocher），这位棒球队经理以伤害对手和在牌局上对自己的球员出千为乐，由此出名。1969年，他带领的芝加哥小熊队在赛季最后几周遥遥领先，但他和球队（还有裁判）的关系弄得太僵，导致球队最终还是没能进入世界大赛（World Series）。在他自己这个案例上，坏蛋掉到后头去了。

这是大卫·伯登尼斯（David Bodanis）笔下的故事之一。这位作者最出名的是科学著作，现在又将注意力转向了领导者应该如何行使他们的权威。他在《公正的艺术》（The Art of Fairness）的副标题里直陈这本书的核心思想：“在一个日益不友善的世界里保持体面的力量。”

帝国大厦仅13个月即告完工，这还包括了先拆除华尔道夫酒店。按照当时的标准，施工承包商保罗·斯塔雷特（Paul Starrett）给工人的待遇相当不错。他非常重视安全，在刮大风不能开工的日子也照常给工人发工资。他开出的日薪是一般水平的两倍多，还在工地上供应热腾腾的饭食。

这里头的理念叫做“效率工资”。薪酬良好并公正合理地对待工人的公司能够吸引更好、更有积极性的员工。与大多数建筑工程项目不同，帝国大厦项目的员工流动率很低，而工人也踊跃提出提高生产率的建议，例如修建一条向工地运送砖头的微型铁路。但斯塔雷特也不是天真幼稚的慷慨：他雇用会计来巡视工地，核查所有材料是否入账，并每日四次记录员工出勤。

作者将斯塔雷特的故事与埃迪·里肯巴克（Eddie Rickenbacker）创建的美国东方航空（Eastern Air Travel）的历程做对比。在这位飞行员先驱的管理下，机修工每周工作40小时，薪酬与利润挂钩，享受养老金。但当弗兰克·洛伦佐（Frank Lorenzo）在上世纪80年代接管公司后便开始削减工

资、疏远员工，并且大肆倒卖公司资产。工人罢工抗议，公司终告破产。

作者还比较了微软前CEO史蒂夫·鲍尔默（Steve Ballmer）与其继任者萨提亚·纳德拉（Satya Nadella），前者咄咄逼人，以雷霆之怒闻名，后者为人更温和。鲍尔默非常讨厌苹果公司，有一次当众从下属手中夺过iPhone，在这位难堪的员工面前作势要踩上几脚。在他任内微软多次错失良机。鲍尔默宣布离任的当天，公司股价上涨了7.5%。在纳德拉的领导下，微软成功地将重心转移到云服务，甚至一度夺回了全球最高市值上市公司的头衔。

公共项目同样需要管理技巧。电影导演丹尼·博伊尔（Danny Boyle）受邀执导2012年伦敦奥运会开幕式，他面临一个大难题：在有成千上万名志愿者参与的情况下保密开幕式的细节。传统的做法是让志愿者签署保密协议。而他却恳请他们将惊喜留到最后，并信任他们一定能够做到。他们确实做到了，因为他以公正、尊重的成熟方式对待他们。他听取他们对开幕式某些内容的改进想法，并（不惜以辞职相威胁）确保志愿者不必自己负担演出服装费用。

作者认为，博伊尔展现了优秀领导力最重要的特质之一，那就是愿意倾听。这涉及一个称为“权力距离”的概念。如果工作关系当中的权力距离分值较高，那么大家都认为下级员工不应质疑上级的决策；分值较低则意味着高层人员更愿意倾听。

至于倾听是否真实发生，不同的人感受可能大相径庭。约翰·霍普金斯大学的一项研究发现，受访的专科医生当中有64%认为自己的工作中团队合作水平很高，但他们的护士只有28%认同这一点。

人们可能会偏执于某一种解决问题的方法，而不理会任何采取不同策略的建议，尤其是来自低年资同事的建议。伯登尼斯写道：“如果你的下属不惧怕你，而你又足够谦虚，知道自己可能犯错，你就可以建立渠道来帮助自己避免执迷不悟。”这是一条明智的经验。用恐惧来统治可能有一时之效，但长期必定会失败。别忘了迪罗谢的前车之鉴。■



The World in 2021

Ten trends to watch in the coming year

A letter from Tom Standage, editor of "The World in 2021"

DO YOU FEEL lucky? The number 21 is connected with luck, risk, taking chances and rolling the dice. It's the number of spots on a standard die, and the number of shillings in a guinea, the currency of wagers and horse-racing. It's the minimum age at which you can enter a casino in America, and the name of a family of card games, including blackjack, that are popular with gamblers.

All of which seems strangely appropriate for a year of unusual uncertainty. The great prize on offer is the chance of bringing the coronavirus pandemic under control. But in the meantime risks abound, to health, economic vitality and social stability. As 2021 approaches, here are ten trends to watch in the year ahead.

1 Fights over vaccines. As the first vaccines become available in quantity, the focus will shift from the heroic effort of developing them to the equally daunting task of distributing them. Vaccine diplomacy will accompany fights within and between countries over who should get them and when. A wild card: how many people will refuse a vaccine when offered?

2 A mixed economic recovery. As economies bounce back from the pandemic the recovery will be patchy, as local outbreaks and clampdowns come and go—and governments pivot from keeping companies on life-support to helping workers who have lost their jobs. The gap between strong and weak firms will widen.

3 Patching up the new world disorder. How much will Joe Biden, newly installed in the White House, be able to patch up a crumbling rules-based

international order? The Paris climate treaty and the Iran nuclear deal are obvious places to start. But the crumbling predates Donald Trump, and will outlast his presidency.

4 More US-China tensions. Don't expect Mr Biden to call off the trade war with China. Instead, he will want to mend relationships with allies to wage it more effectively. Many countries from Africa to South-East Asia are doing their best to avoiding picking sides as the tension rises.

5 Companies on the front line. Another front for the US-China conflict is companies, and not just the obvious examples of Huawei and TikTok, as business becomes even more of a geopolitical battlefield. As well as pressure from above, bosses also face pressure from below, as employees and customers demand that they take stands on climate change and social justice, where politicians have done too little.

6 After the tech-celeration. In 2020 the pandemic accelerated the adoption of many technological behaviours, from video-conferencing and online shopping to remote working and distance learning. In 2021 the extent to which these changes will stick, or snap back, will become clearer.

7 A less footloose world. Tourism will shrink and change shape, with more emphasis on domestic travel. Airlines, hotel chains and aircraft manufacturers will struggle, as will universities that rely heavily on foreign students. Cultural exchange will suffer, too.

8 An opportunity on climate change. One silver lining amid the crisis is the chance to take action on climate change, as governments invest in green recovery plans to create jobs and cut emissions. How ambitious will countries' reduction pledges be at the UN climate conference, delayed from 2020?

9 The year of déjà vu. That is just one example of how the coming year may

feel, in many respects, like a second take on 2020, as events including the Olympics, the Dubai Expo and many other political, sporting and commercial gatherings do their best to open a year later than planned. Not all will succeed.

10 A wake-up call for other risks. Academics and analysts, many of whom have warned of the danger of a pandemic for years, will try to exploit a narrow window of opportunity to get policymakers to take other neglected risks, such as antibiotic resistance and nuclear terrorism, more seriously. Wish them luck.

The coming year promises to be particularly unpredictable, given the interactions between the pandemic, an uneven economic recovery and fractious geopolitics. This annual will, we hope, help you improve your odds as you navigate the risks and opportunities ahead.

And it's not all doom and gloom. Lessons and chances for positive change have emerged from the crisis. So let the dice fly high—and, whatever cards 2021 may end up dealing you, may the odds be ever in your favour. ■



2021年的世界

来年值得关注的十大趋势

来自《2021世界展望》主编汤姆·斯坦迪奇的一封信

你觉得自己幸运吗？数字21和运气、风险、冒险及掷骰子联系在一起。一个标准骰子共有21个点；下注和赛马使用的货币坚尼等值21先令；你必须满21岁才能进入美国赌场；在赌客中流行的包括美国的“黑杰克”（blackjack）在内的一类纸牌游戏总称“21点”。

这一切似乎不可思议地适用于异常不确定的一年。赌局的大奖是有机会控制住新冠疫情。但与此同时，在身体健康、经济活力和社会稳定方面都风险重重。随着2021年临近，新的一年有十大趋势值得关注：

一、疫苗争夺战。随着首批疫苗开始批量生产，重心将从研发疫苗的英勇壮举转移到同样异常艰巨的疫苗分配上。在国家内部和国家之间将围绕谁该在何时获得疫苗展开争斗和“疫苗外交”。有一个未知数：多少人会拒绝递到眼前的疫苗？

二、经济复苏参差不齐。随着经济体从疫情中恢复，复苏会是不均匀的——疫情的局部爆发和压制将此起彼伏，而政府的重心会从拯救企业转向援助失业者。强弱企业间的差距将拉大。

三、修补新的世界失序。基于规则的国际秩序正在崩坏，刚入主白宫的拜登能将它修复多少？巴黎气候协定和伊朗核协议是显而易见的起点。但这种崩坏在特朗普上台前就已经发生，在他下台后还将持续。

四、更多中美矛盾拉锯。不要指望拜登会喊停和中国的贸易战。他会想要修复与盟友的关系以求更有成效地打这场仗。目前从非洲到东南亚的许多国家都在竭力避免在紧张局势加剧之时选边站队。

五、企业冲锋陷阵。美中冲突的另一个前沿阵地是企业，而且不局限于华为和TikTok这样明显的例子，因为商业正变得越来越像一个地缘政治战

场。除了来自政府的压力，老板们也面临来自下方的压力，因为员工和客户要求他们在气候变化和社会正义这些政治家们少有作为的议题上表明立场。

六、“技术加速”过后。2020年，疫情加速了人们采用许多依赖技术的行为方式，从视频会议、网上购物，到居家工作和远程学习。这些变化会在多大程度上保留下来？还是会迅速逆转？这在2021年会变得更加清楚。

七、行动更不自由。旅游业将萎缩并转型——更多地专注国内游。航空公司、连锁酒店和飞机制造商的日子不好过，严重依赖外国生源的大学也一样。文化交流也会大受影响。

八、气候议题的机遇。危机中的一个光明面是有机会对气候变化采取行动，因为政府开始投资于绿色复苏计划以创造就业并减少排放。在从2020年延至2021年召开的联合国气候会议上，各国会做出多宏大的减排承诺？

九、似曾经历的一年。气候会议只是例子之一，显示将要到来的这一年在许多方面都可能像是2020年从头来过。包括奥运会、迪拜世博会和许多其他政治、体育和商业活动将尽力在原计划的一年后举行。并非都会实现。

十、对其他风险敲响警钟。多年来，许多学者和分析师都警告过大流行病的危险。他们将努力把握疫情这个短暂的时机，敦促政策制定者更认真地对待其他被忽视的风险，例如抗生素耐药性和核恐怖主义。祝他们好运。

鉴于疫情、经济复苏不均衡以及剑拔弩张的地缘政治之间的相互作用，未来的一年势必会是尤其不可预测的一年。我们希望本期年刊将帮助你在迎接前方的风险和机遇时提高胜算。

而前路不会是一片灰暗。经验教训和积极改变的机会也已从危机中浮现。所以，让骰子高高飞起吧——而无论2021年最终发给你什么牌，愿幸运女神永远眷顾你。■



The World in 2021

The coming covid-19 credit crunch

A credit crunch is coming, says the World Bank's chief economist

THE COVID-19 crisis did not start as a financial crisis, but it is morphing into one—and a global one at that. The headlines of 2020 have been dominated by news of the pandemic's spread, record-shattering falls in output, and surges in poverty and the newly unemployed. Behind these disturbing trends a quieter financial balance-sheet crisis is gathering momentum across a broad swathe of countries. The financial fallout from the pandemic does not respect differences by region or income status. Financial institutions are facing (and will face for some time) a marked rise in non-performing loans (NPLS).

Historically, banking crises emerge after a lengthy expansion in economic activity. Growth is often fuelled by a credit boom and rising leverage. Under the motto of “this time is different”, asset-price bubbles emerge during the biblical “seven fat years” (whether in property, commodities, equity or bonds). As the economic expansion slows and turns into recession, loans made during the good times turn sour. Sometimes balance-sheet problems undermine confidence, and runs on banks and financial institutions turn the crisis into a fully fledged panic. Households and firms attempt to deleverage after the crisis, even as banks adopt tighter lending standards. If banks resist writing down bad loans in favour of “evergreening”, as was the case in Japan's crisis in the early 1990s and in Europe after 2007-09, the resulting credit crunch may be longer and more severe, even surpassing the biblical “seven lean years”.

But this time truly is different. The run-up to the credit crunch in 2021 does not fit the historical boom-bust pattern in many countries. It is not predicated on having experienced an economic expansion or an asset-price

bubble. The common threads to the evolving balance-sheet crisis and the credit crunch that will follow are the historic magnitudes and likely persistence of the slump in economic activity. It is also a regressive crisis, disproportionately hitting low-income households and smaller firms that have fewer assets to avert insolvency.

High leverage on the eve of the pandemic will amplify the balance-sheet problems of the financial sector. Companies in the world's largest economies, America and China, are highly indebted and skewed towards high-risk borrowers. The IMF has repeatedly flagged concerns about the pre-pandemic rise in corporate leverage in many emerging markets, where much debt is denominated in dollars. Six months into the covid-19 crisis, S&P had downgraded or cut the outlook on almost 60% of the Latin American companies it rates. For the rest of the world the share is about 35-40%. Exposure to commercial property, as malls remain half-empty, is another source of concern in many parts of the world.

Australia and Canada, among others, have record levels of household debt. In Africa, where the NPL ratio was estimated at around 11% in 2019, microfinance institutions' portfolios will come under stress, as much of their lending is to households with volatile income and no assets. India was already dealing with an NPL ratio of about 9% in the run-up to the pandemic, and new lending in recent years had already stalled as a result of efforts to clean up the balance-sheets of state banks.

Since the onset of the pandemic, a range of policies has been introduced by governments across the world to provide liquidity to the many businesses that have been shuttered during the lockdowns and to support households hit by a sudden loss of income and employment. Grace periods in the repayment of existing loans have been granted. Re-contracting of loans in favour of longer maturities or lower interest rates has also been common. The hope is that because the health crisis is temporary, the financial

distress of firms and households will be, too. However, even with a prompt resolution of the pandemic in the form of a globally available vaccine, significant damage has been inflicted on the global economy and the balance-sheets of financial institutions.

Given the emergency, these policies have provided a valuable stimulus tool beyond the conventional scope of fiscal and monetary policy. But by 2021 grace periods will come to an end and it will become apparent whether the problem facing countless firms and households is insolvency rather than illiquidity. An extended credit crunch has been a major headwind to economic recovery in the past. There is little to suggest that it will be different in the post-pandemic landscape. ■



2021年的世界

新冠信贷紧缩来袭

世界银行首席经济学家表示信贷紧缩即将到来

新冠肺炎危机开始时并不是金融危机，但它正在演变成一场金融危机——而且是全球性的。2020年的头条新闻全是疫情蔓延、产值骤降破纪录、贫困和新失业人数激增之类。在这些令人不安的趋势背后，一场金融资产负债表危机正跨越许多国家悄然加剧。疫情的这一金融余波对不同区域或收入水平的国家一视同仁。金融机构正面临（并将面临一段时间）不良贷款（NPLS）的大幅增长。

从历史上看，银行业危机是在经济活动长期扩张之后出现的。信贷繁荣和杠杆上升通常会推动增长。在“这次不同以往”的座右铭下，犹如圣经中“七个丰年”的时期出现了资产价格泡沫（无论是房地产、大宗商品、股票还是债券）。随着经济增长放慢并陷入衰退，经济繁荣时期发放的贷款出了问题。有时资产负债表问题破坏了信心，银行和金融机构挤兑使危机变成了完全的恐慌。危机过后，即使银行采用更严格的贷款标准，家庭和企业也试图去杠杆。如果银行不愿减记不良贷款，而是“不断延期”，就像1990年代初的日本危机和2007至09年后的欧洲那样，那么信贷紧缩可能会更长或更严重，甚至超过圣经中的“七个荒年”。

但这一次确实不同。2021年信贷紧缩的前奏与许多国家历史上“繁荣-萧条”的周期模式不符。它并不是基于经济扩张或资产价格泡沫而做出的预测。在不断演进的资产负债表危机和将要随之而来的信贷紧缩背后，共同的脉络是经济活动下滑达到历史规模且很可能长久持续。这也是一种“累退性”危机，也就是对低收入家庭和资产较少而更易破产的小公司影响更大。

疫情前夕的高杠杆将加剧金融部门资产负债表的麻烦。美国和中国这两个全球最大经济体的公司负债累累，高风险借款人偏多。国际货币基金组织（IMF）曾多次表达对疫情前许多新兴市场企业的杠杆率上升的担忧，其

中许多债务以美元计价。新冠危机发生六个月后，标普已经对其评级的近60%的拉丁美洲公司降了级或是调低了预期，在世界其他地区的这一比例约为35%到40%。由于购物中心到现在还是半空的，商业地产的敞口是世界许多地方令人担忧的另一个问题。

澳大利亚和加拿大等国的家庭债务水平创下历史新高。在非洲，2019年的不良贷款率估计约为11%，小额信贷机构的投资组合将面临压力，因为它们的大部分贷款都发放给了收入不稳定且没有资产的家庭。在疫情爆发前，印度的不良贷款率已经达到约9%，而由于该国努力清理国有银行的资产负债表，近年来新贷款的发放已经停滞。

自疫情开始以来，世界各国政府采取了一系列政策，为在封锁期间关停的许多企业提供流动资金，并支持因收入和就业突然减少而遭受打击的家庭。现有的贷款也获得了还款宽限期。为延长期限或降低利率而重订贷款合同也很普遍。决策者希望，因为这场健康危机终会过去，企业和家庭的财务困境也将是暂时的。但是，就算疫情被全球都能获得的疫苗迅速终结，全球经济和金融机构的资产负债表也已遭到了重大破坏。

考虑到情况的紧急，这些政策提供了超出常规财政和货币政策范围的宝贵刺激工具。但是到2021年，宽限期将结束，无数公司和家庭面临的问题到底是资不抵债还是流动性不足也将变得清晰。过去，长久的信贷紧缩一直是经济复苏的主要障碍。没有什么迹象表明这在疫情之后会有所不同。■



Corporate balance-sheets

A year of raising furiously

Companies have issued more debt and equity in 2020 than ever before. What now?

IN MARCH THE corporate world found itself staring into the abyss, recalls Susie Scher. From her perch overseeing global capital markets at Goldman Sachs, a bank, she witnessed firms scrambling for money to keep going as the wheels of commerce ground to a halt amid the pandemic. Many investors panicked. Surely, the thinking went, public markets would freeze in the frigid fog of covid-19 uncertainty—and then stay frozen.

Instead, within weeks they began to thaw, then simmer, kindled by trillions of dollars in monetary and fiscal stimulus from governments desperate to avert an economic nuclear winter. In the past few months they have turned boiling hot.

According to Refinitiv, a data provider, this year the world's non-financial firms have raised an eye-popping \$3.6trn in capital from public investors (see chart 1). Issuance of both investment-grade and riskier junk bonds set records, of \$2.4trn and \$426bn, respectively. So did the \$538bn in secondary stock sales by listed stalwarts, which leapt by 70% from last year, reversing a recent trend to buy back shares rather than issue new ones.

Initial public offerings (IPOs), too, are flirting with all-time highs, as startups hope to cash in on rich valuations lest stockmarkets lose their frothiness, and venture capitalists (VCs) patience with loss-making business models. VCs still plough three times as much into American startup stars as public investors do. But proceeds from listings are now growing faster than private funding rounds (see chart 2). And the boom is global in nature (see chart 3). On December 2nd JD Health, a Chinese online pharmacy, raked in \$3.5bn in Hong Kong. A week later DoorDash, an

American food-delivery darling, and Airbnb, a home-rental platform, both more or less matched it in New York.

In a world of near-zero interest rates, it appears, investors will bankroll just about anyone with a shot at outliving covid-19. Some of that money will go up in smoke, with or without the corona-crisis. What does not get torched will bolster corporate haves, sharpening the contrast between them and the have-nots.

The original spark that lit capital markets on fire was the \$6.25bn in debt and equity that Carnival Cruise Lines secured in April, remembers Carlos Hernandez of JPMorgan Chase, a bank. Investors reasoned that cruises will one day set sail again—by which time some of Carnival’s flimsier rivals will have sunk. Other dominant firms have benefited from this logic. Boeing, part of a planemaking duopoly, sold \$25bn in bonds this spring, even as its bestselling 737 MAX jetliner remained on the ground and the near-term future of travel up in the air. Many Chinese companies have taken to issuing perpetual bonds, which are never redeemed but pay interest for ever, to repair their balance-sheets.

By the summer, notes Ms Scher, “rescue capital-raising” had given way to something less defensive. Investors’ ultraloose purse-strings allowed opportunistic firms to lock in historically low coupons. S&P Global, a rating agency, calculates that the average investment-grade bond issued this year paid interest of 2.6% amid the covid recession, down from 2.8% in 2019. Thanks to a boom in online shopping and cloud computing, Amazon, which is a leader in both areas, can now borrow at 1.5% for ten years, more cheaply than any American firm since at least 1980—and than some governments. Indebted giants like AT&T, a telecoms-and-entertainment group, are lengthening debt maturities. In November Saudi Aramco, an oil colossus, sold \$2.3bn-worth of 50-year bonds, in spite of looming climate policies that may cripple its business of selling crude long before 2070.

Even cheap debt, of course, must be rolled over and, perpetuities aside, eventually paid back. With stockmarket valuations propped up by loose monetary policy, and only a slim prospect of tightening, many firms opted to shore up their balance-sheets with new share issues. Danaher, a high-rolling industrial conglomerate, raised over \$1.5bn by selling new stock just after its share price returned to its pre-pandemic highs in May; it has risen by 39% since. On December 8th Tesla, an electric-car maker whose market value has grown seven-fold this year, to \$573bn, said it plans to issue \$5bn-worth of shares.

With shareholder payouts trimmed or suspended until the covid fog lifts, the cash held by the world's 3,000 most valuable listed non-financial firms has exploded to \$7.6trn, from \$5.7trn last year (see chart 4). Even if you exclude America's abnormally cash-rich technology giants—Apple, Microsoft, Amazon, Alphabet and Facebook—corporate balance-sheets are brimming with liquidity.

It is still too early to tell what firms will do with all that cash. The merger market is showing signs of life, though mostly as deals put on ice during the pandemic are being revived. Many companies will content themselves with maintaining liquidity, at least until a covid-19 vaccine becomes more widely available.

Startups, for their part, will use IPO proceeds to blitzscale their way to profitability. The pandemic has made business models that might not have matured for years, such as digital health, suddenly viable. Many will fail. But for now giddy investors are pouring money into any firm whose IPO prospectus features the words “digital”, “cloud” or “health”. Headier still, “special purpose acquisition companies”, which go public with nothing but a promise to merge with a sexy startup later on, and which have raised \$70bn in 2020, mostly on Wall Street, are shattering previous records.

Markets seem no more discerning in mainland China, where proceeds from listings hit \$63bn, the most since 2010. Hong Kong added another \$46bn. Shanghai's STAR Market, a year-old technology board, welcomed its 200th member earlier this month, bringing its IPO haul to \$44bn. In September demand for shares to be traded on the Hong Kong Stock Exchange by Nongfu Spring, a water-bottler, outstripped supply by 1,148 times. Even the authorities' last-minute suspension of Ant Group's record-breaking \$40bn IPO in Hong Kong and Shanghai, after the fintech titan's co-founder annoyed regulators, may not frighten other listers. And so long as geopolitical tensions between America and China persist, more Chinese firms with an American stock ticker may avail themselves of a Hong Kong one, observes Julien Begasse de Dhaem of Morgan Stanley, a bank.

For now, capital is likely to keep flowing. Mr Hernandez says his bank's pipeline of IPOs looks "the most robust in years". The ten-year Treasury yield is below 1% and the spreads between American government and corporate bonds have narrowed to pre-pandemic levels. As a result, even riskier firms' paper yields less than 5%, according to JPMorgan Chase. Investors expecting meaningful returns are therefore eyeing stocks. For the pandemic's corporate winners, the choice between cheap debt and cheap equity is a win-win. ■



公司资产负债表

疯狂融资的一年

企业发债发股数量在2020年创下历史新高。接下来呢？

今年3月，整个企业界发觉自己正凝视着深渊，苏西·舍尔（Susie Scher）回忆说。这位高盛全球资本市场的负责人目睹了在商贸的车轮于疫情中渐渐停转之际，企业都在着急忙慌地筹措资金以求活下去。许多投资者惊慌失措。大家都以为公开市场肯定会在疫情不确定性的寒雾中冻结，然后长久冰封下去。

事实却是，各国政府竭力要避免经济核冬天的出现，为此推出了数万亿美元的货币和财政刺激措施，结果市场在不过几周的时间里便开始解冻，随后开始加热，过去几个月里更是变得沸腾滚烫。

数据供应商路孚特的数字显示，今年全球非金融企业从公众投资者手上募集的资本达到了令人瞩目的3.6万亿美元（见图表1）。投资级债券和风险较高的垃圾债券的发行量都创下了纪录，分别为2.4万亿和4260亿美元。已上市公司发行的新股也达到了5380亿美元，比去年跃升70%，扭转了近年企业倾向回购股票而非发行新股的趋势。

IPO数量也接近历史高位，原因是创业公司担心股市泡沫破灭，也怕风险资本对亏损的商业模式失去耐性，赶着把高估值兑现。美国的明星创业公司所获得的风投仍然为上市融资额的三倍之多，但现在上市融资的增速已超过私人融资（见图表2）。而且这股热潮是全球性的（见图表3）。12月2日，中国线上药房京东健康在香港招股共融资35亿美元。一周后，美国外卖宠儿DoorDash和民宿平台爱彼迎在纽约上市，两者的融资规模都与京东健康大致相当。

在利率接近零的世界里，投资者似乎愿意投资任何有机会熬过疫情的公司。不管有没有这场新冠危机，有些钱反正都会化为乌有。而那些没白白烧掉的钱将巩固强大的企业，让它们与弱小企业的对比更加鲜明。

摩根大通的卡洛斯·埃尔南德斯（Carlos Hernandez）回忆说，最初点燃资本市场火花的是嘉年华邮轮公司（Carnival Cruise Lines）在4月通过发行新债券和股票融资62.5亿美元。投资者的想法是，邮轮总有一天会再次起航，而到那时，嘉年华的一些弱小对手应该已被疫情击沉。其他行业霸主也受益于这一逻辑。飞机制造业双寡头之一的波音公司今年春天还是售出了250亿美元的债券，尽管它畅销的737 MAX喷气客机仍然停飞，航空旅行的短期前景也悬而未决。许多中国公司已开始通过发行永续债券（即永不赎回，一直支付利息）来修复资产负债表。

舍尔指出，到夏天，“救援融资”已经让位给了不那么被动防御的做法。投资者的慷慨解囊让伺机而动的公司锁定了处于历史低位的息票利率。据评级机构标普全球计算，在疫情引发的经济衰退中，今年发行的投资级债券的平均利率为2.6%，低于2019年的2.8%。得益于网上购物和云计算的蓬勃发展，在这两方面都领先的亚马逊如今能以1.5%的利率发行十年期债券，借款成本至少比1980年以来的任何一家美国公司都要低——还低于一些政府。电信及娱乐集团AT&T这类负债累累的巨头正进行债务展期。11月，石油巨头沙特阿美发行了23亿美元的50年期债券，尽管日益迫近的气候政策可能远不必等到2070年就把它的原油销售业务击垮了。

当然，先不谈永续债券，就是成本低廉的债务也必须展期而最终偿还。宽松的货币政策推高了股市估值，而且这些政策未来收紧的机会不大，许多公司因而选择通过发行新股来支撑自己的资产负债表。向来挥霍的工业集团丹纳赫（Danaher）在5月股价刚回升至疫情前高点后就通过发行新股融资超过15亿美元，在那之后股价已上涨39%。电动汽车制造商特斯拉今年市值增长了七倍，达到5730亿美元，它在12月8日表示计划发行50亿美元的股票。

在疫情的迷雾散去之前，股东派息纷纷被削减或暂停，全球市值最高的3000家上市非金融企业持有的现金从去年的5.7万亿美元激增至7.6万亿美元（见图表4）。即使不算上苹果、微软、亚马逊、Alphabet、Facebook这些现金异常充裕的美国科技巨头，其他公司的资产负债表也有充沛的流动性。

现在要判断企业会怎样利用这些现金还为时过早。并购市场呈现出复苏的势头，尽管这主要是因为疫情中冻结的并购计划重新启动了。许多公司将满足于维持一定的流动性，至少在新冠疫苗广泛可得之前是这样。

至于创业公司，它们会利用IPO所得闪电扩张以实现盈利。这场疫情使得数字医疗这类原本可能等很多年都不会成熟的商业模式瞬间变得切实可行。许多公司最终会失败，但在目前，忘乎所以的投资者只要看见公司的招股书中带有“数字”、“云”或“健康”等字眼就要往里砸钱。更疯狂的是，只靠承诺日后将与某家大热创业公司合并而上市的“特殊目的收购公司”正在打破之前的记录，在2020年它们融资700亿美元，大部分是在华尔街。

中国大陆的市场也似乎同样来者不拒，上市融资额达到630亿美元，为2010年以来最高。香港市场也融资了460亿美元。上海证交所创立一年的科创板本月稍早时迎来了第200名成员，使其IPO总额达到440亿美元。瓶装水公司农夫山泉9月在香港证交所上市，获得了1148倍的超额认购。在蚂蚁集团的联合创始人惹恼监管机构之后，当局在最后一刻叫停了这家金融科技巨头在香港和上海创纪录的400亿美元IPO，但即便如此也未必会吓跑其他计划上市的公司。摩根士丹利的朱力安（Julien Begasse de Dhaem）认为，只要中美之间的地缘政治紧张持续，就可能有更多已在美国上市的中国公司选择在香港二次上市。

目前而言，资本很可能会继续涌动。埃尔南德斯表示，摩根大通手头的IPO项目储备看起来是“这么多年来最强健的”。十年期国债收益率低于1%，美国政府债券和企业债券之间的利差已经收窄到疫情前的水平。因此，据摩根大通的统计，即使是风险较高的公司债券的收益率也不到5%。期望获得可观回报的投资者于是都把目光投向了股票。对跑赢疫情的企业来说，廉价债务和廉价股票就是双赢。■



Chinese hoteliers

Hospitable climate

Two hotel groups thrive amid their industry's pandemic malaise

COVID-19 HAS, received wisdom has it, been terrible for hotels. The share prices of the eight biggest listed Western groups by room count have slipped by 14%, on average, this year. The glum consensus is, though, being challenged by two big Chinese chains. Both are enjoying resurgent demand for domestic travel as China has tamed its epidemic. And strength at home is fuelling ambitions abroad.

Jin Jiang, the world's second-biggest hotel firm by capacity, boasted an occupancy rate of 74% in the third quarter, in line with last year and more than double that of its bigger rival, Marriott International. Its market value has soared by three-quarters this year, to \$6.4bn, above better-known Asian brands such as Shangri-La and Mandarin Oriental. Huazhu, which like Jin Jiang is based in Shanghai, saw revenue per available room recover by 40% from the second quarter, to 179 yuan (\$27). The group is now worth \$16bn, behind only Marriott and Hilton Worldwide among the world's listed hoteliers.

Similarly to their big Western rivals, Jin Jiang and Huazhu each owns a portfolio of brands that cater to different customers. Jin Jiang, which is controlled by Shanghai's local government, operates everything from budget digs (think Marriott's Fairfield Inn) to the upper end of the mass market (like Sheraton). Huazhu is a more all-encompassing group, which also competes in the luxury segment. Both companies prefer to offload the costs of hotel construction to franchisees in exchange for lower franchise fees, which enables them to expand much more rapidly.

The pair indeed look poised to capture a greater market share at home,

reckons Yulin Zhong of 86Research. In America chain hotels accounted for 72% of all hotel rooms at the end of 2019. In China the equivalent figure was just 27%.

As incomes rise and Chinese travellers become more discerning, the standardised, dependable amenities and good service that big chains guarantee begin to look more appealing. Domestic providers of such things enjoy a substantial first-mover advantage. The number of hotel rooms in China held by Wyndham, the biggest foreign operator, is merely a third that of Huazhu and a fifth that of Jin Jiang. And their advantage is growing—the two firms have more than 7,300 hotels under development between them, mostly in China, equivalent to 47% of their existing stock.

In a bid to break into the global market, two years ago Jin Jiang purchased a majority stake in Radisson, the world's 11th-biggest hotel operator by capacity, for \$332m. In January Huazhu paid \$868m for Deutsche Hospitality, a posh German group. Such tie-ups allow the new owners to study the nuances of serving a sophisticated foreign clientele without spending millions on marketing their unfamiliar brands in the West (or raising the sort of hackles that Chinese acquisitions often do in more sensitive industries such as technology or finance). As American and European hoteliers continue to reel amid the pandemic's second wave, more last-minute deals may be on offer for the Shanghai duo. ■



中国的酒店业者 氛围宜人

行业因疫情普遍萎靡之时，两家酒店集团却蓬勃发展

新冠疫情对酒店来说很糟糕，这是普遍看法。西方客房数量排名前八的上市酒店集团的股价今年平均下滑了14%。不过，这一悲观的共识正受到中国两家大型连锁酒店的挑战。中国的疫情已经得到遏制，这两家连锁酒店正从人们对国内游的需求回升中获益。而国内业务强劲也助推了向外扩张的雄心。

按客房数量计算，锦江是全球第二大酒店集团，今年第三季度的入住率为74%，与去年持平，是比它更大的竞争对手万豪国际集团的两倍多。今年它的市值飙升了四分之三，达到64亿美元，高于香格里拉和文华东方等更知名的亚洲品牌。华住酒店集团和锦江一样总部位于上海，它的可出租客房平均收入较第二季度回升了40%，达到179元。该集团目前的市值为160亿美元，在全球上市酒店集团中仅次于万豪和希尔顿。

与西方大型竞争对手类似，锦江和华住都有一系列品牌来适应不同客户的需求。锦江由上海市政府控股，经营范围涵盖从经济型酒店（类似万豪的万枫酒店）到大众市场的高端酒店（类似喜来登）。华住更加包罗万象，还参与豪华酒店市场的竞争。两家公司都倾向让加盟店承担酒店的建设成本而回馈以更低的特许经营费用，这使得它们的扩张速度大幅提升。

八六证券研究（86Research）的钟玉林（音译）认为，这两家公司看起来的确将会占据更大的国内市场份额。在美国，截至2019年底，连锁酒店占所有酒店客房数量的72%。在中国这一数字仅为27%。

随着民众收入增加，以及中国游客变得更不好糊弄，在大型连锁酒店有保证的标准化的、可靠的设施和良好服务开始越发显现吸引力。而国内的供应商享有巨大的先发优势。中国最大的外资酒店运营商温德姆

（Wyndham）在这里拥有的客房数量仅为华住的三分之一、锦江的五分

之一。它们的优势还在增强——这两大集团共有7300多家在建酒店，相当于它们现有存量的47%，其中大部分在中国。

为了打入全球市场，锦江两年前斥资3.32亿美元收购了丽笙酒店（Radisson）的多数股权。按客房数量计算，丽笙是全球第11大运营商。今年1月，华住以8.68亿美元收购了德国豪华酒店集团德意志酒店（Deutsche Hospitality）。通过这样的联手合作，新东家可以学习为成熟的外国客户服务的微妙之处，还不用花数百万美元在西方营销自己不出名的品牌（也不会像中国企业在科技或金融等更敏感的行业里发动收购那样引发怒火）。美国和欧洲的酒店经营者仍在第二波疫情中挣扎，上海这两大集团也许能捡到更多最后一分钟特价房。 ■



Ping An

Metamorphosis

The world's most valuable insurer has transformed itself into a fintech super-app. Could others follow its lead?

A JOB INTERVIEW at Ping An is a strange experience. To become an agent at the insurance group, the world's largest by market capitalisation, candidates must take questions from an intelligent machine. As they respond, their voice, choice of words and gestures are scrutinised for the qualities of the most productive salespeople. After accruing data from millions of such interviews, the firm believes its artificial-intelligence (AI) system can quickly pluck talent and weed out the duds. Judged by the company's agent-productivity scores, it is working.

Just as the recruitment tool offers a glimpse into the future of hiring, Ping An itself may offer a window on to the future of finance. The tool is just one of thousands of applications built by the group's army of engineers. They support a sprawling array of services, from insurance and banking to health care and education, which this year alone have been used by close to 600m people. No other traditional financial-services group in the world comes close to rivalling Ping An's ability to develop technologies and deploy them at such a scale.

The firm, set up by Peter Ma, began life as a small unit at a state-owned enterprise in Shenzhen, selling bosses insurance against worker-compensation claims. It was eventually spun out in 1988. By the mid-2000s it had become one of China's largest life and property insurers, and attracted investment from HSBC, a bank. Today it is worth 1.5trn yuan (\$236bn; see chart 1), and has redefined itself as a technology conglomerate built around an insurance business. It is now the largest investor in HSBC.

Three things distinguish Ping An's operating model from that of a standard insurer: its vast platform of services; its approach towards its hundreds of millions of users and customers; and, underpinning it all, its technological prowess. Take its array of subsidiaries first. The firm sells life and health insurance, which in the first three quarters of the year accounted for 67% of net profit. It provides health care through Good Doctor, its digital-medicine group. Customers can park their cash with Ping An's bank or invest it through Lufax, its wealth-advisory arm (which listed in New York on October 30th). They can buy a car or sign up for education services, and then finance the payments through Ping An's consumer-credit unit.

The sheer breadth of services on offer allows Ping An to treat customers more as a social-media firm would, rather than an insurer—the second distinctive feature of its business model. Unusually for a financial institution, Ping An considers the majority of people buying its products to be users instead of customers. They may buy a health service from Good Doctor or a car from Autohome, its car-purchasing app, contributing to the company's data pool, yet remaining outside its core customer base. "You don't have to jump through hoops. All you need to do is download our app," says Jessica Tan, one of the group's three co-chief executives. Only when they hold a financial product at one of the core units of the company, such as an insurance policy, do users become customers.

By allowing hundreds of millions of people to dip their toes in its product offering, Ping An has created a pool of users that can be targeted for sales of more sophisticated products. More than 578m people used its platform in the first nine months of the year (see chart 2). Some 214m were customers who had contractual agreements with the company. The rest were considered users. In the first half of the year, about 35% of its 18m new customers were sourced from its users. As the company has won over more users, that percentage has risen steadily in recent years.

Ping An is also becoming better at the lucrative business of “cross-selling”, or selling customers more products from other parts of the group, which increases income without incurring the cost of acquiring new clients. The share of retail customers that have contracts with more than one subsidiary rose from around 19% in 2015 to about 37% in June. That puts Ping An about 20 percentage points above the average cross-selling rate for insurers in Asia, according to Bain, a consulting firm.

None of this would be possible without Ping An’s technological prowess—the third and by far most important ingredient of its success. AI allows cross-selling pitches to customers to be made when they are most useful, for instance. “The final sale is done by an agent but the system develops the recommendation,” says Henrik Naujoks of Bain. “And it’s done at the right time.”

Large banks and insurers often sponsor “fintech incubators” that develop new technologies, or buy in applications that can be patched on to their core operations. HSBC, for instance, hired Identitii, an Australian fintech, this year to build a digital-payments tool. But for regulatory reasons such experiments tend to be ring-fenced from the financial institution.

Ping An, by contrast, has fully internalised these operations, apparently unafraid of regulatory blowback. The group has a 110,000-strong technology development team—larger than the commercial-banking divisions of all but the biggest banks—including 3,000 scientists. It submitted 4,625 technology patents in the first half of the year alone. The tools developed within the group’s technology unit are often used across the company. These include credit-risk models that use vast stores of data to make quick lending decisions at Ping An’s consumer-finance division, Puhui. Similar data crunching can track a customer’s driving habits through movements detected on a mobile-phone sensor and price car insurance accordingly. More accurate pricing on both fronts saves the

company money.

When large financial firms do develop systems in-house, they jealously guard them from competitors. Mr Ma has turned that notion on its head by transforming Ping An's technology division into a sales unit and profit centre. When the company developed its own cloud-computing tech for hosting its banking and insurance systems, it eventually turned the technology into products that now serve 630 banks and 100 insurers across China—a “software-as-a-service” model for banking that is often compared to what Amazon Web Services has done for website hosting.

Ping An's lending algorithms facilitated 47.4bn yuan in loans at rival banks in the first half of the year. That unit, renamed OneConnect, went public last year. Another, called Smart City, builds and operates internal systems for hospitals. Local governments in 118 cities buy Ping An's administrative technology.

Its technology business, which includes the sale of cloud-computing services, generated just 4.5% of group net profits in the first nine months of 2020. But making the transition from financial institution to fintech means turning tech into a profit centre, says Leonard Li at Oliver Wyman, a consultancy. That tech turns a profit at all, rather than adding to its cost base, makes Ping An unusual.

Could elements of the model be adopted elsewhere? Many of the individual technologies developed by Ping An will soon be applied by western insurers; some are already talking about how to become “the Ping An of Europe”. But wholesale fintech adoption will be harder in countries with stricter regulation on big data (and will probably become more difficult in China, too). Customers in America and Europe may also be more reluctant than those in China to buy insurance, health-care and wealth-management from one company.

Meanwhile, Ping An's approach is being put to the test. When covid-19 first struck in January the company was a year into restructuring its life-insurance business. That involves improving its force of over 1m agents, who are still the main channel for insurance sales in China. The country's insurers are not only battling among themselves for talent, they are also fighting off new entrants. "We are competing with the tech companies too," says Jason Yao, another co-CEO. Companies with their own financial technologies, such as Ant Group, have launched rival insurance offerings.

The AI-powered recruitment and training tool has been one of Ping An's top solutions. It appeared to be working in 2019, when the value of new business per agent in the company's life-insurance division rose by a healthy 16.4% compared with the previous year. The gauge fell by almost as much in the first half of 2020. Analysts say that rivals in China have fared even worse. But the risk, says one consultant, is that the effectiveness of some of Ping An's tech solutions may have been overestimated because of rapid growth in the insurance industry in China at the time. A prolonged downturn could show that some of its tech is less effective than first thought.

Another threat comes from leadership changes. In part, these reflect Ping An's position on the tech frontier, which has led rivals to sniff around its executives. Ericson Chan, chief executive of Ping An Technology, was poached in September by Zurich, another insurer. Lee Yuan Siong, Ping An Insurance's chief executive, took over as the boss of AIA, a Hong Kong-based insurer, this year. The loss of the pair has been a blow to the group. More could follow.

Questions also hang around the future of Mr Ma, who is 65 this year. He stepped down as group chief executive in July, prompting industry watchers to expect him to retire soon. But he continues to call the shots as chairman, and there is no talk of succession planning yet. Were Mr Ma to

depart, some worry that Ping An's rapid rise would come to a swift end. "There's only one person driving innovation," says a consultant. For all its use of machines, Ping An is still subject to key-man risk. ■



平安

变形记

全球市值最高的保险公司已经转型为金融科技超级应用。其他公司可能效仿它吗？

平安的求职面试不同寻常。要想成为这家全球市值最高的保险集团的代理人，应聘者必须回答智能机器的提问。他们作答时的声音、措辞和身体语言都会被仔细研判，以确定他们是否具备最高产销售人员的品质。在积累了几百万份这样的面试数据后，平安相信自己的人工智能（AI）系统可以快速择优汰劣。从平安代理人的产能评分来看，这个系统行之有效。

正如这个招聘工具让人一窥未来的招聘模式那样，平安本身可能也提供了一个眺望金融业未来的窗口。这个工具只是平安集团的工程师大军开发的数千个应用中的一个。这些应用支撑起平安多元扩张的服务，从保险、银行，到医疗和教育等，仅今年一年就有近六亿人使用这些服务。在如此大规模开发和部署技术的能力上，世界上找不出哪家传统的金融服务集团可与平安勉强一比。

由马明哲创办的平安起初是深圳一家国有企业下属的一个小部门，向企业老板销售劳工保险。它最终于1988年脱离出来，成为一家独立公司。到2005年前后，它已成为中国最大的人寿和财产保险公司之一，并吸引了汇丰银行的投资。如今，它的市值为1.5万亿元（见图表1），并已把自己重新定义为一家围绕保险业务而建的科技企业集团。它现在成了汇丰的第一大股东。

相比一般的保险公司，平安的运营模式有三大不同：庞大的服务平台、它对待数亿用户和客户的方式，以及支撑这一切的技术实力。先来看看它的子公司阵列。平安的人寿和健康保险业务贡献了公司今年前三季度净利润的67%。它通过旗下的数字医疗集团平安好医生提供医疗保健服务。客户可以把现金存入平安银行，也可以通过它的理财咨询机构陆金所（10月30日在纽约上市）进行投资。他们可以买车或报名参加教育服务，通过平安的消费信贷部门为这些开销付费。

如此广泛的服务范围让平安能够更多地以一家社交媒体公司而非保险商的身份对待客户——这是它商业模式的第二个独特之处。平安把购买它产品的大多数人视为用户，而不是客户，这在金融机构中比较罕见。他们可能会从平安好医生购买医疗服务，或者通过它的购车应用汽车之家买车，为平安的数据池添砖加瓦，却仍处于它的核心客户群之外。“你不用大费周章。只需要下载我们的应用就好。”集团三位联席CEO之一的陈心颖表示。只有当他们在平安的一项核心业务上拥有金融产品时，比如持有保单，用户才会成为客户。

通过让数亿人先尝试自己的某个产品，平安已经创建了一个可定向销售更复杂产品的用户池。今年前九个月，超过5.78亿人使用了它的平台（见图表2）。其中约2.14亿人与平安签约，成为它的客户。其余的人被视为用户。今年上半年，平安的1800万新客户中有约35%来自用户。随着平安不断吸引到更多用户，这一比例近年稳步攀升。

平安也越来越擅长利润丰厚的“交叉销售”，也就是向客户销售更多本集团其他部门的产品，这增加了收入，还省去了招揽新客户的成本。与超过一家子公司签约的零售客户占比从2015年的约19%上升到今年6月的约37%。咨询公司贝恩称，这让平安的交叉销售率比亚洲所有保险商的平均值高出约20个百分点。

如果没有平安的科技实力，这一切都不可能实现——这是它成功的第三个也是绝对最重要的因素。例如，AI能确定向客户做交叉推销的最佳时机。“虽然销售最终由代理人完成，但推荐是AI系统做出的，”贝恩的亨利克·瑙约克斯（Henrik Naujoks）表示，“而且时机把握得很准。”

大银行和保险公司经常资助“金融科技孵化器”开发新技术，或者购买可以连接到自己核心业务上的应用。比如，汇丰银行今年请来澳大利亚金融科技公司Identitii为自己开发数字支付工具。但由于监管方面的原因，这类尝试往往都与这家银行的既有业务分隔开来以隔离风险。

而平安已经完全将这些操作内部化，看起来似乎不担心会触发监管干预。

该集团拥有包括3000名科学家在内的多达11万人的技术开发团队，超过了除最大的几家以外一般银行的商业银行部门的规模。仅在今年上半年平安就提交了4625项技术专利。集团技术部门内部开发的工具经常在整个公司使用。其中就包括消费金融部门平安普惠使用的信贷风险模型，它利用海量数据快速做出贷款决策。类似的数据处理工具可以通过手机传感器监测到的活动来追踪客户的驾驶习惯，据此给车险定价。这两方面更精准的定价为公司节省了资金。

当大型金融公司真的用内部人员自行开发系统时，它们会对竞争对手严加防范。而马明哲颠覆了这一理念，他把平安的技术部门变成了销售部门和利润中心。平安开发出了自己的云计算技术来托管其银行业务和保险系统，最终把这项技术转变成产品，目前为全中国630家银行和100家保险公司提供服务——这种银行业务的“软件即服务”模式常和亚马逊网络服务（AWS）的网站托管相提并论。

平安的借贷算法在今年上半年帮助自己的竞争对手银行总共发放了474亿元贷款。开发算法的部门金融壹账通已于去年上市。另一个叫作智慧城市的部门为医院构建和运营内部系统。118个城市的地方政府购买了平安的管理技术。

包括云计算服务在内，平安的科技业务在今年前九个月只为集团创造了4.5%的净利润。但是，从金融机构转向金融科技公司意味着把技术变成利润中心，奥纬咨询（Oliver Wyman）的李懋华表示。让平安与众不同的是，它确实用科技盈利了，而不是增加自己的成本基数。

这种模式的要素能否在其他地方采用？平安开发的许多单项技术很快会被西方保险公司采用，它们中的一些已经在谈论如何成为“欧洲的平安”。但大规模采用金融科技在更严格监管大数据的国家会更难（在中国也可能变得更难）。相比中国的客户，欧美客户也可能更不愿意从同一家公司购买保险、医疗和理财等多种服务。

与此同时，平安的模式正在经受考验。今年1月新冠疫情爆发时，平安着

手重组人寿保险业务已有一年。此次重组要提升它逾100万名代理人的队伍，因为代理人仍是中国保险销售的主要渠道。中国的保险公司不仅相互争夺人才，也在与新进者较量。“我们也在和科技公司竞争。”平安另一位联席CEO姚波表示。蚂蚁集团等拥有自己的金融技术的公司已经推出了竞争性的保险产品。

AI驱动的招聘和培训工具一直是平安最重要的解决方案之一。它在2019年似乎卓有成效，当时平安寿险部门每个代理人的新业务价值增长良好，较前一年提高了16.4%。但在2020年上半年，这一指标出现了几乎同等幅度的下滑。分析人士表示，它的中国竞争对手的情况还要更糟。但一名顾问表示，风险在于平安的一些技术解决方案的有效性可能在中国的保险业快速发展之时被高估。一个长期衰退期可能会显示它的一些技术不如当初以为的那么有效。

另一个威胁来自领导层变动。这在一定程度上是平安技术前沿地位的反映——这种成就让竞争对手觊觎它的高管人员。9月，平安科技的CEO陈立明被另一家保险公司苏黎世（Zurich）挖走。平安保险的CEO李源祥今年接任总部位于香港的友邦保险（AIA）的掌舵人。失去这两员大将对平安是个打击。未来可能还会有更多人离开。

马明哲今年65岁，他的动向也悬而未决。他在7月辞去了集团CEO一职，业内观察人士因此预计他很快会退休。但目前他继续以董事长的身份发号施令，也还没有听闻有什么接班人计划在议。一些人担心，如果马明哲真的离开，平安的快速崛起会戛然而止。“只有一个人在推动创新。”一名顾问说。尽管如此大规模部署机器，平安仍受制于“关键人物风险”。■



Creatures of the deep

Thar she blew

An encounter with a dying whale on a beach in Perth set off Rebecca Giggs's inquiry

TWO YEARS ago your reviewer stood in an office overlooking the Pacific Ocean at the Monterey Bay Aquarium Research Institute in Moss Landing, California. Outside, giant pelicans sliced through the sea air. Inside, the walls and windows were shaken by a below-bass note that boomed out of huge speakers. This, said John Ryan, an oceanographer, was the moan of a humpback whale, the darling of whale-watchers, known for its impressive fin- and tail-slapping displays and haunting “song”. Most recordings of humpbacks seem almost violin-like, but this was much, much deeper—barely a sound, more a vibration that was felt rather than heard.

In the opening scene of “Fathoms”, Rebecca Giggs describes a very different kind of encounter with a humpback: on a beach in Perth, Australia, where a young giant had found itself stranded. For three days, she witnessed its enormous mass crushing its vital organs; the blubber that evolved over millions of years to keep the species alive in the frigid abyss now had the opposite effect. The humpback, she says, “was boiling alive in the kettle of itself”.

Stirred by this encounter, Ms Giggs embarks on a poetic exploration of the largest creatures alive today. “Fathoms” is a series of essays that span aeons and vast amounts of space, from the bottom of the ocean to the far reaches of the solar system. The *Voyager* probe carries a recording of humpback song; ionic bursts at the surface of the Sun ricochet through space, provoke the shimmering displays of the Northern Lights and eventually disrupt the geomagnetic-field maps that whales use to orient themselves. Throughout, Ms Giggs weaves the human and whale stories around a central question: did the conservationists of the late 20th century save the whales from

extinction-by-slaughter, only to deliver them to a more insidious demise? From plastics to toxins, warming oceans, melting sea ice, acidifying waters and modified soundscapes, humanity is warping everything that whales need to live and thrive.

Many of these changes are reflected in the whales themselves. Their flesh, guts, blood and even their song are all, in this telling, a record of human activity. One whale is found to have ingested an entire greenhouse. Postmortems performed on others reveal gas-bubble lesions, ruptured ear canals and abnormal nitrogen levels, all of which are eventually linked to anti-submarine warfare training. And after the 9/11 terrorist attacks, researchers who were monitoring stress hormones in North Atlantic right whales (by analysing their faeces) noticed that their subjects had relaxed, presumably because most ships temporarily returned to port and, for that time, the oceans were quiet.

Death runs through the pages. Today it would be impossible to write a book about whales that did not combine a sense of awe with inevitable tragedy. But "Fathoms" is brilliantly full of wonder. A passage lingers on whale lice, describing how, even now, their genes hold traces of an epic migration made by at least one right whale in the past 1m-2m years. Another marvels at how the decimation of whales in the oceans has transformed ecologies on land: the past movements of whaling communities can be traced in aerial surveys of Arctic vegetation, in places made richer and greener by buried giants. A third section asks whether conserving whale populations might help stabilise the climate. Whales draw carbon dioxide out of the atmosphere and down into the abyss, by fertilising tiny plankton with their faeces, as well as when they die and sink to the sea floor.

The tragedy is detached rather than gory. In places it is beautiful. The afterlife of a whale is tracked from the surface, where its floating carcass is pecked, chewed and debrided by scavengers, down through the water

column, past fish that resemble “bottled fireworks”, to its resting place on the seabed. There, “the ballooning mass scatters skin and sodden flesh...upon which grows a carpet of white worms.” One “whale fall” feeds entire ecosystems. It jiggles with life—crabs, fish, worms, bacteria. “A whale body is, to this glitter splash of biology, a godsend,” writes Ms Giggs in one of her finest turns of phrase.

When she encounters a live whale, she feels herself shrink to the size of a pinhead yet retains the detachment that she applies, elsewhere, to her observation of dead ones. She does not sense the affinity that others aver. “Only the most witless individual would believe in a benevolent connection with real whales,” she insists. In the presence of leviathan, “the adrenalin in me was the kick of imminent danger.” ■



深海生物

最后的哀鸣

与珀斯海滩上一条垂死鲸鱼的邂逅开启了丽贝卡·吉格斯的探寻之旅【《沧海鲸吟》书评】

两年前，在加州莫斯兰丁（Moss Landing）的蒙特雷湾水族馆研究所（Monterey Bay Aquarium Research Institute），笔者站在一个俯瞰太平洋的办公室里。屋外，巨大的鹈鹕在大海上空划过。屋内，从巨大的扬声器传出超低音轰鸣，墙壁和窗户都在震动。海洋学家约翰·瑞恩（John Ryan）说，这是座头鲸发出的吟唱。座头鲸用鳍和尾巴拍击水面的壮观表演以及余音不绝的“歌声”闻名于世，深得观鲸者喜爱。座头鲸的录音听起来大多近似小提琴，但要深厚太多——简直不能说是听到的声音，而是感觉到的震颤。

在《沧海鲸吟》（Fathoms）的开篇，丽贝卡·吉格斯（Rebecca Giggs）描述了她与座头鲸一次非同寻常的相遇：在澳大利亚珀斯的一处海滩上，一头年轻的庞然大物搁浅了。三天里，她目睹了它沉重的身躯压坏了自己的重要器官；历经千百万年进化、让它们得以在冰冷深海中生存的鲸脂现在却产生了相反的效果。她说，这头座头鲸“就像热水壶，把自己活生生地煮沸了”。

吉格斯被这次邂逅触动，对这种现存最大的生物展开了一场充满诗意的探索。《沧海鲸吟》是一部散文系列，从海底到太阳系深处，跨越了亿万年和浩瀚空间。“旅行者号”（Voyager）探测器携带了录有座头鲸歌声的唱片；太阳表面的离子爆发在太空中弹射，激发了闪烁的北极光，最终干扰了鲸鱼用于自我定位的地磁场图。由始至终，吉格斯围绕着一个中心问题讲述人与鲸的故事：20世纪晚期的环保主义者将鲸鱼从被屠杀灭绝的命运中拯救下来，难道最终也只是让它们更悄无声息地灭亡吗？从塑料到毒素、海洋变暖、海冰融化、水体酸化和声景改变，人类正在扭曲着鲸鱼赖以生存和繁衍的一切。

许多这样的变化都在鲸鱼身上显现。它们的躯体、内脏、血液，甚至歌声，都留下了人类活动的印记。有一次，人们发现一头鲸鱼实际上吞下了一整个暖房。对其他死去的鲸鱼的解剖显示了气泡损伤、耳道破裂和氮水平异常，最终发现这些都与反潜军事演习有关。911恐怖袭击事件后，监测北大西洋露脊鲸的应激激素（通过分析粪便）的研究人员注意到这些研究对象放松了下来，大概是因为大多数船舶暂时返回了港口，在那段时间里海洋恢复了宁静。

死亡贯穿全书。如今要写一本关于鲸鱼的书难免兼具敬畏之情和无可避免的悲剧。但《沧海鲸吟》高明地满载神奇。其中有一个关于鲸虱的段落，描述了即使到现在它们的基因仍保留了过去一两百万年间至少一头露脊鲸史诗般迁徙的痕迹。另一段文字感叹海洋中的鲸鱼被大量捕杀如何改变了陆地上的生态：对北极植被的航空勘测可以追踪过去捕鲸族群的活动轨迹，他们所到之处埋葬的巨鲸让当地变得更加丰饶而葱郁。还有一段探讨了保护鲸鱼种群是否有助于稳定气候。鲸鱼的粪便给微小的浮游生物提供了养分，以及它们在死亡后沉入海底，都相当于从大气中吸取二氧化碳输送到深海。

对悲剧的描述并不血腥，而是超然。有时还颇具美感。鲸鱼死后的故事从海面开始，漂浮的鲸尸被食腐动物啄、啃和清理，然后穿过各层海水下降，途经类似“瓶装烟花”般的鱼群，最后落到海床上的长眠之地。在那里，“皮肤和腐肉从肿胀的躯体上散落下来……上面长满了白色的蠕虫。”一鲸落，万物生，一个个生态系统得到了滋养。这里生机盎然——蟹、鱼、蠕虫、细菌。“对于这个灿烂的小小生物圈来说，鲸鱼的躯体乃是天赐之物。”吉格斯在此以最优美的笔调写道。

当面对一条活鲸时，她感到自己缩得只有针尖大小，但她仍然保持着在别处观察死鲸时的那种超然。她并没有感受到其他人强烈声称的那种亲近感。她坚称：“只有最无知的人才相信和鲜活的鲸鱼之间存在一种善的连结。”在这个庞然大物面前，“我身体里的肾上腺素激烈地回应了凶险的迫近”。■



Asset management

Beyond Buffett

The agonies of traditional value investing are a sign of frothy stockmarkets—and a changing economy

FOR A MOMENT in November investors could afford to ignore stockmarket superstars like Amazon and Alibaba. As news of a vaccine broke, a motley crew of more jaded firms led Wall Street higher, with the shares of airlines, banks and oil firms soaring on hopes of a recovery. The bounce has been a long time coming. So-called value stocks, typically asset-heavy firms in stodgy industries, have had a decade from hell, lagging behind America's stockmarket by over 90 percentage points. This has led to a crisis of confidence among some fund managers, who wonder if their framework for assessing firms works in the digital age. They are right to worry: it needs upgrading to reflect an economy in which intangibles and externalities count for more.

For almost a century the dominant ideology in finance has been value investing. It has evolved over time but typically takes a conservative view of firms, placing more weight on their assets, cashflows and record, and less on their investment plans or trajectory. The creed has its roots in the 1930s and 1940s, when Benjamin Graham argued that investors needed to move on from the pre-1914 era, during which capital markets were dominated by railway bonds and insider-dealing. Instead he proposed a scientific approach of evaluating firms' balance-sheets and identifying mispriced securities. His disciple, Warren Buffett, popularised and updated these ideas as the economy shifted towards consumer firms and finance in the late 20th century. Today measures of value are plugged into computers which hunt for "factors" that boost returns and there are investors in Shanghai loosely inspired by a doctrine born in Depression-era New York.

The trouble is that value investing has led to poor results. If you had bought value shares worth \$1 a decade ago, they would fetch \$2.50 today, compared with \$3.45 for the stockmarket as a whole and \$4.65 for the market excluding value stocks. Mr Buffett's Berkshire Hathaway has lagged behind badly. Despite its efforts to modernise, value investing often produces backward-looking portfolios and as a result has largely missed the rise of tech. The asset-management industry's business model is under strain, as our special report this week explains. Now one of its most long-standing philosophies is under siege, too.

Value investors might argue that they are the victims of a stockmarket bubble and that they will thus be proved right eventually. The last time value strategies did badly was in 1998-2000, before the dotcom crash. Today stockmarkets do indeed look expensive. But alongside this are two deeper changes to the economy that the value framework is still struggling to grapple with.

The first is the rise of intangible assets, which now account for over a third of all American business investment—think of data, or research. Firms treat these costs as an expense, rather than an investment that creates an asset. Some sophisticated institutional investors try to adjust for this but it is still easy to miscalculate how much firms are reinvesting—and firms' ability to reinvest heavily at high rates of return is crucial for their long run performance. On a traditional definition, America's top ten listed firms have invested \$700bn since 2010. On a broad one, the figure is \$1.5trn or more. Intangible firms can also often scale up quickly and exploit network effects to sustain high profits.

The second change is the rising importance of externalities, costs that firms are responsible for but avoid paying. Today the value doctrine suggests you should load up on car firms and oil producers. But these firms' prospects depend on the potential liability from their carbon footprint, the

cost of which may rise as emissions rules tighten and carbon taxes spread.

Value investing's rigour and scepticism are as relevant as ever—especially given how frothy markets look. But many investors are still only just beginning to get their heads round how to assess firms' intangible assets and externalities. It is a laborious task, but getting it right could give asset management a new lease of life and help ensure that capital is allocated efficiently. In the 1930s and 1940s Graham described how the old investing framework had become obsolete. Time for another upgrade. ■



【首文】资产管理

超越巴菲特

传统的价值投资策略遭遇的痛苦是股市泡沫的一个信号，但也反映了经济形态的变化

上个月有一刻，投资者可以暂时放心地忽略亚马逊和阿里巴巴这样的股市超级明星。随着一种疫苗问世的消息曝出，一群形形色色的更乏味的公司领涨了华尔街：航空公司、银行和石油公司因有望复苏而股价飙升。这一反弹实在用了太长的时间。所谓的价值型股票——通常是最传统行业的重资产公司——已经经历了地狱般的十年，落后美国股市90多个百分点。这在一些基金经理中引发了信心危机，他们怀疑自己用以评估公司的框架在数字时代是否还管用。他们的担心不无道理：框架需要升级，才能反映一个无形资产和外部性更重要的经济。

将近一个世纪以来，金融业的主导思想是价值投资。它随着时间的推移而演变，但通常仍以保守的眼光看待公司，更重视它们的资产、现金流和过往表现，而不是投资计划或走势。这一信条源于上世纪三四十年代，当时本杰明·格雷厄姆（Benjamin Graham）认为，投资者要走出1914年前的时代，那时的资本市场由铁路债券和内幕交易主宰。他转而提出了一种科学的方法来评估企业的资产负债表，鉴别出定价错误的证券。在20世纪末经济向消费企业和金融转移时，他的信徒巴菲特普及并更新了这些观点。今天，衡量价值的指标被放进计算机中，追寻能提升回报的“因素”。诞生于大萧条时代的纽约的信条多少启发了今天上海的投资者。

问题是价值投资的结果很糟糕。如果你十年前买了价值1美元的价值股，那么今天卖出能收回2.5美元，而股市整体是3.45美元，不包括价值股是4.65美元。巴菲特的伯克希尔·哈撒韦公司（Berkshire Hathaway）已严重落后。尽管价值投资努力实现现代化，但其投资组合往往着眼于过去，因此基本上错过了科技股的崛起。正如我们本周的特别报道所解释的那样，资产管理行业的商业模式正面临压力。如今，它最悠久的理念之一也遭遇围攻。

价值投资者可能会争辩说，他们是股市泡沫的受害者，因此最终会证明他们是正确的。价值策略上一次表现糟糕是在1998年至2000年，也就是互联网泡沫破灭前夕。今天的股票市场看起来确实很贵，但与此同时经济也发生了两大更深层次的变化，而价值框架仍疲于应付。

首先是无形资产的崛起，目前占美国商业投资的三分之一以上，比如数据，或研究。企业将这些成本列为一种支出，而不是一种会创造资产的投资。一些老练的机构投资者试着适应这一点，但还是很容易误判企业的再投资规模，而企业以高回报率大规模再投资的能力对其长期业绩至关重要。按照传统定义，美国前十大上市公司自2010年以来已经投资了7000亿美元。而以宽泛的定义，这个数字是1.5万亿美元，甚至更多。无形资产丰富的企业通常也能迅速扩大规模，利用网络效应维持高利润。

第二个变化是外部性越来越重要，这是指企业应当承担但躲避支付的成本。今天，价值信条认为你应该买入汽车和石油公司的股票。但这些公司的前景取决于它们对自身碳足迹的潜在责任，而随着排放规则收紧和碳税扩展，碳足迹的成本可能会上升。

价值投资的严谨和怀疑态度一如既往地重要，尤其是在今天市场看起来泡沫满溢之际。但许多投资者才刚刚开始了解如何评估企业的无形资产和外部性。这是一项艰巨的任务，但做好这一点可以让资产管理业焕发新生，并帮助确保资本被有效配置。在上世纪三四十年代，格雷厄姆阐述了旧的投资框架如何已经过时。是时候再升级一次了。■



Exchange-traded fiends

Boiling point

US Congress v China Inc

FOR 18 YEARS American regulators have implored Beijing to let them inspect the China-based auditors of Chinese companies listed on America's stock exchanges. Dream on, China's Communist regime responded, citing sovereignty and national security. On December 2nd Congress had had enough. The House of Representatives passed a bill that would boot offending firms off American bourses if their auditors fail to comply with regulators' information requests for three years running. Since it had earlier sailed through the Senate by 100 votes to nil, it can expect a presidential signature.

This would put Chinese businesses worth a combined \$2trn at eventual risk of expulsion, including Alibaba, a New York-listed internet titan (see chart). It would make it harder for Americans to get exposure to China through American exchanges. Those hungry for juicy Chinese stocks might end up buying them abroad instead, through channels over which Washington exerts no control. ■



交易所交易恶魔

沸点

美国国会对战中国公司

十八年来，美国监管部门一直恳请北京允许它们审查在美国证券交易所上市的中国公司的中国审计机构。中国的共产党政权以主权和国家安全为由回应说，做梦去吧。12月2日，美国国会终于受够了。众议院通过了一项法案，规定如果公司的审计机构连续三年不遵守美国监管部门的信息要求，将被强制从美国退市。由于该法案之前以100票对零票在参议院顺利通过，它预期将获总统签署生效。

这将使总市值达两万亿美元的中国企业面临最终被驱逐的风险，其中包括在纽约上市的互联网巨头阿里巴巴（见图表）。美国人将更加难以通过美国交易所投资中国市场。那些渴望获得诱人的中国股票的人最终可能会通过不受华盛顿控制的渠道，从海外购买这些股票。■



Personal debt in China

Overdue action

Bad debts lead to even worse behaviour

DEBT-COLLECTION videos have become a popular subgenre on Chinese clip-sharing platforms. Many feature young men deftly fielding phone calls from aggressive collectors. Some portray the abuses—hair pulling, slapping—that have come to define a business that has long gone largely unregulated in China. The result has been a Wild West for collections. Debt collectors sometimes impersonate police officers; the details of debtors' friends and family are sold so that they can be harassed. A swift rise in personal debt, though, is forcing regulators to act.

Between 2015 and 2019 the stock of household debt in China rose by about \$4.6trn, close to the \$5.1trn accrued by Americans over a similar period before the global financial crisis of 2007-09, according to data from Rhodium Group, a consulting firm. The outstanding balance of delinquent consumer receivables could reach nearly 3.3trn yuan (\$500bn) next year, up from just 1trn yuan in 2015, reckons iResearch, another consultancy.

In June the southern city of Shenzhen drafted the country's first personal bankruptcy law. Courts routinely heard disputes between lenders and borrowers, but allowed only creditors to file suits. The new law, to be rolled out next year, will offer debtors more protection against creditors. A few other cities are conducting similar experiments, though "these reforms are still very limited," says Li Jiao of Buren, a law firm.

The central bank, meanwhile, issued draft rules late last year, threatening to punish banks for working with dodgy debt collectors, though it softened the language before the guidelines took effect on November 1st this year. Government pressure, say industry executives, has prompted

consolidation. Some companies, such as YX Asset Recovery, have banned in-person visits and operate only call centres—a practice considered less intrusive. YX, which had more than 10,000 agents last year, has sworn off practices including selling debtor information, impersonating government officials, and threatening violence.

Yet the early reforms do not quite hit the mark. They have helped control debt collection for banks, but it is online lenders and microloan companies that pose a bigger risk. Delinquency rates have climbed above 30% this year at many nonbank lenders, compared to 5% for banks. Most online lenders are not targeted by the new rules and tend to hire local collections agencies that pursue aggressive, often-illegal tactics for recovering debts.

Nor has the shift away from in-person visits eliminated debtor harassment. Physical threats seem to be being replaced by mediated forms of “emotional pressure”, applied during frequent phone calls, says Tom McDonald of the University of Hong Kong. Those seeking advice on how to deal with officious agents need look no further than the growing archive of debt-collection videos available online. ■



中国的个人债务

逾期行动

坏帐导致更坏的行为

在中国的短视频分享平台上，追债视频已经成了一个热门类别。许多短片的主题都是年轻男子如何灵巧地应对咄咄逼人的追债人的电话。有些视频展示出的暴行——揪头发、扇耳光等——勾画出一个长期以来在中国基本上不受监管的行业。结果是追债就像“狂野西部”一样无法无天。追债人有时会冒充警察；债务人亲朋好友的个人信息被卖，他们因而受到骚扰。不过，个人债务的迅速增长正迫使监管机构采取行动。

咨询公司荣鼎咨询（Rhodium Group）的数据显示，2015年至2019年间，中国的家庭债务存量增加了约4.6万亿美元，接近美国人在2007年至2009年全球金融危机之前差不多长短的时间里累积的5.1万亿美元。另一家咨询公司艾瑞咨询（iResearch）估计，消费者应收账款拖欠余额明年可能接近3.3万亿元人民币，而2015年为1万亿元。

今年6月，深圳起草了中国第一部个人破产法。法院过去经常性地审理放款人和借贷者之间的纠纷，但只允许债权人提起诉讼。这部将于明年实施的新法规将让债务人在面对债权人时得到更多的保护。荷兰浩达律师事务所（Buren Legal）的焦丽表示，其他一些城市也有类似的尝试，尽管“这些改革还是很有限”。

与此同时，人行在去年年底发布了新规草案，威胁惩罚与不良追债公司合作的银行，尽管它在这一新规于今年11月1日施行之前软化了措辞。业内高管表示，来自政府的压力促进了行业整合。永雄资产管理集团等一些公司已禁止员工上门催收，只运营被认为侵扰性较小的呼叫中心。去年有一万多名催收员的永雄已承诺不会再使用贩卖债务人信息、冒充政府官员或是暴力威胁等手段。

然而，这些早期改革并没有击中要害。它们有助于管控银行的追债操作，

但构成更大风险的是网络贷款机构和小额贷款公司。今年，许多非银行贷款机构的拖欠率升至30%以上，而银行为5%。大多数网络贷款机构并不是这批新法规的整治对象，它们往往会雇用当地的催收机构，这些机构会采取激烈的、通常是非法的追债手段。

禁止上门追讨也并没有消除对债务人的骚扰。香港大学的汤姆·麦克唐纳（Tom McDonald）说，人身威胁似乎正被频繁致电这种非面对面的“情绪施压”所取代。那些想知道该怎么对付盛气凌人的催收员的人，只要看看网上越来越多的追债视频就行了。 ■



Computational biology

The shapes of things to come

Artificial intelligence is solving one of biology's biggest challenges

TO UNDERSTAND LIFE, you must understand proteins. These molecular chains, each assembled from a menu of 20 types of chemical links called amino acids, do biology's heavy lifting. In the guise of enzymes they catalyse the chemistry that keeps bodies running. Actin and myosin, the proteins of muscles, permit those bodies to move around. Keratin provides their skin and hair. Haemoglobin carries their oxygen. Insulin regulates their metabolism. And a protein called spike allows coronaviruses to invade human cells, thereby shutting down entire economies.

Listing a protein's amino acids is easy. Machines to do so have existed for decades. But this is only half the battle in the quest to understand how proteins work. What a protein does, and how it does it, depends also on how it folds up after its creation, into its final, intricate shape.

At the moment, molecular biologists can probe proteins' shapes experimentally, using techniques like X-ray crystallography. But this is fiddly and time-consuming. Now, things may be about to get much easier. On November 30th researchers from DeepMind, an artificial-intelligence (AI) laboratory owned by Alphabet, Google's parent company, presented results suggesting that they have made enormous progress on one of biology's grandest challenges—how to use a computer to predict a protein's shape from just a list of its amino-acid components.

| *Chain gangs*

To non-biologists, this may sound somewhere between arcane and prosaic. In fact, it is a big achievement. Replacing months of experiments with a few hours of computing time could shed new light on the inner workings of

cells. It could speed up drug development. And it could in particular suggest treatments for diseases like Alzheimer's, in which misshapen proteins are thought to play a role.

But there is yet more to it than that. Until now, the machine-learning techniques which DeepMind's team used to attack the protein-folding problem have been best known for powering things like face-recognition cameras and voice assistants, and for defeating human beings at tricky games like Go. But Demis Hassabis, DeepMind's boss, who founded in 2010 what was then an independent firm, did so hoping that they could also be employed to accelerate the progress of science. This result demonstrates how that might work in practice.

The idea of using computers to predict proteins' shapes is half a century old. Progress has been real, but slow, says Ewan Birney, deputy director of the European Molecular Biology Laboratory, a multinational endeavour with headquarters in Germany. And it has been marked by a history of wrong turns and premature declarations of victory.

These days a humbler field, protein-shape prediction now measures its progress by how well algorithms perform in something called Critical Assessment of Protein Structure Prediction (CASP). This is a biennial experiment-cum-competition which started in 1994 and is jokingly dubbed the "Olympics of protein-folding". In it, algorithms are subjected to blind tests of their ability to predict the shapes of several proteins of known structure.

DeepMind's first entry to CASP, two years ago, was dubbed AlphaFold. It made waves by performing much better than any other then-existing program. The current version, AlphaFold 2, has stretched that lead still further (see chart). One measure of success within CASP is the global-distance test. This assigns algorithms a score between zero and 100 by

comparing the predicted locations of atoms in a molecule's structure with their location in reality. AlphaFold 2 had an average score of 92.4—an accuracy that CASP's founder, John Moult, who is a biologist at the University of Maryland, says is roughly comparable with what can be obtained by techniques like X-ray crystallography.

Until now, DeepMind was probably best known for its success in teaching computers to play games—particularly Go, a pastime of deceptively simple rules but fiendish strategy that had been a totem of AI researchers since the field began. In 2016 a DeepMind program called AlphaGo defeated Lee Sedol, one of the world's best players. Superficially, this may seem of little consequence. But Dr Hassabis says that more similarities exist between protein-folding and Go than might, at first, appear.

One is the impracticality of attacking either problem with computational brute force. There are thought to be around 10^{170} legal arrangements of stones on a Go board. That is much greater than the number of atoms in the observable universe, and it is therefore far beyond the reach of any computer unless computational shortcuts can be devised.

Proteins are even more complicated than Go. One estimate is that a reasonably complex protein could, in principle, take any of as many as 10^{300} different shapes. The shape which it does eventually settle into is a result of a balance of various atom-scale forces that act within its amino-acid building blocks, between those building blocks, and between the building blocks and other, surrounding, molecules, particularly those of water. These are all matters of considerable complexity which are difficult to measure. It is therefore clear that, as with playing Go, the only way to perform the trick of predicting protein-folding is to look for shortcuts.

The progress that computers have made on the problem over the years demonstrates that these shortcuts do exist. And it also turns out that even

inexpert humans can learn such tricks by playing around. Dr Hassabis recalls being struck by the ability of human amateurs to achieve good results with FoldIt, a science-oriented video game launched in 2008 that invites its players to try folding proteins themselves, and which has generated a clutch of papers and discoveries.

| *Alpha-helix dogs*

Getting players of FoldIt to explain exactly what they have been up to, though, is tricky. This is another parallel with Go. Rather than describing step by step what they are thinking, players of both games tend to talk in vaguer terms of “intuition” and “what feels right”. This is where the machine learning comes in. By feeding computers enough examples, they are able to learn and apply shortcuts and rules-of-thumb of the sort that human beings also exploit, but struggle to articulate. Sometimes, the machines come up with insights that surprise human experts. As Dr Moulton observes, “In general, the detail of the backbone [the molecular scaffolding that joins amino acids together] is extraordinary. [AlphaFold 2] has decided that if you don’t get the details right, you won’t get the big things right. This is a school of thought that’s been around for some time, but I thought it wasn’t correct.”

As an achievement in AI, AlphaFold 2 is not quite so far ahead of the field as was AlphaGo. Plenty of other research groups have applied machine learning to the protein-structure problem, and have seen encouraging progress. Exactly what DeepMind has done to seize the lead remains unclear, though the firm has promised a technical paper that will delve into the details. For now, John Jumper, the project’s leader, points out that machine learning is a box which contains a variety of tools, and says the team has abandoned the system it used to build the original AlphaFold in 2018, after it became clear that it had reached the limits of its ability.

The current version, says Dr Jumper, has more room to grow. He thinks

space exists to boost the software's accuracy still further. There are also, for now, things that remain beyond its reach, such as how structures built from several proteins are joined together.

Moreover, as Ken Dill, a biologist at Stony Brook University in New York state, who is the author of a recent overview of the field, points out, what AlphaFold 2, its rivals and, indeed, techniques like X-ray crystallography discover are static structures. Action in biology comes, by contrast, from how molecules interact with each other. "It is", he puts it, "a bit like someone asking how a car works, so you open the hood [bonnet] and take a picture and say, 'There, that's how it works!'" Useful, in other words, but not quite the entire story.

Nonetheless—and depending on how DeepMind decides to license the technology—an ability to generate protein structures routinely in this way could have a big impact on the field. Around 180m amino-acid sequences are known to science. But only some 170,000 of them have had their structures determined. Dr Moulton thinks that boosting this number could help screen drug candidates to see which are likely to bind well to a particular protein. It could be used to reanalyse existing drugs to see what else they might do. And it could boost synthetic biology, by speeding up the creation of human-designed proteins intended to catalyse chemical reactions.

Some promising successes have, indeed, already happened. For example, AlphaFold 2 was able to predict the structures of several of the proteins used by the new coronavirus, including spike. As for Dr Birney, he says, "We're definitely going to want to spend some time kicking the tyres. But when I first saw these results, I nearly fell off my chair." ■



计算生物学

未来的形态

人工智能正在攻克生物学最大的挑战之一

要了解生命，必须了解蛋白质。这些分子链每条都由总共20种称为氨基酸的化学链中的某些连接组成，担负着大量的生理功能。它们以酶的形式催化着使身体保持运转的化学反应。肌肉中的肌动蛋白和肌球蛋白让身体可以自由活动。角蛋白是皮肤和头发的主要成分。血红蛋白携带氧气。胰岛素调节身体的新陈代谢。而一种叫做刺突的蛋白质让冠状病毒得以入侵人体细胞，最终令整个国家停摆。

列出组成一种蛋白质的氨基酸很容易。具备这种功能的机器已经发明几十年了。但要了解蛋白质的作用机制，列出氨基酸只是完成了工作的一半。一种蛋白质的作用及其作用机制还取决于蛋白质在生成后如何折叠成最终的复杂形状。

目前，分子生物学家可以用X射线晶体学等技术通过实验来探究蛋白质的形状。但这既费力又耗时。现在，事情可能要容易多了。11月30日，谷歌母公司Alphabet旗下的AI实验室DeepMind的研究人员发布的研究显示，他们在生物学中最严峻的一项挑战上取得了巨大进展，那就是仅凭一种蛋白质的氨基酸成分，用计算机预测它的形状。

| 长链组合

对除生物学家以外的人来说，这听起来可能有些晦涩和单调。实际上这是一项重大成就。用几小时的计算替代几个月的实验可能会进一步揭示细胞的内部运作机制。它可以加速药物研发，尤其是可以为阿尔兹海默症这类与畸形蛋白质有关的疾病提出疗法。

不止于此。DeepMind团队用机器学习技术来攻克蛋白质折叠问题，而这种技术到目前为止最广为人知的应用包括面部识别摄像头和语音助手，以及在围棋等复杂比赛中击败人类。但DeepMind的老板戴米斯·哈萨比斯

（Demis Hassabis）在2010年创建公司时（当时还是一家独立公司）希望机器学习还可以用来加速科学的发展。现在这项成果显示了这可能如何付诸实践。

用计算机预测蛋白质形状的想法在半个世纪前就有了。总部位于德国的政府间组织欧洲分子生物学实验室（European Molecular Biology Laboratory）的副主管伊万·伯尼（Ewan Birney）说，之前有实质性的进展，但很慢。过程中还走了不少弯路，也曾过早地宣布胜利。

如今这个领域已变得更谦逊。其进展由“蛋白质结构预测关键评估”（CASP）中算法的表现来衡量。CASP是一项始于1994年的实验兼比赛，两年举办一次，被戏称为“蛋白质折叠的奥林匹克竞赛”。它通过盲测检验算法预测几种已知结构的蛋白质的能力。

DeepMind两年前首次参加CASP的程序名为“阿尔法否”（AlphaFold）。它的表现远胜于当时任何其他程序，引起轰动。现在这版阿尔法否2进一步扩大了领先优势（见图表）。CASP衡量成功的一个标准是全局距离测试。通过比较算法预测出分子结构中原子的位置及其实际位置，按百分制给算法打分。阿尔法否2的平均得分为92.4。CASP的创始人、马里兰大学的生物学家约翰·穆尔特（John Moult）说，它的准确性与X射线晶体学等技术大致相当。

以前，DeepMind最出名的可能是教计算机玩游戏，特别是下围棋。围棋看似规则简单，但策略极其复杂，自AI研究兴起以来一直是研究人员的一种图腾。2016年，DeepMind名为阿尔法狗（AlphaGo）的程序击败了世界顶级棋手之一李世石。从表面上看这似乎无关紧要。但哈萨比斯说，蛋白质折叠和围棋之间的相似之处可比乍看上去要多。

一个相似之处是这两个问题都不能靠蛮力运算解决。据估计，围棋的棋局大约有 10^{170} 种。这个数字远大于可观察宇宙中的原子数，远远超出了任何计算机的运算能力，除非设计出计算捷径。

蛋白质比围棋还要复杂。一种估计是，一个不算太复杂的蛋白质原则上可

以有多达 10^{300} 种不同形状。它最终的形状是在其氨基酸结构单元的内部、之间，以及氨基酸与周围其他分子（尤其是水分子）之间各种原子级作用力平衡的结果。这些过程都相当复杂而难以测量。因此很显然，和下围棋一样，预测蛋白质折叠的唯一方法就是寻找捷径。

多年来计算机在此课题上取得的进步表明捷径确实存在。而且事实证明，即使非专业人士也可以通过游戏来学习折叠蛋白质。哈萨比斯回忆说，业余爱好者玩科学电子游戏“叠它”（FoldIt）取得的佳绩曾让他倍感震惊，这款2008年推出的游戏邀请玩家尝试自己折叠蛋白质，催生了许多论文和发现。

| 阿尔法螺旋狗

但是，让“叠它”的玩家确切解释他们在做什么很难。这是与围棋的另一个相似之处。两种游戏的玩家都不会一步一步地描述他们的想法，而是用“直觉”和“觉得这样是对的”等模糊的说法表述。这就有了机器学习的用武之地。给计算机提供足够的示例，它们就可以学习和应用人类也会利用却说不清道不明的捷径和经验法则。有时，机器会得出让人类专家感到惊讶的见解。正如穆尔特所观察到的，“总的来说，主链（将氨基酸连接在一起的分子基架）的细节非常特别。（阿尔法否2）的结论是如果这些细节没弄对，那么大方向也会错。这种看法已经存在了一段时间，但以前我认为这是不对的。”

作为AI的一项成就，阿尔法否2的领先优势远没有阿尔法狗那么大。其他许多研究小组也已经将机器学习应用于蛋白质结构问题，并且看到了令人鼓舞的进展。DeepMind具体做了些什么而取得领先地位仍不得而知，不过它承诺会发表一篇技术论文来深入探讨细节。目前，该项目的负责人约翰·姜普（John Jumper）指出机器学习是一个装有各种工具的盒子，他还说，在2018年用于打造最初版阿尔法否的系统显示能力达到极限后，他们就放弃了它。

现在的版本有更大的发展空间，姜普说。他认为有空间来进一步提高软件的准确性。到目前为止，也有一些事情是这个版本无法确知的，例如由几

种蛋白质构建的结构是如何结合在一起的。

此外，正如纽约州立大学石溪分校的生物学家肯·迪尔（Ken Dill）在最近发表的一篇有关该领域的综述中所指出的，阿尔法₂、它的竞争对手，甚至还有X射线晶体学等技术所发现的都是静态结构。相反，生理活动源于分子之间的相互作用方式。他说：“这有点像有人问汽车的工作原理，你打开引擎盖拍了张照片说，‘喏，就是这样子的！’”换句话说，这也并非无用，但没完全说清楚。

但是，能常规化地以这种方式得出蛋白质的结构可能会对这个领域产生重大影响，当然这也要看DeepMind决定以何种方式授权使用这项技术。科学上已知的氨基酸序列有约1.8亿个，但其中只有约17万个的结构得以确定。穆尔特认为，确定更多的序列结构可以帮助筛选候选药物，看哪些药物可能与特定的蛋白质很好地结合。也可以对现有药物重新分析，看它们还有什么其他功效。还可以通过加快创造人工设计的用于催化化学反应的蛋白质，促进合成生物学的发展。

一些具有应用潜力的发现实际上已经出现了。例如，阿尔法₂能够预测刺突等几种被新冠病毒利用的蛋白质的结构。伯尼说：“我们肯定会要花一些时间做检验。但当我第一次看到这些结果时，我激动得差点从椅子上摔下来。”■



Christine Lagarde

Culture shock

The ECB's boss is taking the bank out of its comfort zone—and into hers

CHRISTINE LAGARDE has been an outsider before. Speaking to *The Economist*, she relishes the memory of shaking up bureaucrats—“men in grey suits”—when she took over as France’s finance minister in 2007. She even installed a “psychedelic” carpet in her office, to get them to look up from the floor. Now Ms Lagarde, who then went on to run the IMF, is shaking up the idea of what it is to be a top central banker.

The main prerequisite used to be a degree of nerdiness: just think of Janet Yellen, a former chairwoman of the Federal Reserve and Joe Biden’s choice for treasury secretary; Ben Bernanke, her predecessor at the Fed; or Mervyn King, a former governor of the Bank of England. All spent decades in academia. By contrast Ms Lagarde, who has been the head of the European Central Bank (ECB) for just over a year, is not an economist but a lawyer and a former executive and politician. She brings a glittering CV and a high public profile to the job, but is probably more comfortable rubbing shoulders with heads of state than participating in a research seminar.

On the face of it, Ms Lagarde and the ECB have had a decent year. The bank has acted decisively, avoiding the mistakes of the financial crisis of 2007-09 and the sovereign-debt woes of 2010-12. Since the start of the year it has injected stimulus of €2.2trn (\$2.6trn) into the economy (see chart 1). In contrast with the austerity of a decade ago, fiscal policy is acting in concert with monetary easing, including at the EU-wide level. The new opportunity to help co-ordinate monetary policy and government spending plays to Ms Lagarde’s strengths. Yet it is precisely her willingness to venture into areas that most central bankers consider political terrain that is causing some controversy among the experts.

The ECB's ammunition was sorely depleted even before covid-19 struck. Its benchmark deposit rate was -0.5%, and it had been buying government and corporate bonds through its quantitative-easing (QE) scheme since 2015. But the bank warded off a credit crunch earlier this year by ripping up self-imposed rules. Instead of buying a country's assets in rough proportion to the size of its GDP, it has bought more of those of Italy and Spain. The ECB has also expanded the generosity of its long-term loans to banks, paying them up to 1% if they continue to lend. That, together with government guarantees, has kept credit from seizing up, even as a second wave of infections and lockdowns make a double-dip recession seem inevitable. An ECB survey published on November 24th found that access to finance was towards the bottom of small firms' list of anxieties.

All this, however, has done little to revive the outlook for inflation. The bank itself expects annual inflation of only 1.3% by 2022. Market participants are even gloomier (see chart 2). It is becoming harder to believe that the ECB can do much more by itself. *The Economist* spoke to executives from five of the euro area's biggest banks. None thought the ECB's cheap funding alone would stir demand for credit, or encourage banks to lend to risky prospects. Ms Lagarde insists stimulus is "not exclusively a fiscal business", and that the ECB can still do its bit. But in a speech on November 11th she made a forceful case for further fiscal action.

There have been two criticisms levelled at Ms Lagarde. One is that communication slip-ups over the past year show that she has only a weak grasp of the technical detail of monetary policy. That may in part reflect economists' snootiness. But her missteps did indeed move markets. In March her comment that the ECB "was not here to close spreads" sent Italian government-bond yields soaring. In September her seeming indifference to a strengthening euro and its impact on inflation meant the currency only rose further against the dollar. Both were followed the next day by an explanatory blog post from Philip Lane, the bank's accomplished

chief economist—seeming to correct the president’s words.

Ms Lagarde is only too aware of the fact that markets hang on her every word, and now carefully watches what she says. In order to stress collective decision-making, blog posts by Mr Lane and others on the bank’s executive board will no longer appear immediately after a press conference. Some wonks reckon she has improved markedly on the job. Still, it is hard to imagine her becoming a conviction rate-setter.

Where she does have conviction is on matters such as climate change and gender equality, subjects that she promoted while at the IMF, to which grey-suited monetary policymakers generally give a wide berth—and which are the source of the second concern about her approach to central banking. It is instructive to compare Ms Lagarde’s speeches and interviews over the past year with those of Mario Draghi, her predecessor. Though “inflation” has featured 190 times, she is half as likely to mention it as Mr Draghi did in 2018 and 2019. By contrast, Ms Lagarde has mentioned “climate change” 80 times—compared with just seven across Mr Draghi’s entire eight-year term.

Climate change, according to Ms Lagarde, is an element not just of the ECB’s “secondary” objective—which is to support the EU’s economic policies. More controversially, she sees it as having a bearing on the bank’s primary mandate of price stability. She has said before that the bank will consider the merits of “green”QE, which would tilt bond-buying away from polluters. The idea clashes with the views of many central bankers, including Jens Weidmann, the head of the Bundesbank. At a Bloomberg conference on November 16th, both Ms Yellen and Lord King worried about mission creep at central banks. Few economists think climate change has a big influence on inflation; most would point out that changing polluters’ behaviour is a job for elected officials.

Ms Lagarde intends to win over the rest of the ECB’s 25-strong governing

council during the bank's strategy review, due to conclude in mid-2021. It will cover everything from relatively uncontroversial tweaks to the inflation target to more contested areas, the financial-stability effects of low interest rates and, of course, climate change. She says she hopes to convince her colleagues to “appreciate that they should be not only on the right side of history and face their children and grandchildren with a straight face, but be able to focus on the core mandate of price stability”.

That the euro area has avoided a financial crisis means Ms Lagarde can look back on the past year with some satisfaction. But her term lasts for eight years—far longer than many politicians or executives hang around for. Her push to broaden the ECB's mission has just begun. And if some countries (eg, Germany) return to economic normality sooner than others (eg, Italy), then the ECB will also face tough choices about when precisely to unwind its emergency measures. The outsider's next seven years promise to be more controversial than the first one. ■



克里斯蒂娜·拉加德

文化冲击

欧洲央行行长正带领该行走出它的舒适区——进入她的舒适区

克里斯蒂娜·拉加德（Christine Lagarde）过去就曾是个局外人。她愉快地对本刊回忆起了2007年接任法国财政部长时如何震撼了那些官僚——“穿灰色西装的男人们”。她甚至在自己的办公室里铺了一块“让人头晕目眩”的地毯，让他们没法总是低头看地板。如今，在执掌国际货币基金组织（IMF）后，她正在撼动央行行长的固有形象。

以前做央行行长的主要条件是得有点学究范儿：想想美联储前主席、拜登选择的财政部长珍妮特·耶伦（Janet Yellen）、她在美联储的前任本·伯南克（Ben Bernanke），或者英国央行前行长默文·金恩（Mervyn King）。这些人都在学术界工作过数十年。相比之下，担任欧洲央行行长仅一年多的拉加德不是经济学家，而是律师出身，还曾担任高管和从政。她加入央行前履历辉煌，知名度很高，但与参加研讨会相比，她可能在和国家元首打交道时更如鱼得水。

表面上看，拉加德和欧洲央行过去一年战绩不错。该行行动果断，避免了重蹈2007至2009年金融危机和2010至2012年主权债务危机的覆辙。自年初以来，它已注资2.2万亿欧元（2.6万亿美元）刺激经济（见图表1）。相比十年前的紧缩，如今财政政策是与货币宽松协同实施的，在整个欧盟范围内也是如此。帮助协调货币政策和政府支出的新机遇可让拉加德发挥强项。然而，正是因为她愿意冒险进入大多数央行官员眼中的政治领域，才在专家之中引发了一些争议。

即使是在新冠疫情爆发之前，欧洲央行的弹药就已经严重枯竭。它的基准存款利率为-0.5%，自2015年以来一直在通过量化宽松计划购买政府和企业债券。但它于今年早些时候打破了自己设定的规则，避免了信贷紧缩。它没有按照与一国GDP大致相称的比例购买资产，而是买入了更多意大利和西班牙的资产。它还延长了对银行长期贷款的优惠，如果它们继续放

贷，利率可低至-1%。这种操作，再加上政府的担保，使得在第二波疫情和封锁似乎让二次衰退不可避免之时，信贷也一直没有冻结。欧洲央行11月24日发布的一项调查发现，融资渠道是中小公司最少担心的问题之一。

然而，所有这些对改善通胀的前景无济于事。欧洲央行自己的预计是，到2022年，年通胀率将仅为1.3%。市场参与者的看法甚至更悲观（见图表2）。人们越来越难相信欧洲央行自己还能再做些什么。本刊采访了欧元区五家大银行的高管。他们都不认为欧洲央行仅凭廉价的资金就能激起对信贷的需求，或者能鼓励银行放贷给高风险项目。拉加德坚称刺激措施“不仅仅是财政的事”，认为欧洲央行仍可发挥自己那部分作用。但在11月11日的一次讲话中，她极力主张进一步采取财政措施。

对拉加德的批评有两种。一是过去一年的沟通失误表明她对货币政策的技术细节理解不足。这种批评可能在一定程度上反映出经济学家的傲慢，但她的过失确实确实影响了市场。今年3月，她评论称欧洲央行“不是来收窄利差的”，此言一出，意大利国债收益率飙升。9月，她对走强的欧元及其对通胀的影响显得无动于衷，结果欧元兑美元汇率进一步上升。这两次沟通失误后的次日，老练的欧洲央行首席经济学家菲利普·莱恩（Philip Lane）都在博客上发帖做了说明，似乎是在纠正拉加德的话。

拉加德很清楚市场会紧盯她的每一个用词，现在已言语谨慎。为了强调决策是集体制定的，每次新闻发布会之后，莱恩和欧洲央行其他执行委员会成员都不会再立即发帖。一些学究认为她在工作上进步明显。尽管如此，很难想象她会成为一名坚定的利率制定者。

她在气候变化和性别平等方面倒是有坚定的信念，她在IMF时就推动过这些议题。那些穿灰色西装的货币政策制定者通常对它们敬而远之，而这些议题也引来了对她主持央行工作的第二个担忧。把拉加德过去一年的讲话和访谈与她的前任马里奥·德拉吉（Mario Draghi）比较一下，很能说明问题。尽管她提到“通胀”这个词有190次之多，却也只是德拉吉在2018年和2019年提及次数的一半。拉加德提到过80次“气候变化”，而德拉吉在整个八年任期中只提过七次。

拉加德认为气候变化不仅是欧洲央行支持欧盟经济政策这一“次要”目标的一部分。更有争议的是，她认为它关系到欧洲央行稳定价格的首要任务。她曾说欧洲央行将考虑“绿色”量化宽松政策的优点，这将使债券购买远离污染行业。这个想法与包括德国央行行长詹斯·魏德曼（Jens Weidmann）在内的许多其他央行官员的观点相冲突。在11月16日彭博举行的会议上，耶伦和金恩都担心央行出现“使命偏离”。没有几个经济学家认为气候变化对通胀有重大影响；他们中大多数会指出改变污染行业的行为是民选官员的工作。

欧洲央行的战略评估将于2021年中结束，拉加德想要在此期间赢得该行管理委员会25名成员中其他人的支持。战略评估的内容相当广泛，既包括通胀目标微调这样相对没有争议的问题，也包括更意见不一的领域，如低利率对金融稳定的影响，当然还有气候变化。拉加德说希望能说服她的同事“明白他们不仅应该在历史上站在正确的一边，严肃直面他们的子孙，还应该专注于稳定价格的核心任务”。

欧元区躲过了一场金融危机，意味着拉加德可以较为满意地回顾过去的一年。但她的任期长达八年，远远超过许多政客或高管在位的时间。她扩大欧洲央行使命的努力才刚刚开始。而且，如果某些国家（如德国）的经济比其他国家（如意大利）更快恢复正常，那么欧洲央行也将面临究竟何时取消紧急措施的艰难选择。拉加德这位局外人接下来的七年应该会比第一年更具争议。 ■



The Economist Film

Disrupting Corruption 1 - South Africa

During the nine-year presidency of Jacob Zuma, corruption captured the state. In Zuma's second term alone, about a hundred billion US dollars was stolen just short of a third of South Africa's GDP. But South Africans demanded change and in 2019 they elected a new president on an explicit platform to crack down on corruption.



经济学人视频

颠覆者系列 | 大数据反腐：南非

在雅各布·祖玛的九年总统任期内，腐败现象席卷了全国。仅在他的第二任期内，就有约1000亿美元遭窃取。南非人民要求改变，于2019年选出了明确以反腐为纲领的新总统。



Buttonwood

Home-schooled

The financial, economic and psychological forces behind the incipient M&A boom

IMAGINE YOU are the boss of a public company. Normally you are busy making decisions, visiting outposts, talking to customers, suppliers and employees. The meetings are endless. You have little time for reflection. Then, suddenly this spring, after a bout of firefighting, the diary is bare. You sit in your study, hiding from the family, and ruminate—about what your firm lacks, about what it has too much of. You call a friendly investment banker and say: “I may need to do a deal soon.”

The results of such stay-at-home strategy sessions are now apparent. The past few weeks have seen a burst of M&A activity. There are merger deals of all kinds, in all parts of the world, across many industries—from tech and health care to banking and publishing. The dealmakers at investment banks are joyful. The last time things were this busy, they say, was in 2007-08.

Shareholders have some call to fear the worst. There is a weighty body of literature, some of it dating from the stockmarket bust of the early 2000s, that says mergers do not create value for the acquiring company. More recent research is more nuanced. Mergers overseen by serial acquirers tend to add to value, it finds. Once M&A gets going, things can quickly get out of hand, of course. But this early in the economic cycle, and in the unusual circumstances, mergers are more likely to have a coherent logic to them.

To understand the burgeoning M&A boom, go back to January and February. Bankers had a full pipeline of deals. Then the pandemic took hold. A dealmaking CEO had to think again. If you had a merger in the works, you pulled it. You couldn't project numbers with confidence. You didn't know if you could afford a deal, or finance it. Even then, the calls

with bankers never stopped. In place of black-tie events came virtual schmoozing—from one home study to another.

The deal pipeline started to thaw in June or July. Announcements have been coming thick and fast since. A lot of this is down to market conditions, which quickly turned favourable and have remained so. Equity prices have roared back from their lows of late March. The companies with shares that rallied first—technology and health care—found themselves with a highly valued currency with which to pay for deals. The corporate-bond market has reopened with a vengeance, making debt finance available. Interest rates are at rock bottom and likely to stay there for a while. Private-equity firms have a lot of unused capital (“dry powder”) to call upon.

But financial conditions are not the only explanation. The economy is another. The pandemic has given companies new problems to solve and made some existing ones more pressing. M&A offers a fix. Debt-laden firms need to sell assets. Buyers want to plug some strategic holes. The rationale for a deal might be to secure supply chains, to diversify across geographies, to acquire a specific (often digital) capability; or simply to bolster revenues or cut costs when the outlook for profits is rather bleak. Some of the transactions that are happening now are deals of opportunity, says Alison Harding-Jones, head of M&A in Europe, the Middle East and Africa for Citigroup, a bank. And some are deals of necessity. Covid-19 has created winners and losers across industries, but also within them. CEOs of winning companies may find that the acquisition on their lockdown wishlist is available. Those of losing companies must simply try to sell wisely.

Both kinds will be wary of the response from shareholders. The risks of getting the price wrong or of underestimating the hassle of integrating acquisitions are ever-present. But deals that have a decent-looking strategic case are likely to be given the benefit of the doubt. Serial dealmakers will

get the most leeway. Research from McKinsey, a consultancy, finds that companies that do lots of smallish acquisitions over time tend to add value to them. Such “programmatically acquirers” take more care in assessing targets, aligning M&A with broader corporate strategy and integrating their purchases.

As a rule big, one-off deals are riskier. The dangers seem small now but will grow the longer the M&A boom goes on. Bosses will start to worry that their dealmaking rivals look more in command of events. They will be prone to the ill-advised, grandiose merger. When the boom is all over, a few such souls will find themselves back in the study at home, but this time because they no longer have an office to go to, asking themselves: “Why did I do it?” ■



梧桐

居家学习

新兴的并购潮背后的金融、经济和心理力量

想象你是一家上市公司的老板。通常你都是忙着做决策，视察分支机构，与客户、供应商和员工交谈。没完没了地开会。你几乎没有时间思考。然后，今年春季，在一通救火式操作之后，你的日程表突然空空如也。你躲开家人，坐在书房里沉思：公司缺什么？什么又过剩了？你给一位友好的投资银行家打电话说：“我可能很快需要做一笔交易。”

这类居家战略商榷的成果现在已经显现。过去几周掀起了一波并购潮。从科技、医疗，到银行和出版，世界各地的诸多行业发生了各种各样的并购交易。这让投资银行的并购交易员们欣喜不已。他们说，上次这么忙还是2007到2008年间的事。

股东们有一定的理由担心会出现最坏的情况。大量资料（其中一些可追溯到本世纪初的股市崩盘）表明，并购并不能为收购方创造价值。较新的研究更加细致。它发现，由开展连续并购的收购方主导的并购往往会提升价值。当然，一旦并购启动，情况可能很快失控。但是新经济周期才刚刚开始，而且大环境非同寻常，这轮并购更有可能有其清晰一致的缘由。

要理解这股新兴的并购潮，让我们回到今年一二月间。此时银行家手头有一大堆交易计划。然后新冠疫情开始肆虐。正在洽谈交易的CEO们不得不重新考虑。你可能取消了筹备中的并购。你在预测数据时没有把握。你不知道自己是否负担得起一项并购，或者能不能筹到资金。即使在那会儿，与银行家的通话也没有停止过。没有了正式的商务活动，取而代之的是隔空闲谈——从一项居家调研到另一项。

交易管道在六七月间开始解冻。从那时起并购公告层出不穷。这在很大程度上得益于迅速转好并持续向好的市场状况。股价已经从3月底的最低点强劲回升。那些股价率先反弹的公司——比如科技和医疗公司——发现自

己可以用高估值的股票来为交易买单。企业债券市场“报复性”重启，企业因而可以运用债务融资。利率处于谷底，短期内不大会变化。私募股权公司有大量的待投资资金（即“干火药”）可用。

但金融状况并不是唯一的解释。还有一个因素是经济。疫情给公司带来了有待解决的新问题，也让一些原有问题变得更加紧迫。并购提供了一种解决办法。负债累累的公司需要出售资产。收购方希望弥补一些策略上的漏洞。并购的理据可能是稳住供应链，实现跨地域多元化，获得特定的（通常是数字方面的）能力；或者只是为了在利润前景相当黯淡时增加收入或者削减成本。花旗银行的欧洲、中东和非洲并购业务负责人艾莉森·哈丁-琼斯（Alison Harding-Jones）表示，目前正在发生的一些交易是投机型的。另一些则是必要的。疫情不仅在行业间，也在行业内部造就了赢家和输家。赢家的CEO们或许会发现，自己在居家隔离时列的愿望清单上的收购这一项有望实现了。而输家的CEO们只能想办法卖得好一点。

两类CEO都要留心股东们的反应。定价失误和低估整合难度是永恒的风险。但那些战略理由看起来还过得去的交易很可能让股东暂时打消疑虑。连续并购交易者会获得最大的回旋余地。咨询公司麦肯锡的研究发现，那些长期以来进行了大量较小规模收购的公司往往会提升并购的价值。这样“有章法的收购方”在评估目标、让并购符合公司整体战略，以及整合自己的收购成果时都会更谨慎。

一般说来，那些“一次性”的并购风险更大。目前看起来风险似乎较小，但并购潮持续的时间越长，风险会上升。老板们会开始担心他们的交易对手看上去更能掌控局势。他们容易去追逐不理智的、华而不实的并购。当并购的热潮全部退去，其中一些人会回到家中书房，但这一次却是因为他们不再有办公室可去。他们会问自己：“当时我干嘛要做这笔买卖？”■



Financial-market data

Go figure

A crowd of data firms are cashing in on the quant-investing boom

TRADERS AND their Bloomberg terminals are seldom parted. Some 330,000 people fork out around \$25,000 annually to access Bloomberg's suite of services: financial-market data; graphing and pricing tools; the ability to chat with other market participants. These functions are so vital for bond traders, hedge-fund managers and pension-fund investors that, when the pandemic closed offices worldwide, many lugged their terminals home in taxi cabs.

As quantitative investing swells and algorithms dominate financial markets, though, the demand for data is changing. A human stock-picker might prefer a single slick platform through which they can build charts and chat to their broker, but quantitative firms want to be plugged into vast data sets that they can sift for signals. One of the quickest-growing slices of the market-data industry for the past five years has been direct selling to investment managers, rather than traders. And a motley, fragmented bunch of providers are having enormous success selling proprietary data directly to quantitative managers. A reminder of this came on November 30th when S&P, a rating agency and financial-information firm, said it would buy IHS Markit, a credit-data provider, for \$44bn. The tie-up is the second-largest acquisition announced this year, behind only a \$56bn Chinese oil-pipeline deal in July.

The providers that are winning from the quant boom are doing so almost by historical accident. Some—such as Nasdaq and Intercontinental Exchange (ICE), which run exchanges—were once merely financial-market plumbers, clearing transactions and matching trades. Other niche players, like IHS Markit, started off by providing pricing for the opaque market in credit-

default swaps, hoping to tap investors' growing appetite for derivatives. The transaction data these firms accumulated used to be a by-product. Now they are "the lifeblood of finance", says Audrey Blater of Aite Group, a research firm. Market-data revenues have grown by around 5-8% per year for the past five years and margins are fat. S&P has an operating margin of 56%, 16 percentage points more than five years ago.

Now these once entirely disparate firms are teaming up. The S&P and IHS Markit merger follows a slew of similar deals. In 2019 the London Stock Exchange (LSE) agreed to buy Refinitiv, a financial-data service once owned by Thomson Reuters, for \$27bn. In September this year ICE bought Ellie Mae, a mortgage-information provider, for \$11bn.

Incumbents hope these mega-mergers will allow providers to reap economies of scale and create data bundles that appeal to clients. Like the giants of consumer technology, financial-data firms are seeking to create "ecosystems" that clients never have to leave, says Ms Blater. Such scale economies certainly seem to exist for S&P and IHS Markit. The companies expect around \$480m in annual savings, but Hamzah Mazari of Jefferies, an investment bank, thinks they could end up closer to \$600m. The transaction should also create revenue-generating synergies, which the pair estimates at an annual \$350m. That is because they have complementary businesses and serve the same pool of clients. S&P provides equities indices, for instance, whereas IHS Markit looms large in the pricing of bonds. The combined entity could sell its array of products through enterprise-wide contracts, charging clients a fee for all-you-can-consume data.

All this makes regulators worry about the growing market power of a shrinking group of data providers. European watchdogs are due to make a decision on LSE'S purchase of Refinitiv by mid-January. But they may not do much to block the union between S&P and IHS Markit. Mr Mazari says

overlaps between the firms' businesses do not amount to more than 10-12% of their revenues, so concentration in their various segments will not rise by much. But whether the deals are pulled off or not, their size shows how the industry is being recast. For decades rivals attempted to usurp Bloomberg by offering similar but cheaper platforms. Traders may still clutch at their terminals, but the market for data is being transformed. ■



金融市场数据

算不到

一批数据公司正从量化投资热潮中获利

交易员和他们的彭博终端总是形影不离。约有33万人每年花费约2.5万美元使用彭博的服务套件：金融市场数据、图表和定价工具，以及和其他市场参与者聊天的功能。这些功能对于债券交易员、对冲基金经理和养老基金投资者至关重要，在疫情导致全球各地的办公室关闭时，许多人索性把自己的彭博终端搬上出租车运回了家里。

但是，随着量化投资扩大、算法主导金融市场，对数据的需求正在改变。人类选股者可能更喜欢能让他们构建图表并和经纪人聊天的单一的精巧平台，但量化投资公司希望接入庞大的数据集，从中找寻信号。过去五年里，市场数据行业发展最快的部分之一是直接对投资经理而非对交易员的销售。而一群五花八门的分散的供应商因为把自家专有数据直接出售给量化投资经理而大获成功。看看近期宣布的一宗交易：评级机构及金融信息公司标普11月30日表示将以440亿美元收购信贷数据供应商埃信华迈（IHS Markit）。这是今年宣布的第二大收购案，仅次于7月一宗价值560亿美元的中国油气管道并购交易。

在量化热潮中胜出的这批供应商几乎都是缘于历史偶然而取得佳绩。纳斯达克和美国洲际交易所（ICE）这类交易所曾经只是金融市场的管道工，负责清算业务和匹配交易。而其他利基玩家，如埃信华迈，最开始是为信用违约掉期的不透明市场提供定价信息，希望从投资者对衍生品日益增长的需求中分一杯羹。这些公司积累的交易数据本来只是副产品，但现在它们成了“金融的命脉”，研究公司Aite Group的奥黛丽·布拉特（Audrey Blater）说。过去五年里，市场数据业的营收以每年5%到8%的速度增长，而且利润丰厚。标普的营业利润率为56%，比五年前高出16个百分点。

如今，这些以往完全不相关的公司开始联合起来。在标普并购埃信华迈之前已有一系列类似的交易。2019年，伦敦证券交易所（LSE）同意以270亿

美元的价格收购曾属于汤森路透的金融数据服务商路孚特。今年9月，洲际交易所以110亿美元收购了抵押信息供应商Ellie Mae。

既有数据供应商希望通过这类大型合并收获规模经济，并打造吸引客户的数据包。和消费科技巨头一样，金融数据公司也在寻求创建客户永远不必离开的“生态系统”，布拉特说。对标普和埃信华迈而言，这样的规模经济似乎确实存在。两家公司预期每年将节省约4.8亿美元，但投资银行杰富瑞的哈姆扎·马扎里（Hamzah Mazari）认为这个数字最终可能接近6亿美元。这一合并应该还会产生让收入增长的协同效应，两家公司估计可以每年增收3.5亿美元。这是因为它们的业务互补，而且服务相同的客户群。例如，标普提供股票指数信息，而埃信华迈在债券定价信息方面举足轻重。两者合并后可以通过企业合同销售一系列产品，向客户收取一个全包费用，提供他们所需的全部数据。

所有这些都令监管机构担心整合后数量减少的数据供应商会有更强的市场支配力。欧洲监管机构将于明年1月中旬前决定是否批准伦敦证券交易所对路孚特的收购。但它们可能不会对标普和埃信华迈的合并设置多少障碍。马扎里说，这两家公司之间重叠的业务不到它们收入的10%到12%，因此各个业务领域的集中度不会提高太多。然而，无论这些交易最终是否达成，其规模都表明这个行业正在重塑。几十年来，竞争对手试图提供类似但更便宜的平台来抢夺彭博的老大哥地位。交易员也许还是会彭博终端不离手，但数据市场正在经历大转型。 ■



Business software

Get me some Slack

The boss of Salesforce has his sights set on tech's big league

MARC BENIOFF got the idea for the “ohana” corporate culture on a sabbatical in Hawaii. The term refers to a network of families bound together. He likes to think of Salesforce, the world’s third-biggest software firm, which he founded and runs, as just such a network. On December 1st Mr Benioff welcomed Slack, an instant-messaging tool, to his ohana. The \$27.7bn deal is one of the biggest ever in the software industry.

Like many family alliances the tie-up is partly about power and feuds. Slack’s product has a cultlike following, which Salesforce wants to harness to build a tech platform that sells digital tools that no firm can do without. Stewart Butterfield, Slack’s co-founder, hailed it (hyperbolically) as “the most strategic combination in the history of software”. The feud is with Microsoft, whose advances Slack spurned four years ago. The deal makes Salesforce a far more formidable challenger to the giant.

Mr Benioff may be best known to the public for championing corporate “purpose” (and owning *Time* magazine). But in his own industry he wins kudos for disruptive innovation. In the 2000s the young Salesforce basically invented software-as-a-service (SaaS)—accessing programs remotely rather than installing them on office computers—particularly for managing customer relationships. Microsoft, Oracle, SAP and others had to follow suit.

The explosive growth of SaaS has propelled Salesforce to ever greater heights. And to greater breadth: since 2016 it has spent over \$25bn snapping up over a dozen firms to boost its computing chops. It bought Tableau, a data-analytics platform, and MuleSoft, which helps firms

connect legacy IT systems to the cloud.

Then came the pandemic. A boom in tech stocks lifted Salesforce's market value from \$144bn to \$225bn this year. Slack, whose share price has lagged behind those of Zoom and other enablers of remote work, suddenly looked affordable. Mr Benioff is paying with a mix of cash and Salesforce stock. His firm's valuation is still well behind Microsoft's \$1.6trn. But it may at last have a shot at tech's top table. It already rules in customer-relationship software and thrives in other areas of business software, especially since acquiring Tableau. Aaron Levie, boss of Box, a cloud firm, describes Slack as "another dot on the graph" that plots Salesforce's rise to become the world's number-two business-software company (behind Microsoft). Perhaps, Mr Levie muses, "even the largest".

Such sentiments explain why for Microsoft the Slack deal is a red rag. Slack got the giant's attention a few years ago when Mr Butterfield promised to wipe out email, which would threaten Outlook, Microsoft's popular inbox, and its email server, Exchange. "If you are going to come at the king, you'd better not miss," quips Charles Fitzgerald, a former executive at Microsoft who is now an angel investor. Back then Mr Butterfield did miss—and Microsoft shot back with a new product, Teams, combining messaging with videoconferencing and other functions. Slack has launched an antitrust complaint against it for offering Teams free of charge in its Office bundle, together with its popular word processor and Excel spreadsheets.

Teams is a big reason why Mr Butterfield is in an ohana-ish mood. Like Zoom, it has videoconferencing—and far more active users than Slack, which explains the latter's lacklustre stockmarket performance. Salesforce will invest to reinvigorate it, presumably adding more video-meeting capability. Its sales machine will push Slack beyond early adopters into the corporate mainstream.

That will intensify Salesforce's rivalry with Microsoft, with which it will compete in three main areas. With Slack it will directly take on Office, now that Teams has been folded into it. Slack also offers a gateway to 2,400 software tools, mostly created by independent companies, that compete with other Microsoft products. Salesforce and Slack could bundle all this software into a convenient alternative to Microsoft. Second, Salesforce competes with the giant in customer-relationship management, where it plans to make Slack the user interface, and other business functions.

Then there is the bigger battle over platforms. Both Salesforce and Microsoft aim to give businesspeople who do not themselves write software the tools to build customised programs—"with clicks not code", as Salesforce puts it. Salesforce's Developer 360 is punier than Microsoft's Power Platform but is improving, thanks to MuleSoft and Einstein, a set of artificial-intelligence services. Slack could be a "Trojan horse" to hook customers of Salesforce's own clients on more of the company's applications, says George Gilbert of TechAlpha Partners, a consultancy.

Success is not in the bag for Salesforce. Mr Benioff may fail to turn his vision into reality. Even if Slack gets its video act together it would be late to videoconferencing, which has matured rapidly during the pandemic. Most large corporate clients already use Zoom, Teams or Cisco's Webex software. And Salesforce might mistakenly end up sacrificing Slack's growth while trying to bolster its own businesses.

Moreover, Slack is not in and of itself enough to make Salesforce into a genuine rival to Microsoft. Mr Benioff would need to build (or buy) capabilities in document storage, cyber-security and more, reckons Mark Moerdler of Bernstein, a broker.

Wall Street is already wary of Salesforce's big acquisitions; the firm's share price dipped when news of the Slack deal surfaced. Still, SaaS holds vast

potential, as Microsoft shareholders know well. And, as Mr Butterfield noted on the deal's announcement, Mr Benioff has already started one revolution. Betting against this ohana is not for the faint-hearted. ■



商业软件

给我腾个地儿

*Salesforce*的老板志在跻身科技巨头之列

马克·贝尼奥夫（Marc Benioff）在夏威夷休假的时候想到了要建立一种“ohana”公司文化。Ohana的意思是紧密连接的大家庭网络。他喜欢把自己创立并掌管的全球第三大软件公司Salesforce看成是这样的家庭网络。12月1日，贝尼奥夫让即时通讯工具Slack加入了他的ohana。这宗交易耗资277亿美元，是软件业史上最大的并购案之一。

和许多家庭联姻一样，这起收购也涉及权力和宿怨。Slack的产品有一批狂热的追随者，Salesforce希望借此打造一个科技平台，销售任何公司都离不开的数字工具。Slack的联合创始人斯图尔特·巴特菲尔德（Stewart Butterfield）（夸张地）盛赞这是“软件业史上最有战略意义的结合”。宿怨则事关微软，它曾在四年接洽收购Slack被拒。这次收购让Salesforce对这家软件业巨头的威胁大增。

贝尼奥夫最为公众所熟知的或许是他倡导企业“使命”（以及拥有《时代》杂志）。但在软件行业内，他是颠覆性创新赢得威望。在本世纪头十年，年轻的Salesforce公司可说是发明了软件即服务（SaaS，即远程使用程序，无需安装到办公计算机上），特别是在客户关系管理方面。微软、甲骨文、SAP和其他公司也只能步其后尘。

SaaS的爆炸式增长推动Salesforce节节上升，也扩大了它的版图：自2016年以来，它已斥资超过250亿美元收购了十几家公司以提升其计算能力。它收购了数据分析平台Tableau和帮助企业把旧有IT系统接到云端的MuleSoft。

接着新冠疫情爆发。科技股暴涨，Salesforce的市值今年从1440亿美元升至2250亿美元。而Slack的股价落后于Zoom等其他远程办公工具，突然之间显得不再高不可攀。贝尼奥夫以现金加Salesforce股票出手收购。他的

公司的市值仍远远落后于微软的1.6万亿美元。但它也许终于有机会跻身科技巨头之列。它已称霸客户关系软件，在商业软件的其他领域也如鱼得水，特别是在收购Tableau之后。云计算公司Box的老板阿隆·列维（Aaron Levie）形容，Slack是Salesforce计划晋身全球第二大商业软件公司（仅次于微软）的“版图上的又一城”。也许，他思忖道，“甚至是最大的”。

这些看法解释了为什么Salesforce收购Slack会惹怒微软。几年前微软注意到了Slack，当时巴特菲尔德誓言要淘汰电子邮件，而这会威胁微软用户广泛的电邮管理软件Outlook和电邮服务器Exchange。“要刺杀国王，你最好别失手。”天使投资人、微软前高管查尔斯·菲茨杰拉德（Charles Fitzgerald）打趣说。那会儿巴特菲尔德的确失手了，而微软推出了结合即时通讯和视频会议等功能的新产品Teams来反击。Slack已提出反垄断投诉，指责微软把Teams免费捆绑到Office系列软件中，和流行的文字处理程序Word以及电子表格软件Excel一起提供给客户。

Teams是巴特菲尔德想加入ohana大家庭的一大原因。跟Zoom一样，Teams具有视频会议功能，而且活跃用户数远远超过Slack，后者在股市表现不佳的原因也许就在于此。Salesforce将投资重振Slack，想必会扩展视频会议功能。Salesforce的销售团队会把Slack从早期尝鲜的用户群体推向企业主流。

这将激化Salesforce和微软的竞争，主要在三个领域展开。首先，有了Slack，Salesforce现在会直接挑战捆绑了Teams的Office。Slack还是通往2400个软件工具的门户，而这些主要由独立公司开发的工具又是微软其他产品的对手。Salesforce和Slack可以将所有这些软件捆绑为一个便捷的软件包，作为微软产品的替代。其次，在客户关系管理和其他商业服务领域，Salesforce也在对撼微软，计划把Slack打造成为客户关系管理服务的用户界面。

再有是围绕平台展开的更大的较量。Salesforce和微软的目标都是为本身不会编写软件的商界人士提供工具来打造定制化程序——用Salesforce的话

说，就是“只要点点鼠标，不用写代码”。Salesforce的Developer 360不如微软的Power Platform强大，但正在MuleSoft以及人工智能服务Einstein的辅助下不断提升。Slack可能充当“特洛伊木马”，把Salesforce的企业客户的客户吸引到公司的更多应用程序上，咨询公司TechAlpha Partners的乔治·吉尔伯特（George Gilbert）表示。

Salesforce并非稳操胜券。贝尼奥夫不一定能把愿景变为现实。即使Slack全力加强视频功能也可能为时已晚，因为视频会议市场在疫情期间已经迅速成熟。大多数大公司已经在用Zoom、Teams或者思科的Webex软件了。而且在努力加强自身业务之时，Salesforce也可能错误地牺牲掉Slack的增长。

另外，单凭Slack，Salesforce还不足以成为微软的真正对手。券商盛博的马克·莫德勒（Mark Moerdler）认为，贝尼奥夫还需要构建（或收购）文件存储和网络安全等方面的能力。

华尔街本就对Salesforce的大规模收购持谨慎态度，此次收购Slack的消息一出，Salesforce的股价应声下跌。但SaaS有着巨大潜力，微软的股东对此深有体会。而且，正如巴特菲尔德在交易公告中指出的，贝尼奥夫已经发动过一场革命。胆小的人可不适合做空这个大家庭。■



Publishing

Book-binding

Bertelsmann snaps up Simon & Schuster

IN THE DAYS before Thanksgiving two top contenders emerged for Simon & Schuster, the fifth-biggest English-language book publisher by revenues, from ViacomCBS, an American media group. On November 25th Bertelsmann gained the upper hand. With an offer of \$2.2bn the German parent of Penguin Random House (PRH), the largest publisher by a Tolstoyan margin, outbid News Corp, Rupert Murdoch's media group, whose catalogue contains HarperCollins, ranked third (see chart).

A merger with Simon & Schuster would give PRH almost one-third of English-language book sales. That is more than double the market share of its closest rival, Hachette Livre, owned by Lagardère, an ailing French conglomerate. (Vivendi, a French group that is Lagardère's biggest shareholder, also briefly vied for Simon & Schuster.) In America the merged biblio-behemoth would control 70% of the market for literary fiction.

Authors and agents worry that the enlarged PRH may become ever more dominant in distribution—and that market concentration could lead to an excessive focus on bestsellers such as Michelle Obama's memoir of her time as America's first lady (which was published by a PRH subsidiary) at the expense of niche titles that are no less worthy. Robert Thomson, News Corp's boss, is certain, for his part, that the Bertelsmann deal will alert trustbusters. Earlier this year America's Department of Justice thwarted a merger of Cengage and McGraw-Hill, two publishers of educational books. Any delay would be bad news for ViacomCBS, which needs the money badly for investments in video-streaming, where it lags behind rivals such as Netflix, Disney or AT&T, a telecoms giant that owns HBO.

Thomas Rabe, Bertelsmann's boss, says he is confident that regulators in America and other countries will bless the deal. They rarely block mergers that only reduce the number of big players from five to four. The last big union, Bertelsmann's takeover in 2013 of Penguin, did not fall foul of antitrust guardians. Moreover, the leading five have lost market share in recent years to smaller rivals, not to mention Amazon, which these days not only sells books (as well as just about everything else) but also publishes them.

That still leaves the question of whether the deal is a good one for Bertelsmann. The price was heftier than even ViacomCBS expected. Covid-19 initially hurt book sales, as it did other discretionary spending. "The first five weeks [of the pandemic] were very tough," admits Brian Murray, chief executive of HarperCollins.

But with their pantries full, self-isolators turned to fiction for escapism and edification. "People are always predicting the decline of book publishing, but it has actually been very resilient," says David Steinberger, chief executive of Arcadia Publishing, a publisher of history books.

And Simon & Schuster is a prestigious prize. It was originally set up in 1924 to publish crosswords, but went on to represent Ernest Hemingway, F. Scott Fitzgerald and Tom Wolfe. This year it made waves with the publication of "Rage", a ferocious account of Donald Trump's White House by Bob Woodward, a far-famed journalist, as well as a tell-all memoir by the president's niece, a psychologist.

Nabbing Simon & Schuster is Bertelsmann's second coup in the space of a week. On November 17th American and Canadian readers set a record for first-day sales, snapping up 890,000 copies of a new memoir by Mrs Obama's husband, also published by a PRH subsidiary. ■



出版业

图书装订

贝塔斯曼一举拿下西蒙与舒斯特

感恩节前夕，意欲收购美国媒体集团ViacomCBS旗下全球第五大（以营收计）英语图书出版商西蒙与舒斯特（Simon & Schuster）的两大竞争者浮现。11月25日，贝塔斯曼集团（Bertelsmann）占得上风。它是营收遥遥领先的全球最大出版商企鹅兰登书屋（Penguin Random House）的德国母公司，出价22亿美元，高于默多克的媒体集团新闻集团（News Corp）的出价。新闻集团旗下拥有排名第三的出版商哈珀·柯林斯（HarperCollins）（见图表）。

与西蒙与舒斯特合并将使企鹅兰登占到全球英语图书销量的近三分之一。这是紧随其后的竞争对手阿歇特出版公司（Hachette Livre）市场份额的两倍多，后者的母公司为陷入困境的法国企业集团拉加代尔（Lagardère）。拉加代尔最大的股东法国集团维旺迪（Vivendi）也曾一度参与争夺西蒙与舒斯特。在美国，合并后的这个图书出版巨兽将控制虚构类文学作品市场70%的份额。

作家和代理商们担心，扩张后的企鹅兰登可能会日益主导图书分销，而市场高度集中可能会导致过分重视畅销书，比如米歇尔·奥巴马对自己身为美国第一夫人时期的回忆录（由企鹅兰登的子公司出版），而忽略同样有价值的小众书作。新闻集团的老板罗伯特·汤姆森（Robert Thomson）就深信，贝塔斯曼的这宗收购将惊动反垄断机构。今年早前，美国司法部阻止了两家教育图书出版商圣智（Cengage）和麦格劳希尔（McGraw-Hill）的合并。此次收购的任何延误对ViacomCBS来说都是坏消息，因为它迫切需要资金投资视频流媒体业务。ViacomCBS在这方面落后于奈飞（Netflix）、迪士尼或拥有HBO的电信巨头AT&T等竞争对手。

贝塔斯曼的老板托马斯·拉贝（Thomas Rabe）表示，他相信美国和其他国家的监管机构会支持这宗收购。它们很少会阻止那种只是把某个市场上

的大公司数量从五个减少到四个的并购。上一次大型收购，也就是贝塔斯曼在2013年收购企鹅集团，并未受到反垄断监管机构的阻拦。而且五大出版集团近些年也被较小的竞争对手夺去了部分市场份额，被亚马逊抢走的份额就更不用说了。亚马逊现在不仅销售图书（以及其他几乎一切商品），还出版图书。

但仍然有个问题——这对贝塔斯曼而言是否算一宗好交易。它的出价甚至比ViacomCBS期望的还要高。和其他非必要消费品一样，图书的销售最初也受到了新冠疫情的打击。“（疫情的）头五周非常艰难。”哈珀·柯林斯的首席执行官布莱恩·默里（Brian Murray）承认。

但随着隔离在家的人们囤足了食品，他们又转向小说以逃避现实和寻求启迪。“人们一直预测图书出版会走下坡路，但它实际上却很坚韧。”历史书籍出版商阿卡迪亚出版公司（Arcadia Publishing）的首席执行官戴维·斯坦伯格（David Steinberger）说。

而西蒙与舒斯特这个竞逐目标享有盛名。这家公司成立于1924年，最初的业务是出版填字游戏，后来出版了欧内斯特·海明威、斯科特·菲茨杰拉德和汤姆·沃尔夫的作品。今年它出版了著名记者鲍勃·伍德沃德（Bob Woodward）激烈展现特朗普主政的白宫的《愤怒》（Rage）和特朗普的心理学家侄女所写的爆料回忆录，引起轰动。

拿下西蒙与舒斯特是贝塔斯曼在一周内的第二场胜利。11月17日，在美国和加拿大读者的抢购下，奥巴马的最新回忆录单日售出89万本，创下了图书首发日销量新高。这本书同样由企鹅兰登的子公司出版。■



Buttonwood

Sand in the gears

The lesson from the most recent quant quake

WHAT IS IT like to lose to a machine? In 1997 the world's best chess player, Garry Kasparov, was beaten by Deep Blue, a \$10m super-computer made by IBM. Twenty years later he wrote "Deep Thinking", a book about the experience. What comes across vividly is how exhausting each game was. Chess players, even great ones like Mr Kasparov, get tired and frustrated. Doubts begin to creep in. By contrast, Deep Blue just needed the occasional reboot.

Now turn the tables. What is it like to win against the machines? By New Year's Eve the least smart buy-and-hold investor in an index fund might be able to boast of such a victory. For 2020 has been rotten for "quant" funds, which use powerful computers to sift market data for patterns that might predict future prices. "Long-short" momentum—buying recent winners and selling recent losers—had been one of quant's better strategies this year. Yet on November 9th, when news broke of an effective vaccine for covid-19, it had its worst ever day.

Quants rely on history. If something happens that is without precedent, such as a vaccine in a pandemic, they have a problem. No doubt a few quant hedge funds are nursing heavy losses. And perhaps a few discretionary funds have made a killing. The terrain on which human traders can beat the machines is much diminished. But November 9th shows it is still possible. Chalk it up as a small victory for the species.

It is no small irony that momentum trading takes advantage of human weaknesses. One of these is "conservatism bias". Investors tend to stick to prior views too rigidly and change them only slowly in response to new

information. They may give undue emphasis to the price paid for a stock as a marker of its true value and, as a consequence, sell winning stocks too soon and hang on to dud stocks for too long. There is also a contrasting tendency to extrapolate past success. So as well as under-reacting to news, people also over-react to it. Momentum trading seeks to exploit this.

A lot of long-short strategies, including momentum, rank stocks by a particular attribute and then buy the top decile (or quintile) of the group and sell the bottom one. This requires machines. Sorting through thousands of securities quickly is beyond the meagre talents of a living, breathing portfolio manager. It requires algorithms that first establish and then fine-tune the optimal period over which to do the sorting. And it needs speedy and seamless access to automatic trading platforms and market data. You would not want to do all this by hand and brain.

In chess, the brute force of computing power eventually wins out. In investing, the strength of synthetic traders is in dealing with reams of information that is machine-readable, such as tick-by-tick stock prices. The most powerful machines can make sense even of unstructured (“big”) data. But an event like the discovery of a vaccine can flummox even the smartest of them. Humans retain an edge. They are able to winnow down endless possibilities using mental shortcuts. They can imagine scenarios that the past has not thrown up—scenarios such as “a vaccine may become available soon, given the amount of money and effort being thrown at it”; and “news of such a vaccine might spark a sell-off in ‘stay-at-home’ shares and a rally in ‘get-out-of-the-house’ shares”.

But why were the moves in prices so dramatic? A good rule of thumb, says one quant guru, is that the faster you trade, the less capacity there is for your strategy. A speedy trading strategy, such as momentum, relies on liquid markets to keep turnover costs in check. The strategy can become crowded. And when the quants suffer losses, they may be forced by risk-

management rules to close their positions. As everyone rushes to get out at the same time, it makes for extreme price movements. This is in part why sophisticated quant funds are constantly evolving. They look for unique datasets on which to train their machines. Or they try to come up with new ways to parse weaker signals that others cannot detect in the market noise.

The quants have had a rough time, but they are hardly in retreat. Their domain will only expand. The margin of advantage for discretionary trading—for human ingenuity, in other words—will shrink. It is worth remembering that the first time Mr Kasparov played against Deep Blue, in 1996, he won. Now, as he has pointed out, you can download free chess engines that are far more powerful. We should savour victories over the machines while we can. ■



梧桐

机器卡壳

最近一次“量化地震”的教训

输给一台机器是什么感觉？1997年，世界上最优秀的国际象棋选手加里·卡斯帕罗夫（Garry Kasparov）被一台价值千万美元的IBM超级计算机“深蓝”打败。20年后，他围绕这段经历写下了《深思》（Deep Thinking）一书。其中让人感受最深的是，每一场比赛都如此让人精疲力竭。即使像卡斯帕罗夫这样伟大的棋手也会感到疲倦和沮丧。自我怀疑随之滋生。相比之下，深蓝只需要偶尔重启一次。

现在换位想一下。击败了机器又是什么感觉？到今年年底，哪怕是最不精明的投资者，只要买入并持有一支指数基金，就可能取得这样的胜利。因为对于使用强大的计算机从市场数据中寻找模式来预测未来价格的“量化”基金来说，2020年是惨烈的一年。买入近期表现好的股票、卖出近期表现差的股票的“多空”动量策略曾是今年表现较好的量化投资策略之一。然而，11月9日有关一种新冠肺炎疫苗有效的消息传出时，该策略经历了有史以来最糟糕的一天。

量化交易依赖历史数据。如果发生的事件没有先例，例如在全球疫情中一种疫苗问世，它们就有麻烦了。几个量化对冲基金无疑在经受巨亏。而一些自选型基金或许大赚了一笔。人类交易员能够击败机器的领域已经不多了，但11月9日表明这仍然是可能的。就当这是人类取得的一次小小胜利吧。

颇为讽刺的是，动量交易策略恰恰是利用了人类的弱点。其一是“保守性偏差”。投资者往往过分坚持自己先前的观点，面对新信息时不能及时改变看法。他们可能会过分强调股票的买入价格来衡量其真实价值，因此会过早地卖掉牛股，而又过久地持有表现平庸的股票。另一种相反的倾向是根据过往的成功推断未来。因此除了对新消息反应迟缓之外，人们也会反应过度。动量交易正是试图利用这一点。

包括动量交易在内的许多“多空”策略都是根据特定的属性为股票排序，然后买入该类别当中的前十分位（或五分位），同时卖出垫底的股票。这种操作需要机器完成。单凭人类投资组合经理的薄弱能力无法迅速筛选成千上万的证券。这需要通过算法来确定并微调出一个最优的筛选期。同时也需要快速、无缝地访问自动交易平台和市场数据。这样的工作是人的双手和大脑无法胜任的。

在国际象棋中，机器运算的蛮力最终胜出。在投资中，机器交易的优势是能够处理大量机器可读的信息，例如一笔笔的股票交易价格。最强大的机器甚至还能读懂非结构化数据（“大数据”）。但是，即便最聪明的机器面对疫苗诞生这样的事件也会不知所措。人类仍有一个优势。他们能够利用心理捷径来筛选无限的可能性。他们可以想象过去从未出现过的情景——比如，“都已经投入这么多钱、付出这么多努力了，一种疫苗也许很快就会面世”；以及“有关这种疫苗的消息可能会引发‘居家’股票的抛售和‘出门’股票的反弹”。

但为何价格波动如此剧烈？一位量化交易专家表示，一条很好的经验法则是，一种策略的交易速度越快，可供操作的市场容量就越小。像动量交易这样的快速交易策略需要有高流动性的市场来控制交易成本。可能会有太多交易采用这种策略。一旦量化基金蒙受损失，可能会根据风险管理规则的要求被迫平仓。由于所有人都在同一时间争相离场，就会导致价格的极端波动。这也是先进的量化基金不断演化的原因之一。它们寻求独特的数据集来训练机器，或者试图采用新的解析方法从市场噪音中辨别出别人无法察觉的微弱信号。

量化交易这次栽了跟头，但丝毫没有退让。它们的领地只会越来越大。自选交易——也就是人类的聪明才智——相对于机器的优势将逐渐缩小。值得一提的是，1996年卡斯帕罗夫第一次与深蓝交手时，他赢了。而现在，正如他指出的，你能免费下载的国际象棋程序都比当年的深蓝强大多了。趁我们还能击败机器的时候，细细品味这胜利的滋味吧。■



Global technopolitics

The new grand bargain

Without teaming up, democracies will not be able to establish a robust alternative to China's autocratic technosphere

AMERICA HAS long dominated the world in information technology (IT). Its government, universities and enterprising spirit have provided it with decades of leadership in hardware and software. Its military drones, satellites and “system of systems” give its armed forces a powerful edge over those of any competitor. Silicon Valley is more visited by foreign dignitaries and finders-of-fact than any other business locale in the world. One of its tech giants is currently worth over \$2trn; three more are worth over \$1trn. The contribution technology makes to the buoyancy of its markets is without equal.

China, too, has digital resources in abundance, not least its huge population of 1.4bn, which means it will eventually boast an even deeper pool of data and experts to develop AI models. The country's digital giants, from Alibaba to Tencent, have already become AI and cloud-computing powers in their own right. Its people live online to an extent that Americans—many of whom still have cheque books—do not. The country's Great Firewall keeps undesirable digital content out. Within the wall, tech firms are allowed to fight it out as long as they are happy helpers of China's surveillance state.

And China is on the move. It is investing billions in emerging technologies, from AI and chip fabrication to quantum computing and 5G, a new generation of mobile networks. It is hacking other countries' computer systems and grabbing intellectual property where it can. It is packing the organisations that develop global technical rules, such as the International Telecommunication Union. And it is pulling other countries into its orbit

with initiatives such as the “digital Silk Road”, helping them build out their digital infrastructure.

President Donald Trump saw, correctly, that this made China a serious challenger to America’s digital supremacy. His humbling of Huawei, a Chinese telecoms-equipment maker, has begun a decoupling of Chinese and American IT infrastructures and of the supply chains between China and America that will continue.

Many device-makers have already moved part of their production out of China and some will end up with two separate supply chains. Apple’s contract manufacturers, for instance, are setting up plants in India. TSMC, a Taiwanese chip firm, announced in May that it will build a facility in Arizona. Feeling its dependence on American semiconductor technology, China is doubling down on efforts to build its own. In software and other areas, too, bifurcation has begun—and not just because of bans against Chinese apps.

What Mr Trump was unable or unwilling to understand, though, was that China and America are not the only economies that matter in this contest, and that fact provides America with a potentially decisive advantage. India, the European Union, Japan and others all play crucial roles in the world’s IT system—as do tech giants such as Alphabet, Apple and Microsoft.

All these entities, whether national or corporate, are at odds with the American government and often with each other over something or other in the IT world, whether it be visas, privacy rights or competition complaints. But they would also all prefer a world in which international agreements, practices and expectations for IT embody the values and interests they share with America, rather than those of China. And if democratic countries cannot agree on common rules in the digital realm, China could end up setting the rules for large swathes of the world. The

result would be a technosphere engineered for the comfort and support of autocracies.

A partial catalogue of the past few months' disagreements shows the fractiousness that stops the free world coming together on this—and how many opportunities for dealmaking there would be if it decided it should. America's commerce department told foreign firms they could sell no more chips made using American technology to Huawei; its justice department filed an antitrust lawsuit against Google. America also pulled out of talks at the Organisation for Economic Co-operation and Development (OECD), a club of mostly rich countries, about how to tax the tech giants. India blocked dozens of Chinese apps, including TikTok, a popular video-sharing service, which the American government also wants to ban. The European Court of Justice (ECJ) struck down the "Privacy Shield" agreement between America and the European Union (EU), thus throwing the legal basis on which personal data flows across the Atlantic into doubt.

Europe has been trying for some time to carve out its own space in the digital realm as a protector of the citizenry—a noble goal made easier by the fact that the companies from which its citizens are being protected are mostly based the other side of the ocean. This has heightened tensions between Brussels, Washington and Silicon Valley. The ECJ's ruling on the Privacy Shield is one example. The European Commission is drafting legislation that would weaken the power of America's tech giants. Its proposed Digital Services Act would outlaw some of the firms' business practices, such as bundling their services to take over new markets or displaying them more prominently than competing ones.

| *We will rock you*

Some of the EU's member states have also begun defending their right to rule their own digital roost, something now called "digital sovereignty". There is talk of creating a European cloud within the American one. GAIA-X

is a step down that road—a federation of clouds, launched by Germany and France in June, whose members agree to certain rules, such as allowing customers to choose where their data are stored and move freely to providers' competitors if they wish. There is more to come: a “data strategy” on the table in Brussels would, if fully implemented, create “data spaces” ruled by European law and give people more rights on how their data are used.

These disputes offer ample space for mutually beneficial trade-offs. If America and its allies can reach good enough accommodations on the most contentious issues—notably privacy and competition—and find ways to live with the smaller contradictions and conflicts which remain, they can become a force to be reckoned with—one that others will need little encouragement to join. An insular America can remain a technology superpower. A connected America cemented into the rest of the world by means of a grand technopolitical bargain could be the hub of something truly unsurpassable.

There is a range of ideas about how to do this. In a recent report for the Council on Foreign Relations, a think-tank, Robert Knake imagines such a grand bargain taking the form of a “digital trade zone”, complete with a treaty organisation. America would “weaponise its digital trade relationships” in order to promote such things as cyber-security, privacy protection and democratic values on the internet. Only countries that comply with the organisation's rules on such matters would be able to become members and only members would be allowed fully to trade with each other digitally. Violations would be dealt with by imposing sanctions and tariffs. “If the digital trade zone grows strong enough, China might see more benefit to co-operative engagement than to continued disruptive behaviour,” writes Mr Knake.

Others prefer to imagine something less formal, rules-based and punitive.

In October three other think-tanks—the Centre for a New American Security (CNAS), MERICS of Germany and the Asia-Pacific Initiative of Japan—outlined a less exclusive construction. They propose that democratic countries form a “technology alliance” not subject to a formal treaty. It would be like the G7, which consists of America, Britain, Canada, France, Germany, Italy and Japan, and could one day, perhaps, include India and other countries from the Global South. It would hold regular meetings, as the IMF and World Bank do, and issue consensus opinions, and it would invite other stakeholders—from NGOs to tech firms—to pitch in.

| *Let us cling together*

Until last month, such ideas seemed premature. But with Joe Biden soon in the White House, they have become more realistic: IT will be high on the agenda of the “summit of democracies” he has promised to convene. Closer co-ordination and some new institutions to back it up are also more needed, and not just because of the Chinese threat. The coronavirus, by pushing much of human activity into the cloud, has emphasised the importance of the digital realm and its governance. Left alone, the world of technology will continue to disintegrate into a splinternet in which digital protectionism is widespread—much as the global financial system fell apart before the second world war.

To make sense of all this, it helps to see the political world as one in which technology is beginning to look ever more like geography. The geopolitical way of looking at the world, which was born in the 19th century and revolutionised strategic thinking in the 20th, was based on the idea that the geographical aspects of the physical world could be crucially important to the relations between states. Mountains that blocked transit and plains that permitted it; oilfields and coalfields; pinch-points where maritime traffic could be constrained. Where a state’s territory stood in respect to such geographical facts of life told it what it should fear and what it might aspire

to, whose interests conflicted with its own and whose might align with them. In other words, geography was destiny.

The units of analysis for today's nascent technopolitics are platforms: the technologies on which other technologies are built—and alongside them, increasingly, businesses, governments and ways of life. The platform of all platforms is the internet. Some of the things which stand upon it are huge and widely known, such as Facebook, others small and obscure, such as Kubernetes, a sort of software used in cloud computing. Like geographical territories, these platforms have their own politics. They have their own populations, mostly users, coders and other firms. They have their own laws, which lay out who can change code and access data. They have a position with respect to other platforms which underpin, compete with or build on them, just as territories have defined relationships with their neighbours.

And they have their own governance systems. Some are “open”. The most famous is Linux, an operating system created and maintained through cooperative efforts to which all are, in principle, free to contribute and from which all are welcome to benefit. Others are “closed”, as is the convention among many corporate-software makers, such as Oracle. Some are run like absolute monarchies, such as Apple under Steve Jobs, who was the final arbiter over the smallest details in his tech empire.

| *Don't stop me now*

Their dominant positions in this world of platforms give companies like Facebook and Google powers approaching or surpassing those of many countries. Yet countries can—as their economies become more digitised—be increasingly understood as platforms, too: national operating systems of sorts. Natural resources still count, but digital resources are gaining ever more relevance: skilled and well-trained tech workers, access to scads of data, computing power, internet bandwidth, industrial policy

and venture capital. And as with technology platforms, a country's competitiveness will, to a large extent, depend on how it manages and multiplies these resources.

America is a platform like Microsoft's Windows and Android, Google's mobile operating system. These mix aspects of open and closed systems, allowing others to develop applications for their platform, but also closely control it. America combines monopolies and a strongish state with lots of competition. Mainly thanks to this profitable amalgam, the country has given rise to most of the world's leading tech firms. China is more like Apple and Oracle, which combine being closed with lots of internal competition. The European Union is best compared to an open-source project such as Linux, which needs complex rules to work. India, Japan, Britain, Taiwan and South Korea all run differently and have technology bases to match.

The rise of cloud computing and AI—the first a truly global infrastructure, the second its most important application—has heightened the tensions between these platforms. More and more value is created by using oodles of computing power to extract AI models from digital information generated by people, machines and sensors. The models can then be turned into all sorts of services. Transport, health care, teaching, campaigning, warfare—these parts of society will not become “data-driven” as fast as many predict, but in time they will all be transformed. Whoever controls the digital flows involved can divert much of the rent they generate. Knowledge is power in the virtual world even more than in the real one—and it generates profit. Ian Hogarth, a British tech thinker, summarised the sudden sense of urgency when he wrote in a paper in 2018 that “AI policy will become the single most important area of government policy”.

Many rich countries have drawn up ambitious industrial-policy plans for

AI. Some have also instituted national data strategies which limit the data that can leave the country. A few have begun attacking other countries' platforms by hacking their computer systems and spreading misinformation. In short, they are behaving increasingly like the companies producing the technology reshaping their world. "Everybody has become much more techno-nationalist," says Justin Sherman of the Atlantic Council, a think-tank.

That the 21st-century internet would be a splinternet was, perhaps, inevitable. It is not just that nations act in their own interests; they also have different preferences and values, for instance regarding privacy. High digital borders behind which data get stuck, however, are not in the interests of most countries—though they may be in the interest of some governments. Russia wants to create a "sovereign internet" that can be cut from the rest of the online world at the flip of a switch (while retaining the capability to mess around in more open systems). Countries interested in using flows of data to improve their citizens' lot, though, will see few advantages. In a splinternet world choice will be limited, costs will rise and innovation will slow. And all the while China, with the biggest silo and thus the greatest access to data, loses least.

| *You're my best friend*

It is against this background that a grand bargain needs to be struck. Its broad outline would be for America to get security guarantees and rule-making bodies in which its interests can be taken seriously. In return it would recognise European privacy and other regulatory concerns as well as demands that tech titans be properly taxed. Ideally, such a deal would also include India and other developing countries, which want to make sure that they do not risk becoming mere sources of raw data, while having to pay for the digital intelligence produced.

In terms of security, the parties to the bargain would ensure each other

secure, diverse supply chains for digital infrastructure. To get there, the CNAS proposes, in effect, to partially mutualise them: among other things, members of a tech alliance should co-ordinate their efforts to restructure supply chains and might set up a semiconductor consortium with facilities around the world. Supporting open technologies and standards that create a diverse set of suppliers would help, too. An example is OpenRAN, a mobile network that allows carriers to mix and match components rather than having to buy from one vendor. A world with open infrastructure like this need not, in principle, just depend on a few suppliers, as is the case today with Huawei, Nokia or Ericsson.

To give in to Europe on other fronts in return for help in such matters would be costly to America, which has largely opposed attempts to regulate and tax its tech giants abroad. In terms of statecraft, that is an attractive part of the arrangement; to be willing to pay a cost shows that you place real value on what you are getting.

If an alliance of democracies is to deliver a China-proof technosphere, America will have to accept that the interdependence of the tech world on which the whole idea is based means that it cannot act unconstrained. Henry Farrell of Johns Hopkins University argues that America has so far simply “weaponised” this interdependence, using chokepoints where it has leverage to strangle enemies and put pressure on friends. But Europe’s resistance to banning Huawei’s gear and the ECJ’s decision show that even friends can balk. America needs to give if it is to receive.

It might not have to give all that much. European views on regulating platforms more strictly because of their tendency to become quasi-natural monopolies are not exactly mainstream in Washington, DC, but nor are they completely alien to the political debate there. A recent congressional report about how to limit big tech’s power included many ideas already touted in Brussels, such as banning tech giants from favouring their own

services and refusing to connect to competing ones. Positions on regulating speech online are not that far apart either. As in Europe, there is growing agreement in America that legislation is needed to push social-media firms to do more to rid their services of hate speech and the like.

A deal on taxing tech firms seems within reach, too. The Trump administration resisted efforts to compel them to pay taxes where they do business rather than in tax havens, regarding this as a grab for the profits of American companies. A Biden administration is likely to be more open to the argument that more of the taxes on digital firms should go to places where their customers live. Expect negotiations on the matter at the OECD to be revived—as they must be to keep countries from charging digital taxes unilaterally. Barring a compromise, France, Spain and Britain will start collecting such a levy early next year.

In parts of the world's international bureaucracy the grand bargaining has already begun. When Japan presided over the G20, a club of developing and rich countries, last year, it succeeded in getting the group to launch the “Osaka Track”, an attempt to come up with rules to regulate global data flows. This summer also saw the launch of the Global Partnership in AI, which is meant to come up with rules for the responsible use of AI, and of the Inter-Parliamentary Alliance on China, which brings together lawmakers from 18 countries. These new groups join a few established ones, such as the OECD and the Internet Governance Forum, which have long pushed for common rules in the digital realm. NATO has started to do the same for AI and data-sharing among its members.

One of the key parameters in the bargaining will be how formal a framework the parties want. In some ways, formal is better: everyone knows where they stand. In others, formal is worse: agreement is harder. Take the example of trade, thoroughly formalised within the WTO. Trade agreements take years to negotiate, often only to be blocked by legislatures

at the last minute. This is why a Biden administration will probably aim for a much looser form of co-operation, at least initially. An idea discussed in foreign-policy circles close to Mr Biden is that, instead of agreeing on certain policies that then have to be implemented nationally, governments should opt for a division of labour within certain red lines. If Europe wants to go ahead with rules to regulate big tech which do not amount to expropriation, America would not put up a fight—thus allowing the EU regulation to become the global standard of sorts, rather as it has done with the GDPR.

| *The show must go on*

Compromises that provide something for everyone are not hard to spot. But reaching them will not be easy. After four years of President Trump, “the mistrust on the European side runs deep,” says Samm Sacks of CNAS. On the other side of the Atlantic, Congress will not want to make life more difficult for its intelligence agencies, for whom social media and online services have become a crucial source of information. In order for a grand bargain to be reached, all of that must be made more difficult. If the ECJ struck down the Privacy Shield, it was mostly because the court believed that America does not provide enough safeguards to protect European data from the eyes of its intelligence and law-enforcement agencies.

Another big barrier on the way to a bargain will be the question of how much America’s tech titans need to be reined in. “To bring globe-spanning technology firms to heel, we need something new: a global alliance that puts democracy first,” argues Marietje Schaake, a former member of the European Parliament who now works for the Cyber Policy Centre at Stanford University, in a recent article. Many in California and elsewhere in America like the sound of this, but Congress will only go so far in restricting its tech giants and their business model, which is increasingly based on extracting value from data.

Even if a grand bargain can be reached, many small ones will need to be done as well. That is why, in the long run, the world needs more than bilateral deals and a loose form of co-operation, but something more robust and specialised. It may even have to be something like a World Data Organisation, as Ian Bremmer of the Eurasia Group has suggested (or at least a GADD, a General Agreement on Data and Digital Infrastructure, a bit like the General Agreement on Tariffs and Trade, as the WTO's predecessor was called). Given the sorry state of the WTO, this may seem fanciful, but without such an organisation today's global data flows may shrink to a trickle—much as protectionism limited trade in the days before the GATT and the WTO.

Will it ever happen? Yes, if history is any guide. In July 1944 representatives of 44 countries met in Bretton Woods, New Hampshire, to hash out a new financial order, including the IMF and the World Bank. Granted, the pandemic is no world war. But, with luck, living through it may provide enough motivation to try again in the digital realm. ■



全球科技政治

新的大协议

没有合作，民主国家将无法建立能替代中国专制科技圈的强健系统【深度报道】

长久以来美国主导了IT领域。它的政府、大学和创业精神让它在数十年里引领硬件和软件行业。它的军用无人机、卫星和“系统的系统”（system of systems）给了它的军队超越任何竞争对手的强大优势。访问硅谷的外国政要和调查人员的数量比世界上任何其他商业区都多。它有一家科技巨头目前市值超过两万亿美元，另有三家超过一万亿美元。技术对其市场繁荣的贡献无与伦比。

中国也拥有丰富的数字资源，尤其因为它有14亿人口，这意味着中国最终会有更多的数据和专家来开发AI模型。从阿里巴巴到腾讯，中国的数字巨头已经凭自身建立了强大的AI和云计算能力。中国人生活的网络化程度让美国人相形见绌——很多美国人还在用支票簿。中国的防火墙把它不欢迎的数字内容挡在门外。在防火墙内，只要科技公司乐意协助政府监控，它们就可以一争高下。

而且中国正在积极行动。它正在新兴技术领域投入巨资，包括AI、芯片制造、量子计算和新一代移动网络5G等。它在触角可及的地方入侵其他国家的计算机系统并攫取知识产权。它向国际电信联盟（International Telecommunication Union）等制定全球技术规则的组织安插人员。它还通过“数字丝绸之路”等倡议帮助其他国家建立数字基础设施，借此将它们拉入自己的势力范围。

特朗普正确地看到这让中国对美国的数字霸权地位构成了严重挑战。他对中国电信设备制造商华为的打压已经开始让中美的IT基础设施以及两国间的供应链脱钩，这种脱钩还将继续下去。

许多设备制造商已经将部分生产线迁出中国，有些制造商最终将拥有两条独立的供应链。例如，苹果公司的代工厂就正在印度建厂。台湾芯片公司

台积电在5月宣布将在亚利桑那州建厂。中国真切感受到了自己对美国半导体技术的依赖，正在加倍努力打造自己的半导体产业。在软件等领域，分叉也已开始，而这不仅仅是因为中国的应用被禁。

但特朗普无法或不愿理解的是，中国和美国并不是这场竞赛中唯一重要的两个经济体，而这一事实为美国提供了潜在的的决定性优势。印度、欧盟、日本以及其他国家和地区都在全球IT体系中发挥着至关重要的作用，Alphabet、苹果和微软等科技巨头也一样。

所有这些实体——无论是国家还是企业——都在IT领域与美国政府存在这样或那样的矛盾，无论是签证、隐私权，还是竞争申诉等。它们彼此之间往往也有这类矛盾。但它们也都更希望IT领域的国际协议、实践和预期能体现它们与美国共有的价值观和利益，而不是中国那一套。而且，如果民主国家不能就数字领域的共同规则达成共识，那么最终可能就会由中国来为世界大片地区制定规则。其结果是整个科技圈的运作会迎合和支撑专制政权。

过去几个月里的部分分歧显示，这些实体之间容易产生纷争，阻碍了自由世界在这方面团结一致，也显示出它们如果决意合作，就能有很多机会达成一致。美国商务部告知外国公司不得再向华为出售使用美国技术制造的芯片。美国司法部对谷歌提起了反垄断诉讼。美国还退出了主要由富裕国家组成的经合组织（OECD）就如何对科技巨头征税所开展的谈判。印度封锁了几十个中国的应用，其中包括美国政府也希望禁用的流行视频共享服务TikTok。欧洲法院否决了美国与欧盟之间的《隐私保护盾》（Privacy Shield）协议，让跨大西洋传输个人数据的法律依据受到质疑。

欧洲在数字产业中努力开辟自己作为公民保护者的一席之地已有一段时日。它为保护其公民而防范的公司总部大多在大西洋彼岸，减轻了实现这一崇高的目标的难度。这让布鲁塞尔、华盛顿和硅谷之间关系紧张。欧洲法院对《隐私保护盾》的裁决就是一个例子。欧盟委员会正在起草将削弱美国科技巨头影响力的法律。它拟议的《数字服务法案》（Digital Services Act）将禁止科技公司的某些商业行为，例如捆绑自己的服务以占

领新市场，或者把自己的服务摆在比竞争对手更显眼的位置。

| 我们会震撼你

一些欧盟成员国也已经开始捍卫对自己的数字领地的权利——现在叫作“数字主权”。人们正在讨论在美国的云里建立欧洲云。GAIA-X项目就是为此创建的，这是由德国和法国于6月发起的云联盟，其成员就一些规则达成了一致，比如允许用户选择在哪里存储数据，或者按自己的意愿把数据自由转移到供应商的竞争对手那里。未来还会有更多动作：布鲁塞尔正在讨论的“数据战略”如果得到充分实施，将创建受欧洲法律管辖的“数据空间”，赋予人们更多决定自己的数据如何被使用的权力。

这些纠纷提供了大量空间来达成互惠的折衷方案。如果美国及其盟国能够在最有争议的问题（尤其是隐私和竞争）上求得大同，并找到留存小异的方法，那它们就是一支不可小觑的力量，其他国家无需鼓励也会想加入它们。一个封闭的美国依然会是科技超级大国。而一个借助一项科技政治大协议与世界其他地区牢牢粘固在一起的美国却可能主导一个真正不可超越的系统。

关于如何做到这一点有很多想法。在最近为智库对外关系委员会（Council on Foreign Relations）撰写的一份报告中，罗伯特·科纳克（Robert Knake）设想的大协议形式是“数字贸易区”加上一个公约组织。美国将“把其数字贸易关系作为武器”，以求在互联网上加强网络安全、隐私保护和民主价值观。只有遵守公约组织在这些问题上的规则的国家才能成为成员国，只有成员国之间才能进行全面的数字贸易。违规者将被制裁和加征关税。“如果数字贸易区变得足够强大，中国可能会看到合作参与要比持续破坏好处更多。”科纳克写道。

其他人则更倾向于设想一些不那么正式、较少基于规则和惩罚的形式。10月，另外三个智库——新美国安全中心（CNAS）、德国的墨卡托中国研究中心（MERICS）和日本的亚太倡议（Asia-Pacific Initiative）——概述了一种没那么排他的架构。它们建议民主国家组成一个不受制于正式条约的“技术联盟”。它就像是由美国、英国、加拿大、法国、德国、意大利和日

本组成的七国集团，可能有一天会纳入印度和其他发展中国家。它将像IMF和世界银行那样定期召开会议，发表共识，并邀请非政府组织和科技公司等其他利益相关者参与进来。

| 让我们紧相连

在11月之前，这类想法似乎还不成熟。但随着拜登不久将入主白宫，它们已变得更现实可行：在他承诺召集的“民主国家峰会”中，IT会是一个重要议题。促成更紧密的协调和支撑这种协调行动的新机构如今也更显迫切，这不仅仅是因为中国带来的威胁。疫情把很多人类活动推上云端，凸显了数字领域及其治理的重要性。如果任其发展，科技世界将继续分裂成数字保护主义泛滥的“分裂网”，与二战前全球金融体系的瓦解颇为相似。

要理解这一切，在观察政治世界时，可以认为科技因素越来越像地理因素。从地缘政治的角度看待世界始于19世纪，并在20世纪彻底改变了战略思维。它的思想基础是现实世界的地理特征可能对国家间的关系至关重要。阻挡交通的山脉和通行无阻的平原、油田和煤矿、能够限制海上交通的咽喉要道……一国领土的这些实际地理因素决定了它该害怕什么，可以追求什么，哪国利益与本国相冲突，哪国可能与其一致。换言之，地理即命运。

分析当今新生的科技政治的单位是平台，即支撑其他技术的技术，以及与之关联越来越紧密的企业、政府和生活方式。所有平台的平台是互联网。在互联网上，有的平台规模庞大且广为人知，比如Facebook，也有的小而不知名，如一种用于云计算的软件Kubernetes。像地理上的领土一样，这些平台也有自己的政治。它们有自己的人口，主要是用户、程序员和其他公司。它们有自己的法律，规定了谁可以更改代码和访问数据。它们对其他平台秉持某种位置立场——那些平台或者为自己提供了支撑，或者与自己竞争，或者建基于自己之上——就像领土与其邻国的关系界定那样。

它们还有自己的治理体系。有些是“开源的”。其中最著名的是Linux，这个操作系统通过合作来创建及维护，原则上所有个人和机构都可以自由地修改该系统，也欢迎各方从中受益。其他平台则是“闭源的”——大量企业

软件制造商的惯常操作，比如甲骨文。有些平台的运作像绝对的君主制一样，例如乔布斯领导下的苹果，在他的科技帝国中，最小的细节都要由他做最终裁决。

| 现在别拦我

在这个平台世界中的主导地位让Facebook和谷歌等公司“势可敌国”。但是，随着各个经济体的数字化程度不断提高，国家也日益可被看作平台——某种程度上的国家操作系统。自然资源仍然很重要，但是数字资源变得越来越重要，包括训练有素的熟练科技工人、海量数据的访问权、计算能力、互联网带宽、产业政策和风险投资。和科技平台一样，一国的竞争力在很大程度上将取决于它如何管理和扩大这些资源。

美国就像是微软的Windows和谷歌的移动操作系统安卓那样的平台，开源和闭源系统的特征兼而有之，既允许其他人为其平台开发应用，同时也对平台严加控制。美国将垄断和较强势的政府与大量竞争相结合。美国主要得益于这种有利的混合形式，催生了大多数全球领先的科技公司。中国大陆更像是苹果和甲骨文那样的平台，封闭而内部竞争激烈。欧盟与Linux这类开源系统最相近，它的运作需要依赖复杂的规则。印度、日本、英国、台湾和韩国的运行方式各不相同，也都有相匹配的技术基础。

真正的全球基础设施云计算及其最重要的应用AI的兴起加剧了这些国家平台之间的紧张关系。通过使用庞大计算能力从人、机器和传感器生成的数字信息中提取AI模型，越来越多价值正被创造出来。这些模型而后可以转变为各种各样的服务。运输、医疗、教学、竞选和战争——人类社会的这些方面将不会像许多人预测的那样迅速变成“数据驱动”，但假以时日它们全都将转型。谁能控制这些领域的数字流，谁就能分走它们产生的大部分经济租。“知识就是力量”在虚拟世界中的效应更甚于在真实世界，而且知识还可以产生利润。英国科技思想家伊恩·霍加斯（Ian Hogarth）在2018年的一篇文章中对突然浮现的紧迫感做了总结，认为“AI政策将成为政府政策中最重要的领域，没有之一”。

许多富裕国家已经草拟了雄心勃勃的AI产业政策计划。有些还制定了国家

数据策略，以限制可能离开本国的数据。一些国家已经开始通过入侵其他国家的计算机系统并传播错误信息来攻击它们的平台。总之，这些国家的行为越来越像那些开发出技术来重塑世界的公司。“大家的科技民族主义情绪都大涨。”智库大西洋理事会（Atlantic Council）的贾斯汀·谢尔曼（Justin Sherman）说。

也许21世纪的互联网演变成分裂网已是不可避免。这不仅仅是因为各国从自身利益出发各行其是，也因为它们在隐私等问题上有不同的偏好和价值观。但是，竖起高高的数字边境阻止数据的流动不符合大多数国家的利益，尽管这可能符合某些政府的利益。俄罗斯希望打造一个“主权互联网”，可以随时轻松隔断与全球互联网的连接（同时仍能在其他更开放的系统中捣乱）。而那些有意利用数据流来改善民生的国家几乎没有优势。在分裂网的世界中，选择会受限，成本会增加，创新会放缓。而与此同时，拥有最大的“筒仓”而可以获取最多数据的中国损失最小。

| 你是我最好的朋友

正是在这种背景下，需要达成一项大协议。它的大致内容是让美国获得安全保证，以及能够认真对待其利益的规则制定机构。作为回馈，它将认可欧洲的隐私和其他监管顾虑，以及对科技巨头恰当收税的要求。理想情况下，这样的协议还应包括印度和其他发展中国家，它们希望确保自己不会沦为纯粹的原始数据来源，同时还得为这些数据带来的数字智能付费。

在安全方面，协议各方将确保为彼此提供安全的、多样化的数字基础设施供应链。为此，新美国安全中心建议将供应链的一部分相互融合：这个科技联盟的成员应携手重组供应链，也许可以建立一个在世界各地都有设施的半导体联盟，诸如此类。支持开放技术和标准以创建多元化的供应商群体也有助益。OpenRAN就是这样一个例子，该移动网络让运营商可以混合搭配基础设施部件，而不必绑定一家供应商。在这样一个拥有开放性基础设施的世界里，原则上就不需要像今天这样依赖华为、诺基亚或爱立信等少数几家供应商了。

对美国而言，在其他方面对欧洲让步以换取在上述问题上的帮助代价高

昂。美国很大程度上一直反对自己的科技巨头在国外被监管和课税。但从治国方略看，这会是“大协议”的一个吸引人之处，因为愿意付出代价会向世人表明你确实重视自己要换取的东西。

如果民主国家联盟要建立一个“防华”科技圈，美国将不得不接受一件事：科技世界的相互依存——也就是整个构想的基础——意味着美国不能不受约束地行事。约翰·霍普金斯大学的亨利·法雷尔（Henry Farrell）认为，到目前为止，美国只是“武器化”了这种相互依存关系，利用它有影响力的咽喉点扼杀敌人并向盟友施压。但欧洲对禁用华为设备的抵制以及欧洲法院的裁决表明，即使盟友也可能踌躇不前。想要有所得，美国就需要有所付出。

美国可能并不需要付出太多。欧洲认为科技平台往往会自然而然地形成垄断，因此需要更严格的监管，这种观点在华盛顿不是主流，但在那里的政治辩论中也不完全陌生。国会最近关于如何限制科技巨头影响力的报告就包括了布鲁塞尔已经在提倡的许多方案，例如禁止科技巨头偏向自家服务和拒绝连接竞争对手的服务。双方对监管网络言论所持立场也相差不多。和在欧洲一样，美国也有越来越多的人同意需要通过立法来推动社交媒体公司做出更多努力，在它们的平台上隔绝仇恨言论之类的内容。

一项对科技公司征税的协议似乎也触手可及。特朗普政府拒绝强迫科技公司在业务所在地而非避税天堂缴税，视之为抢夺美国公司的利润。对于这类税收更多应流向公司客户所在地的观点，拜登政府很可能持更开放的态度。可以预期经合组织会恢复这方面的谈判——为避免各国单方面征收数字税也必须重启谈判。如果无法达成妥协，法国、西班牙和英国将于明年年初开始征收这类数字税。

在一些国际组织机构中，对“大协议”的谈判已经开始。去年日本在主持G20（由一些发展中国家和富裕国家构成的组织）峰会时成功让该组织创设了“大阪框架”（Osaka Track），以求制定规范全球数据流的规则。今年夏天新创的组织包括AI全球合作组织（Global Partnership in AI），旨在就负责任地应用AI建立规则，以及汇集18个国家立法机构的对华政策跨国议

会联盟（Inter-Parliamentary Alliance on China）。它们加入了经合组织和互联网治理论坛（Internet Governance Forum）等成熟机构的行列，这些成熟机构长期推动建立数字领域的通用规则。北约也已开始在其成员国之间寻求制定AI和数据共享规则。

谈判中的关键因素之一是各方想要一个多正式的框架。在某些方面，正式一点更好，这样各方都明确自己的立场。在另一些情况下，正式会造成问题，因为这样更难达成协议。以WTO内完全正规化的贸易谈判为例。贸易协定的谈判耗时数年，结果往往在最后一刻卡在成员国的立法机构。因此拜登政府至少在初期很可能会寻求一种宽松得多的合作形式。一些与拜登关系密切的外交政策圈子讨论的一个想法是，政府不应就某些需要在国内实施的政策达成一致，而应该划清界限，明确分工。如果欧洲想继续执行监管科技巨头的法规，只要没到征用的地步，美国就不会发起争斗，而让欧盟法规像通用数据保护条例（GDPR）那样成为某种全球标准。

| 合奏必须继续

让各方都能有所得的妥协方案并不难找到。但要达成妥协并不容易。特朗普执政四年后，“欧洲的不信任感非常强烈，”新美国安全中心的萨姆·萨克斯（Samm Sacks）说。而在大西洋彼岸，美国国会不希望加大情报机构工作的难度。社交媒体和在线服务已成为这些机构重要的信息来源，而为达成大协议，这些信息搜集工作都必然会变得更难。欧洲法院否决《隐私保护盾》主要是因为它认为美国没有提供足够的保障来保护欧洲的数据免受美国情报和执法机构的监控。

达成协议的另一大障碍是美国的科技巨头需要在多大程度上被约束。“要让业务遍布全球的科技公司顺从配合，我们需要新的尝试：一个将民主放在首位的全球联盟。”曾任欧洲议会议员、目前在斯坦福大学网络政策中心（Cyber Policy Centre）任职的玛丽切·沙克（Marietje Schaake）最近在一篇文章中指出。加州和美国其他地区的许多人都喜欢这种提法，但对于限制科技巨头及其越来越依赖从数据中提取价值的商业模式，国会能做的有限。

即使可以达成一个大协议，也还需要同时达成很多小协议。因此，长远来看，世界需要的不仅仅是双边协议和宽松的合作，而是某种更强健、更专门化的东西。甚至可能必须要有一个像欧亚集团（Eurasia Group）的伊恩·布雷默（Ian Bremmer）建议的“世界数据组织”之类的机构（或者至少也得有一个“数据和数字基础设施总协定”[GADD]这样有点像WTO的前身“关贸总协定”的东西）。考虑到WTO现在令人遗憾的状况，这似乎有点异想天开，但如果没有这样的组织，今天的全球数据洪流可能会萎缩成细流，正如在成立“关贸总协定”和WTO之前贸易保护主义限制了贸易发展那样。

这真能实现吗？能，如果历史可以作为参照的话。1944年7月，来自44个国家的代表在新罕布什尔州的布雷顿森林开会，经充分讨论后建立了包括IMF和世界银行在内的新金融秩序。当然，疫情不是世界大战。但是，幸运的话，抗击疫情可能会带来足够的动力，在数字领域也试一回。■



The Economist film

Disrupting Corruption - trailer

Corruption costs the world nearly 3 trillion dollars every year, but in some parts of the world there's a renewed drive to disrupt corruption - with new technologies.



经济学人视频

抗击腐败的数据科技（预告）

腐败每年令全球损失近3万亿美元，但在世界某些地方，科技已开始成为颠覆腐败的新动力。



Globalisation

Ports in a storm

The great port cities were the keys that opened up the world

IN LIVERPOOL, A French observer marvelled in 1907, “one feels one is in contact with America, Australia, west Africa, the Far East, at the same time as with Germany and France. There one is at the commercial centre of the world.”

This remark neatly captures the subject of John Darwin’s new book. He tracks a century of what he calls “steam globalisation”, when steamships and railways drove a dramatic acceleration in the exchange of goods, people, ideas and money across the world. Faster and cheaper transport seemed to shrink the globe; the volume of world trade and foreign investment soared. Mr Darwin shows how major port cities were both products of these transformations and agents of change. In the great opening up of the world that is his subject, the port cities were the hinges.

The current era of globalisation, the author notes, is not unique but the latest in a series that have built on each other in a cumulative, though not neatly linear, fashion. In the mercantile system that sprang up in the wake of the voyages of Ibn Battuta, Christopher Columbus and Vasco da Gama, Asia was the world’s workshop and Europe relatively peripheral.

Then coal, readily available in Europe, fuelled what historians have called the “Great Divergence” of the 18th century, whereby Europe (and later North America) came to dominate. By describing the evolution and sometimes decline of a number of major port cities, most compellingly London, Bombay, Singapore and New York, Mr Darwin shows how this process worked.

Singapore, for instance, grew exponentially, and played a central role in the industrialisation of tin and rubber production in its maritime hinterland of Malaysia. New Orleans rose in importance with the Mississippi riverboat steamer, only to decline as railway connections to Baltimore and New York changed the dynamics of American trade once more. Trieste enjoyed a brief heyday as the Austro-Hungarian Empire's main seaport, before collapsing abruptly into romantic obscurity after 1918.

Mr Darwin takes globalisation to mean primarily "economic connectedness between different parts of the world". That is a reasonable but limited definition, missing the ascent in the 19th century of ideologies such as nationalism and socialism that purported to explain social relations around the world. Rising sciences such as geology and palaeontology had a similarly broad scope. "Unlocking" the world, meanwhile, is a vivid metaphor, but it implies a smooth, even inevitable process. In reality the world's doors were not just unlocked, but often kicked down. Mr Darwin knows this, and stresses the influence of geopolitics and imperialism, not just free trade as an abstract concept. But he might have depicted the bootprints more graphically.

Still, his book is an enjoyable synthesis of a large body of scholarship. He closes by remarking that today's globalisation is not simply a bigger, faster version of what happened in the steam age. As in the early-modern period, Asia is once again the workshop of the world. He wonders if there is another parallel, however. In 1914 the European-dominated global economic system seemed irresistible. Then war intervened. Will a systemic crisis break the current cycle of globalisation, too? ■



全球化

风暴中的港口

伟大的港口城市是打开世界的钥匙【《解锁世界》书评】

一九〇七年，一位法国观察家惊奇地发现，在利物浦，“人们觉得自己在和德国、法国连接的同时，也在和美国、澳大利亚、西非以及远东地区联系。在那里他们处于全世界的商业中心”。

这句话可以拿来概括约翰·达尔文（John Darwin）新书的主题。他追溯了他称之为“蒸汽全球化”的一个世纪，期间轮船和铁路极大地加速了世界各地商品、人员、思想和金钱的交换。更快、更便宜的交通似乎把地球缩小了；世界贸易量和外国投资猛增。达尔文展示了主要的港口城市既是这些转变的产物又是改变的推动力。在他的“世界大开放”的主题中，港口城市起到了枢纽作用。

作者指出，目前的全球化时代并非独一无二，而是一系列相互累积的时代中最新的一个，尽管这种累积并不是完全线性的。在伊本·白图塔（Ibn Battuta）、哥伦布和达·伽马航海之后兴起的商业体系里，亚洲是全世界的工厂，而欧洲处于相对次要的地位。

随后，欧洲便于开采的煤矿资源推动了历史学家所说的18世纪的“大分流”，欧洲（以及后来的北美）开始占据主导地位。达尔文描述了一些主要港口城市的发展——有时是衰落——来展示这个过程。其中最令人信服的例子有伦敦、孟买、新加坡和纽约。

例如，新加坡经济呈指数级增长，并在马来西亚航运腹地的锡和橡胶生产的工业化进程中发挥了核心作用。新奥尔良的重要性随着密西西比河上内河轮船的出现而上升，但通往巴尔的摩和纽约的铁路再次改变了美国贸易的格局，新奥尔良的地位随之下降。作为奥匈帝国的主要海港，的里雅斯特（Trieste）曾短暂地繁荣过一段时间，但在1918年后骤然崩溃而隐匿为一个朦胧神秘之地。

达尔文把全球化主要诠释为“世界不同地区之间经济上的连通性”。这个定义合理但有局限，它忽略了民族主义和社会主义等意识形态在19世纪的崛起，它们想要解释世界各地之间的社会关系。地质学和古生物学等新兴科学也有同样广阔的研究领域。与此同时，“解锁”世界是个生动的比喻，但暗示了一个平稳的甚至是不可避免的过程。而在现实中，世界各地的大门不只是被解锁的，而常常是被踢开的。达尔文明白这一点，他强调了地缘政治和帝国主义的影响，而不仅仅是自由贸易这个抽象概念。但他或许本可以更生动地描绘出这些足印。

不过，他这本书仍然是对大量学术研究的精彩集成。他在结尾处评论说，今天的全球化不仅仅是蒸汽时代全球化的更大、更快的版本。和近代早期一样，亚洲再次成为世界工厂。不过他寻思着是否还存在另一个类似的现象。1914年，欧洲主导的全球经济体系似乎势不可挡。然后战争来了。会不会再发生一场系统性危机，打破目前这一轮全球化周期？ ■



Janet Yellen

Something for everyone

The Fed's former chairwoman will lead the Treasury. What does she stand for?

IN THE FIRST instalment of the “Harry Potter” series, the protagonist stumbles across the Mirror of Erised. Anyone who looks into the mirror sees the “deepest, most desperate desire” of their hearts reflected back at them. There is a touch of Erised about President-elect Joe Biden’s decision to nominate Janet Yellen as America’s next treasury secretary, announced on November 30th. No economist is more qualified than Ms Yellen, a former head of the Federal Reserve and a respected academic, for the job. Perhaps more important, however, for what is a political role as much as an economic one, people from the progressive left to the conservative right can see something to like in her.

In today’s political configuration, that matters. Mr Biden must tame a split in the Democratic Party between run-of-the-mill centrists and tear-it-down millennial socialists. And before she becomes treasury secretary, Ms Yellen must be confirmed by the Senate, which Republicans currently control. That hurdle ruled out candidates such as Elizabeth Warren, a senator from Massachusetts whom many Republicans would never confirm because she is seen as too hostile to free markets and the financial industry.

In the days before the announcement Washington insiders believed the race was between Ms Yellen and Lael Brainard, a governor of the Fed. Some favoured Ms Brainard on the grounds that she had more expertise in trade economics, others because she is younger than Ms Yellen, and would therefore do a better job of balancing an elderly president. Left-leaning Democrats were particularly taken with Ms Brainard’s monetary doveishness.

Yet Ms Yellen has many advantages of her own. She is an accomplished economist, originally specialising in labour economics, and is the president of the American Economic Association, the field's pre-eminent learned society. (There are also few better-liked people in the profession; wonks turn up their collars in homage to one of Ms Yellen's sartorial quirks.) She was a highly competent chairwoman of the Fed between 2014 and 2018, communicating the central bank's intentions clearly in advance so as not to take investors by surprise. Her experience at the Fed may prove useful given that the central bank and the Treasury must continue to cooperate to help the economic recovery along. Under Ms Yellen there would be little chance of the sort of spat that has developed over the Fed's lending schemes.

The genius of choosing Ms Yellen lies in the fact that people of all political persuasions can find some reason to cheer her appointment. That means she will almost certainly be confirmed by the Senate. Take monetary policy. Hawks point out that during Ms Yellen's tenure the Fed raised rates from near zero to 1.25-1.5%. Doves counter that hawks were over-represented on the rate-setting panel at the time, and that Ms Yellen in fact did a good job of keeping them in check.

It is a similar story on fiscal policy. Shortly before Donald Trump became president, Ms Yellen argued that "fiscal policy is not obviously needed to provide stimulus to help us get back to full employment". She is on the board of the Committee for a Responsible Federal Budget, an organisation that spends a lot of time warning people about the dangers of high public debt. Yet in the pandemic Ms Yellen has urged "extraordinary fiscal support". In June she co-signed a letter saying "Congress must pass another economic recovery package."

Passing another stimulus bill may be her first big task. Republicans and Democrats have been unable to agree on a replacement to the bill passed in

the spring, with particular disagreement on the size of the eventual package, even as it is now clear that America's economic recovery is slowing. It is a lot to expect that the sheer force of one person could help break the deadlock, not least because Republicans are likely to retain control of the Senate for a while yet. But if anyone can do it, it may be Ms Yellen. ■



珍妮特·耶伦

众口可调

前美联储主席将出任美国财政部长。她代表什么？

在《哈利·波特》系列小说的第一部中，主角偶然发现了“厄里斯魔镜”。照这面镜子的人会从中看到自己内心“最深切、最强烈的渴望”。当选总统拜登11月30日宣布提名珍妮特·耶伦（Janet Yellen）出任美国下一任财政部长，这里头就颇有点厄里斯魔镜的味道。耶伦是美联储前主席，也是备受尊敬的学者，可谓是最胜任这个职位的经济学家。但或许更重要的是，对于财政部长这个政治重要性不亚于其经济角色的职位，无论是进步左派还是保守右派都能在耶伦身上看到某些称心之处。

这在今天的政治格局中非常重要。拜登必须克服民主党内因循守旧的中间派和主张打破旧秩序的千禧一代社会主义者之间的分歧。而在耶伦成为财政部长之前，对她的提名必须在目前由共和党控制的参议院通过。这道障碍已经将一些候选人排除在外，比如来自马萨诸塞州的联邦参议员伊丽莎白·沃伦（Elizabeth Warren）。许多共和党人认为她过于敌视自由市场和金融业，因而绝不可能通过对她的任命。

提名公布之前，华盛顿知情人士认为这应该是耶伦和美联储理事莱尔·布雷纳德（Lael Brainard）之间的争夺。一些倾向布雷纳德的人认为她在贸易经济学方面更专业。也有人觉得她比耶伦年轻，更能平衡总统的高龄。左翼民主党人尤其喜欢布雷纳德温和的货币政策主张。

但耶伦也有诸多优势。研究劳动力经济学出身的她是一位杰出的经济学家，还是顶尖经济学学术团体美国经济学会（American Economic Association）的现任主席。（业内也少有人像她那样深受拥戴；一众政策专家曾模仿耶伦的着装习惯立起领子向她致敬。）她在2014年至2018年担任美联储主席时表现极为出色，总能在美联储采取行动前清晰传达其意图，不致让投资者措手不及。她在美联储的经验可能派上用场，毕竟美联储和财政部必须继续合作以推动经济复苏。在耶伦的领导下，不大可能再

发生围绕美联储的贷款计划的那种争吵。

选择耶伦的妙处在于，所有政治派别的人都可以找到某种理由支持对她的任命。这意味着她几乎肯定会获得参议院通过。以货币政策为例。鹰派人士指出，耶伦任美联储主席期间，利率从接近零提高至1.25%到1.5%。鸽派反驳说，当时设定利率的货币政策委员会中鹰派过多，而实际上耶伦在抑制他们的影响力方面做得很不错。

在财政政策方面也一样。特朗普出任总统前不久，耶伦认为“用财政政策刺激经济恢复充分就业的需要并不明显”。她是“负责任的联邦预算委员会”（Responsible Federal Budget）的成员，该委员会大力提醒人们警惕高公共债务的风险。但在新冠疫情中，耶伦敦促政府推出“特别财政支持”。今年6月，她参与联署了一封信，指出“国会必须通过另一项经济复苏方案”。

通过另一项刺激方案可能是耶伦的第一大任务。美国经济的复苏步伐目前已明显放缓，两党却一直无法就推出新方案替换今年春季通过的方案达成共识，尤其是在最终刺激方案的规模上存在分歧。要让谁凭一己之力打破僵局未免要求太高了，尤其是看起来共和党短期内仍将控制参议院。但如果有谁真能做到，那也许非耶伦莫属。■



China's bond market

No guarantees

Investors are jolted by the default of a highly rated state-owned firm

CHINA'S CREDIT-RATING agencies do not disguise their love for the state. Yongcheng Coal and Electricity's state pedigree was at the top of a list of merits in a recent credit appraisal by CCXI, one such agency, which expressed its confidence in the group on October 10th with a top-notch AAA rating on a 1bn-yuan (\$152m) bond.

Yongcheng's default a month later on a different 1bn-yuan bond has sent a shockwave through China's \$14trn bond market. The company paid overdue interest three days later, but not before investors dumped state-backed debt with links to Henan province, the region in central China where it is based. The jarring news that a state group with a recent AAA-rating had defaulted halted at least 20bn-yuan-worth of planned debt issuance over the following week, as yields on state debt surged.

The concern was so great that a large state-owned company in neighbouring Shanxi province was forced to issue a rare statement to investors on November 14th pledging that the companies it controls would not default. "The particular thing about this case was that it was completely unexpected," said Charles Chang of S&P, another rating agency.

Investor panic has focused on Yongcheng, but there are signs of wider tumult. Huachen Automotive, a carmaker owned by a provincial northern government, said on November 16th that it had sought restructuring after defaulting on a bond in October. Tsinghua Unigroup, a technology firm controlled by Tsinghua University, failed to repay a 1.3bn-yuan bond on the same day. The companies had enjoyed AAA and AA ratings, respectively.

That state firms can default is no surprise. Yongcheng is one of ten to have done so this year. Regulators have realised they can no longer afford to bail out inefficient, loss-making companies. A small but steady stream of weak state firms have been allowed to default since 2015, part of a government plan to impose discipline on the market. Defaults also make it possible to price in risk better, something foreign investors have struggled to do. As defaults have risen over the past three years, foreign investors have ploughed record sums into China's bond market.

But Yongcheng's default has alarmed investors because it throws out the old rule-book that helped determine which groups would receive state support and which would be allowed to go bust. Parent companies have been the strongest guiding light to date. Yongcheng's parent, for example, is one of Henan's largest state-owned groups and is wholly owned by the province's asset administrator, making Yongcheng state royalty in the region. Huachen Automotive is owned by a similar entity. Such proximity to powerful asset administrators used to give investors confidence that the state would swoop to the rescue at the first sign of distress. Not any more.

Scale also used to be important. Large state groups have been valuable to cities and provinces because they give secure employment to tens of thousands of people. Huachen Automotive alone has more than 40,000 employees. Restructuring them would threaten jobs and social stability, but these are risks the government appears increasingly willing to take. "Parent company, size—these are the reasons people argue you should buy," says Edmund Goh of Aberdeen Standard Investments, an asset manager. "This is starting to change, and people are going to be reading more of the details."

Investors and rating agencies will have to study state firms' fundamentals, instead of relying on perceived government backing. S&P expects more defaults among large state groups that were once considered untouchable. Zhu Ning, a professor at the Shanghai Advanced Institute of Finance, said

that regulators may even launch “a crackdown on the rating agencies for better-informed ratings”. The shift will prove awkward for local agencies, such as CCXI, which are under pressure from state groups to hand out as many sparkling AAA ratings as possible. ■



中国的债券市场

无担保

一家高评级国有企业违约，令投资者震惊

中国的信用评级机构毫不掩饰自己对政府的爱。在近期一次信用评估中，评级机构中信诚国际将永城煤电的国有背景列在其各种优点的首位。该机构于10月10日对永城煤电一只10亿元的债券予以最高的AAA评级，表达了对该集团的信心。

一个月后，永城另一只10亿元债券违约，在中国14万亿美元的债券市场中掀起轩然大波。三天后该公司支付了逾期利息，但在此之前，投资者已经抛售了与永城总部所在省份河南有关联的政府支持债券。一家近期获评AAA级的国有集团竟然违约，刺耳消息导致国债收益率飙升，随后一周价值至少200亿元的债券发行计划暂停。

人们忧心忡忡，邻省山西的一家大型国企不得不罕见地在11月14日向投资者发表声明，承诺其控股的公司不会违约。另一家评级机构标准普尔的查尔斯·张（音译）表示：“这起事件特别的地方是它完全出人意料。”

投资者的恐慌集中在永城，但有迹象显示会出现更大范围的骚动。北方某省政府所有的汽车制造商华晨汽车11月16日表示，公司在10月份一只债券违约后已寻求重组。同一天，清华大学控股的科技公司紫光集团未能偿还13亿元的债券。这两家公司先前分别获得了AAA和AA评级。

国有企业有可能违约这件事并不奇怪。永城是今年以来违约的十家国企之一。监管机构已经意识到自己再也负担不起搭救效率低下的亏损企业了。作为强化市场纪律计划的一部分，自2015年以来，政府已少量但持续地允许经营不善的国企违约。违约也让更好地为风险定价成为可能，这对外国投资者来说一直是个难题。过去三年违约数量上升之时，外国投资者向中国债券市场投入的资金也创下纪录。

但永城的违约引起了投资者的警觉，因为现在看来，那套帮助判断哪些集团会获得政府支持、哪些会被允许破产的老经验不再有效了。一直以来，母公司是哪家是最有力的指引。例如，永城的母公司是河南最大的国有集团之一，由河南省国资委完全控股，因此永城在河南是“皇族”。华晨汽车也由一家类似的实体拥有。像这样靠近权力强大的资产监管部门这一点曾让投资者相信，政府会在危机显现的第一时间出手相救。再也不是这样了。

规模曾经也很重要。大型国有集团对城市和省份来说很宝贵，因为它们为成千上万的人提供了稳定的就业机会。仅华晨汽车就有四万多名员工。重组它们会威胁就业和社会稳定，但政府似乎越来越愿意承担这些风险。“母公司、规模——人们主张该买进的时候总爱搬出这些理由，”资产管理公司安本标准投资管理（Aberdeen Standard Investments）的埃德蒙·吴（音译）说，“这种情况已开始改变，人们会去揣摩更多的细节。”

投资者和评级机构将不得不去研究国企的基本面，而不是靠感知到的政府对它们的支持。标准普尔预计，还会有更多曾经被认为动不得的大型国有集团违约。上海高级金融学院的教授朱宁表示，监管机构甚至可能会“整顿评级机构，以获得更全面可靠的评级”。这种转变将会让中诚信国际这样的本土评级机构感到为难，因为它们受到来自国企的压力，要尽可能多地给出闪闪发亮的AAA评级。■



Initial pandemic offerings

Public holidays

Airbnb's stockmarket debut will be a hit. Never mind its murky prospects

TALK ABOUT terrible timing. When the pandemic hit in March, Brian Chesky had just put the finishing touches on the paperwork for Airbnb's much-awaited public listing. Instead of travelling to New York to ring the opening bell at the Nasdaq stock exchange, he found himself spending days (and nights) on Zoom in his home office in San Francisco, fighting to keep his online holiday-rental marketplace alive. "It was like you are going 100 miles an hour and suddenly have to hit the brakes," Airbnb's boss recalls.

This time around Mr Chesky might be luckier. On November 16th Airbnb unveiled its prospectus, putting it on track for an initial public offering (IPO) in December, just as the first doses of the covid-19 vaccine may become available. The IPO could value Airbnb at more than \$30bn. The firm's longer-term prospects are harder to divine.

The vaccine is not the only thing that makes this an opportune time for Airbnb to go public. The window for tech IPOs has not been open this wide since the dotcom bubble 20 years ago. More than 50 tech startups have floated this year, raising a total of \$26bn, according to Dealogic, a data provider. Many of Airbnb's employees want to cash in on the shares they have been awarded before their right to do so expires. And the firm needs money, on top of the \$2bn it raised earlier this year to tide it over—hence its decision to scrap earlier plans to list shares directly without drumming up fresh capital.

Mr Chesky has a good recovery story to tell, too. In the painful second quarter the number of nights booked on Airbnb fell to 28m, from 84m a year before. Gross bookings collapsed by two-thirds, to \$3.2bn. In the next

three months, though, the numbers rebounded, to 62m and \$8bn, mainly thanks to what Mr Chesky calls “travel redistribution”. Guests eschewed virus-hit foreign cities, formerly Airbnb’s stronghold, for domestic and rural destinations. Stays less than 500 miles (800km) from home rose by more than 50% this summer.

Mr Chesky has also made Airbnb leaner. Before the pandemic the firm had sunk money into new businesses, including flights and a television studio, to pad revenues ahead of the listing. Since then his motto has been “back to the roots”. He has fired around 1,800 employees, a quarter of the workforce, shut down most of the new activities and radically cut online advertising (more than 90% of guests now book directly on Airbnb’s site). As a result, though the firm lost \$916m in the first six months of the year, it turned a net profit of \$219m in the third quarter.

Can Airbnb keep this up? Even before the pandemic growth had begun to slow. Once things are back to normal, room for further expansion may be limited, at least in the company’s core market. Bernstein, a research firm, expects annual growth in private rentals to slow to 7-8%, from around 20% in the past few years. And Airbnb’s operating margins lag behind those of its closest rivals, Booking.com and Expedia (which operates VRBO, a site that lists mostly holiday homes).

Airbnb’s future also depends on its ability to police its service and meet a growing list of legal requirements across many jurisdictions where it operates. As with other big online firms, renters have found ways to abuse the platform, for instance by using rental properties for parties; in July police in New Jersey broke up a rowdy event with 700 people. As for regulations, the firm says in its prospectus that by October 2019, 70% of its top 200 cities by revenue had imposed restrictions, such as limits on how many days a year residential properties can be rented out.

Mr Chesky's biggest task, however, will be to work out what Airbnb, now entering its teens, should be when it grows up. He has said he would like to see it evolve like Apple or Disney—firms that have adapted over time and outlived their founders. The pandemic has been a setback for its new lines of business. “Either we keep doing new things as the world changes,” he says, “or we stop doing new things—and we won't exist in the future.” Even if, occasionally, doing new things means sticking to the old ones. ■



首次疫情募股

公共假期

爱彼迎在股市的亮相会很轰动，尽管它的前景并不明朗

时机可真是糟糕啊。3月疫情来袭时，布莱恩·切斯基（Brian Chesky）刚刚为爱彼迎（Airbnb）备受期待的挂牌上市做完最后的文书润色工作。他没能去纽约敲响纳斯达克的开市钟，而是在旧金山家里的办公桌前熬了几天（和几夜），在Zoom上努力让他的线上度假短租平台活下去。“就好像你正在以100英里的时速开着车，可是突然得猛踩刹车。”这位爱彼迎的老板回忆道。

这一次，切斯基可能会走运些。11月16日，爱彼迎发布了招股书，这让它有望在12月上市，届时可能恰逢第一批新冠疫苗上市。此次IPO对爱彼迎的估值可能超过300亿美元。这家公司更长远的前景却更难窥测。

疫苗并非爱彼迎上市恰逢其时的唯一因素。自20年前的互联网泡沫以来，IPO的窗口还从未对科技企业如此敞开过。数据供应商Dealogic称，今年已有50多家科技创业公司上市，共募集资金260亿美元。许多爱彼迎员工都想在认股权到期前兑现公司奖励自己的股份。而爱彼迎除了今年初筹集的20亿美元之外，也还需要更多钱来渡过难关，因此它决定放弃早些时候不筹集新资本而直接上市的计划。

切斯基也有一个很好的复苏故事可讲。在艰难的第二季度，在爱彼迎上预定的住宿天数从一年前的8400万降至2800万。预定总额暴跌三分之二，至32亿美元。但在接下来的三个月里，这两个数字分别回升至6200万和80亿美元，主要是由于切斯基所说的“旅行再分布”。旅客避开了受病毒侵袭的国外城市这些从前爱彼迎的重要据点，转而选择国内游和乡村游。今年夏天，离家800公里之内的住宿订单增长了超过50%。

切斯基还让爱彼迎成功“瘦身”。疫情之前，这家公司把资金投入到了航班和电视演播室等新业务中，以求在上市前做大营收数字。疫情爆发后，他的

座右铭一直是“回归本源”。他裁员约1800人，占到员工总数的四分之一，关停了大部分新业务，并大幅削减线上广告支出（现在超过九成客人都直接在爱彼迎网站上预订）。因此，虽然爱彼迎今年前六个月亏损了9.16亿美元，却在第三季度实现了2.19亿美元的净利润。

爱彼迎能把这样的势头保持下去吗？早在疫情之前其增长就已经开始放缓。一旦整体环境恢复正常，它进一步扩张的空间可能有限，至少在它的核心市场是这样。研究公司盛博（Bernstein）预计，私人租赁业务的年增长率将从过去几年的20%左右放缓至7%至8%。而爱彼迎的营业利润率也落后于最接近它的竞争对手Booking.com和亿客行（Expedia，旗下的VRBO网站以提供度假房源为主）。

爱彼迎的未来也取决于它监督自身服务的能力，以及在它有业务的许多司法辖区满足越来越多法律要求的能力。同其他大型网络公司的遭遇一样，租客已经找到了滥用平台的方法，比如用出租房产举办派对；7月，新泽西州警方驱散了一起700人参与的喧闹的活动。至于规管，爱彼迎在招股书中称，截至2019年10月，在其营收列前200位的城市中有70%实施了诸如限制住宅地产一年可出租天数的规定。

但是，切斯基最大的任务将是想清楚目前进入少年阶段的爱彼迎长大后该是什么样。他曾说过希望它像苹果或迪士尼那样进化——随着时间推移不断调整适应，比公司的创始人更长寿。疫情打击了爱彼迎的全新业务。“我们要么在变化的世界中继续做新东西，”他说道，“要么停止做新的——那样的话未来我们也就不存在了。”即便，有时候尝试新事物意味着要坚守旧的。■



Venture capital

Frogs and princes

More and more capital is chasing fewer and fewer ideas

WHO ARE the heirs of Robert Fleming, the 19th-century Scot who saw that America was the coming place to put risk capital? The venture capitalists of Silicon Valley have the best claim. The businesses that loom largest in public equity markets—Amazon, Apple, Facebook, Google, Tesla and the rest—were nurtured by VCs. Venture-backed companies account for around a fifth of the market capitalisation of public companies in America and almost half their research spending. The funds that unearth such gems stand to make pots of money. VCs have on average (an important qualifier) beaten the public market net of fees over the long run.

Most firms that receive VC funding fail. But the winner-takes-all nature of technology markets means those that succeed often do so extravagantly. The VC industry is at the frontier of capital allocation. The typical investor has to kiss a lot of frogs to find a prince (or even a decent-looking frog). The average VC firm screens 200 targets, but makes only four investments, according to a study in the *Journal of Financial Economics*. Part of the added value, say its authors, is to improve the governance of startups and keep a watchful eye on management.

No wonder pension schemes, sovereign-wealth funds and mutual funds are competing to write big cheques for Silicon Valley's next generation of stars. But unlike the railways, brewers, distillers and mines of the Fleming era, today's new firms have no great need of capital. A young technology firm can rent computing power from the cloud, download basic software from the internet and use a range of cheap, outsourced services to help it grow. Startups are staying private for longer. When they list, it is because the founders need to cash out or (as with the latest rash of tech IPOs) when

the money on offer in the public markets is simply too good to turn down. It is not to raise capital for the business.

Very few new firms turn out to be world-beaters. Good ideas are scarce. But VC firms that have succeeded in the past may have an edge in finding them. A study by Morten Sorensen finds that companies funded by more experienced VCs are more likely to succeed. And sourcing the best entrepreneurial talent is more important to success than the development of that talent.

In this sense the best venture-capital firms resemble elite universities. Because the brightest turn up at their door, they are able to charge the highest fees. And those fees are mostly for the accreditation and the social networks that the institution can offer. ■



风险投资

青蛙和王子

越来越多的资本追逐越来越少的点子【专题报道《资产管理》系列之三】

19世纪的苏格兰人罗伯特·弗莱明（Robert Fleming）认为美国才是风险资本的好去处，谁继承了他的衣钵呢？最可能的人选是硅谷的风险投资家们。公开股票市场上规模最大的那些公司——亚马逊、苹果、Facebook、谷歌、特斯拉等——都是风险投资人培育出来的。由风险投资支持的公司约占美国上市公司市值的五分之一，研究支出则几乎占到了一半。挖掘出此类宝石的基金必然赚得盆满钵满。从长远来看，风投在除去费用后平均而言（这是个重要的修饰词）击败了公开市场。

大多数获得风险投资的公司都会失败。但是，技术市场的“赢者通吃”的本质意味着成功的企业往往能够获得极大的成功。风险投资行业处于资本配置的前沿。典型的投资者必须亲吻很多青蛙才能找到王子（或者哪怕是好看的青蛙）。根据《金融经济学杂志》（*Journal of Financial Economics*）的一项研究，风险投资公司平均会筛选200个目标，但仅进行四项投资。其作者说，增加的价值的一部分在于改善创业公司的治理并密切注意管理层。

难怪养老金计划、主权财富基金和共同基金竞相为硅谷的下一代明星开出大笔支票。但是，与弗莱明时代的铁路、啤酒坊、酿酒厂和矿山不同，如今的新公司对资本没有太大的需求。年轻的技术公司可以从云端租用计算能力，可以从互联网上下载基本软件，并可以使用各种廉价的外包服务来帮助其扩展。创业公司保持私有化的时间更长了。当它们上市时，这是因为创始人需要套现，或者（如最新的科技公司扎堆上市）是公开市场上提供的价码实在是太好了，无法拒绝。它并不是为了给企业筹集资金。

很少有新公司能做到举世无双。好点子很稀有。但是曾有过成功经验的风险投资公司可能在寻找它们方面有优势。莫滕·索伦森（Morten Sorensen）的一项研究发现，由经验丰富的风险投资公司资助的公司更有

可能成功。而在取得成功上，寻找最好的创业人才比培养这种人才更重要。

从这个意义上说，最好的风险投资公司类似于精英大学。因为最聪明的人会来敲它们的门，所以它们能够收取最高的费用。而这些费用主要是为了这些院校可以提供的资质认证和社交网络。 ■



Brazil

Bundles in the jungle

How e-commerce works in the rainforest

WHEN YOU behold the *Lion of Judah* you do not think “e-commerce”. Its lower decks have hooks for 467 hammocks where passengers sleep on the three-day voyage up the Amazon river from Manaus, a city of 2m people, to Uarini, a manioc-growing town. Its upper deck has more hammocks, a bar for sinners and a chapel for saints. Its cargo hold stinks of fish. But when the Amazon’s largest department store, Bemol, started delivering to customers in the rainforest, three-decker passenger boats were its chosen means of transport.

Bemol was founded in 1942 by three grandsons of a Moroccan Jewish immigrant who arrived in Brazil in 1887. It sold fridges and televisions in the traditional way from its megastores in Manaus until 2018, when one of the founders’ grandsons, Denis Minev, took over. He suspected there were hundreds of thousands of customers up and down the Amazon and its tributaries that Bemol wasn’t reaching and decided to go to them.

But delivering parcels in the rainforest is difficult and expensive. (Amazon the company barely serves its namesake river.) Consumers in far-flung places either had to pay up to 30% of the product’s price for shipping and wait a month or longer for the postal service to deliver it or spend money and time on shopping trips to Manaus. Mr Minev made what sounded like an impossible promise: to deliver an order placed online within a week for not a *centavo* more than the “Manaus price”.

Bemol calls its answer to those problems *caboclo* e-commerce. A term for Brazilians with both indigenous and European ancestry, *caboclo* has come to mean a mix of tradition and modernity. Mr Minev’s experience at a

cooking-gas firm, also owned by his family, showed him how challenging the Amazon's logistics could be. Rather than buy a fleet of boats, risking collisions, fuel theft and high debt, Mr Minev outsourced delivery to the brightly painted ferries that carry people and provisions around the region.

As the *Lion of Judah* lay at anchor in the port of Manaus on a recent Tuesday, deckhands stuffed its hold with hundreds of cases of beer, thousands of cartons of eggs, scores of frozen chickens and three squawking ones. Alongside them were near-identical mattresses, supplied by Bemol, to be left in different towns. Contracts with boat owners are verbal, inventory is recorded with pen and paper and mix-ups happen. If merchandise goes missing—smartphones can disappear—Bemol swallows the loss. Just a few boats and their crews serve each route. “If I fight with all of them, there's no one left to deliver our products,” says Fred Galvão, who runs logistics for Bemol.

To encourage Amazonians to place their first online orders, Bemol installed Wi-Fi in the plaza of every town where it launched *caboclo* e-commerce. It set its catalogue to pop up on users' smartphones and grants free minutes to those who place orders. Like Amazon, Bemol sends customers adverts based on the data they provide.

It invented some tactics to suit the region. Amazonians who lack savings or credit cards use zero-interest loans starting at 150 reais (\$26) to finance their purchases; a whopping 85% of Bemol's online sales are paid for this way. Shoppers who are uneasy about using the internet can place orders and lodge complaints with an attendant's help at chemists and floating petrol stations. Bemol allows returns, but encourages customers to accept vouchers instead. “The traditional e-commerce model without a physical presence doesn't work in the Amazon,” says Mr Minev.

His *caboclo* model seems to. Its pilot operation in Autazes, 100km (60

miles) downriver from Manaus, which started in April last year, brought in 113 orders and 73,000 reais in its first month. By February this year Bemol had expanded to dozens of towns. It booked 2.6m reais in sales that month. After the pandemic struck, business boomed. Bemol's e-commerce revenues in June reached 10.5m reais. "Amazon lost money for years," Mr Minev says. "We're already profitable."

The *Lion of Judah* has been less lucky. At the start of the pandemic, it stayed in port for two weeks while ambulance boats brought covid-19 patients and the bodies of those who had died on the journey. The *Lion* resumed sailing in April but with half as many passengers. The captain, Richard Lacet, who inherited the boat from his father, has made up for lost revenue by charging more for cargo, to squawks from merchants sending chickens upriver and farmers dispatching manioc flour down it. But Bemol, which pays a flat rate for its own compartment, "is starting to change the business", he says. E-commerce could keep the *Lion* afloat. ■



巴西

丛林中的包裹

电子商务如何在雨林中运作

看到“犹大雄狮”号时，你不会联想到“电子商务”。它下层的甲板上有钩子，能挂467张吊床，乘客们可以睡在那儿，度过沿亚马逊河而上的三天航程，从人口200万的城市玛瑙斯（Manaus）去往种木薯的小镇尤里尼（Uarini）。上层的甲板上还有更多吊床，此外还有为罪人准备的酒吧和为圣人准备的小教堂。货舱散发出阵阵鱼腥味。但是当亚马逊流域最大的百货公司Bemol开始为雨林地区的顾客送货时，这样的三层客船是它首选的运输方式。

Bemol于1942年创立，创始人三兄弟的祖父是1887年从摩洛哥来到巴西的犹太移民。它一直以传统方式在它位于玛瑙斯的大卖场销售冰箱和电视机，直到2018年创始人的孙儿之一丹尼斯·米涅夫（Denis Minev）接手公司。他怀疑Bemol遗漏了亚马逊及其支流沿岸成千上万的顾客，于是决定把生意做到他们那里。

但是在热带雨林投递包裹很难，成本也很高。（亚马逊公司在亚马逊河流域几乎不提供服务。）偏远地区的消费者要么得支付高达产品价格30%的运费、花一个月或更长时间等邮政服务送货，要么得花钱花时间去玛瑙斯跑一趟。米涅夫做出了一个听起来似乎不可能实现的承诺：网上下单，一周内送达，价钱不会比在玛瑙斯多一分。

Bemol管自己的解决办法叫“卡波科洛”（caboclo）电子商务。“卡波科洛”是对巴西的土著和欧洲人混血后裔的称呼，现在这个词也意指传统和现代的混合。米涅夫曾在自己家族拥有的一家燃气公司工作，他很清楚亚马逊地区的物流挑战之大。他没有冒着撞船事故、燃油被盗和高额债务的风险去买一支船队，而是将物流外包给刷着鲜亮油漆、在亚马逊流域运送居民和物资的渡船。

近日的一个周二，“犹大雄狮”号停泊在玛瑙斯港口，甲板水手们把几百箱啤酒、几千盒鸡蛋、几十只冻鸡和三只咯咯叫的活鸡塞进了货舱。此外还有Bemol自家生产的几乎一模一样的床垫要送到不同的城镇。与船主的合同是口头的，货物进出是用纸笔记录的，错漏时有发生。如果商品丢失，比如智能手机可能不翼而飞，Bemol会承担损失。每条航线只有几条船及船员在跑。“要是我跟他们所有人都打起来，就没人帮我们送货了。”负责Bemol物流的弗雷德·盖尔沃（Fred Galvão）说。

为了鼓励亚马逊居民开始第一次网购，Bemol在它推出“卡波科洛”电子商务的每个城镇的广场上都安装了Wi-Fi。它把商品目录推送到用户的智能手机上，并为下订单的用户提供免费流量。和亚马逊公司一样，Bemol根据客户提供的数据向客户推送广告。

它还发明了一些适合该地区的策略。积蓄不足或没有信用卡的亚马逊人可以用零利率贷款购物，最低额度为150雷亚尔（26美元）；Bemol高达85%的线上销售都是通过这种方式支付的。对使用互联网感到不放心的顾客可以请药店和流动加油站的服务员帮忙下单或投诉。Bemol允许退货，但鼓励顾客接受代金券。“没有实体设施的传统电子商务模式在亚马逊行不通。”米涅夫说。

他的“卡波科洛”模式似乎行得通。公司于去年4月起在玛瑙斯河下游100公里的奥塔兹（Autazes）试点运营，第一个月就收到了113份订单，价值7.3万雷亚尔。到今年2月，Bemol已经扩展到几十个城镇。它2月的销售额为260万雷亚尔。新冠疫情爆发后，生意红火起来。Bemol的电子商务收入在6月达到了1050万雷亚尔。“亚马逊公司亏损了好多年，”米涅夫说，“而我们已经盈利了。”

“犹大雄狮”号就没那么幸运了。疫情一开始，它就在港口停了两周，救护船送来了新冠患者和在途中死亡的人的遗体。它在4月恢复航行，但载客量减少了一半。船长理查德·拉塞特（Richard Lacet）从他父亲那里继承了这条船，他通过提高运货价格来弥补收入损失，引得往上游送鸡的商人和往下游送木薯粉的农民怨声载道。但他表示，为自己的独立货舱支付固

定费用的Bemol“开始改变整个生意”。电子商务可以让“雄狮”号继续航行。 ■



Capital allocation

Stewards' inquiry

If investors buy index funds, who watches the companies?

ROBERT FLEMING has a claim to be a pioneer of active asset management. His First Scottish investment trust pledged to invest mostly in American securities, with choices informed by on-the-ground research. Fleming saw that shareholders needed to act as stewards in the governance of the businesses that they part-owned. So once the fund was launched, in 1873, he sailed directly to America. It was the first of many fact-finding trips across the Atlantic over the next 50 years, according to Nigel Edward Morecroft's book, "The Origins of Asset Management".

The art of asset management is capital allocation. It is easy to miss this amid confusing talk of alpha and beta, active and passive, private and public markets. For investors of Fleming's kind the work of finding the best investment opportunities and engaging with business was inseparable. Walter Bagehot believed the rapid growth of the mid-Victorian economy owed much to the efficient channelling of capital. In England, he wrote, "Capital runs as surely and instantly where it is most wanted, and where there is most to be made of it, as water runs to find its level."

Most of today's financiers will say they are engaged in capital allocation. There are many dedicated stockpickers who take this social role seriously and see it as a vocation. But for the most part ties between suppliers and users of capital have become more tenuous. An index fund does not screen the best stocks from the worst. It holds whatever is in the index. Other passive strategies select stocks or bonds based on narrow financial characteristics. The nature of the entity behind the securities and how well the people running it perform their duties are incidental. Does such disengagement matter? Some evidence suggests that it might.

To understand why, it helps to distinguish two functions of capital allocation. The first is to direct savings to their best use. This involves finding new opportunities, comparing their merits and deciding which should receive capital and on what terms. John Kay, a business economist, calls this role “search”. The second role is stewardship, ensuring that the best use is made of the capital stock that is the product of past investment.

Both matter. Search matters in the early stages of economic development, when ideas are abundant, businesses are capital-intensive and savings are scarce. The late 19th century was such a time. In New York, Fleming’s hunting-ground, most bonds were for railroad companies. In Britain, brewers, distillers and miners were also thirsty for capital. In 1886 Guinness, a century-old beer company, raised £6m in London. A few years later shares in the Broken Hill Proprietary Mining Company (BHP), which began trading in Australia, were owned and exchanged in London.

When search works well and capital runs to “where there is most to be made of it”, relevant information is quickly reflected in asset prices. The case for index investing rests on the idea that the stockmarket is, in this sense, broadly efficient. Prices are set by informed buying and selling by active and engaged investors. But as more money goes to index funds, the market might become less efficient. Whether it does rests in theory on the quality of investors being displaced. If they are “noisy” active managers, who buy and sell on gut feel, expect more efficiency, not less. If they are farsighted stockpickers, the quality of market prices might suffer.

Some empirical studies hint at a problem. A paper in 2011 by Jeffrey Wurgler finds that whether a share is part of an index influences its price. Shares that are included in an index go up in value relative to similar shares that are not. When shares drop out of an index, they tend to fall disproportionately. And once in the index, a share’s price moves more in sympathy with others that are also included. Another paper, by researchers

at the University of Utah, finds that index inclusion leads to a higher correlation with index prices. Inclusion also spurs a reduction in “information production”: fewer requests for company filings, fewer searches on Google, and fewer research reports from brokerages. Even so, the authors conclude that more intensive effort by the remaining active investors may counter any adverse effects.

Share prices may no longer matter so much for how capital is allocated. Most big companies are nowadays self-financing. Guinness (now Diageo) and BHP are still among the leading stocks listed in London. Like a lot of businesses, they generate enough cash to cover their investment needs. When a company taps the capital markets, it is usually to tidy up its capital structure (lengthening the maturity of debt, say, or buying back shares) or to build cash reserves in times of stress, such as now. It is management teams that now do most to allocate capital.

This makes stewardship more important. When it works, investors engage with a firm’s managers to verify that the business is well run. The problem is that the incentives to be good stewards are weak. An asset manager that bears the cost of stewardship will capture only a small share of the benefits. A paper in 2017 by Lucian Bebchuk, Alma Cohen and Scott Hirst, a trio of law professors, found that asset managers mostly avoid making shareholder proposals, nominating directors or conducting proxy contests to vote out managers. Index funds are especially at fault. Their business model is to avoid the costs of company research and deep engagement. The law professors reckoned that the big three asset managers devoted less than one person-workday a year to stewardship.

| *Bosses and agents*

The growth of index investing is likely to have raised the agency costs of asset management. Bosses may be either too timid or too lax, depending on the circumstances, to act in the best interest of shareholders. They may

shun profitable projects because it is hard to persuade disengaged owners that the rewards justify the risks. Or they may be careless with shareholders' money. Some research finds passive ownership aggravates these problems. A paper by Philippe Aghion, John Van Reenen and Luigi Zingales finds that companies with a larger share of active owners are more innovative. They find no such link between index ownership and innovation. Other research suggests that indexing makes it more likely that managers will pursue ill-judged mergers.

Investors now care more about what they are investing in. The growth of environmental, social and governance (ESG) investing, which selects companies on how they score on such matters, reflects this. Some asset managers suspect ESG is a fad, but many do not. An ESG score will soon be a requirement, says one. It will eventually be as important to a firm as its credit rating, says another. "Sustainability" is increasingly seen as a risk factor for long-term performance. "If your firm is more sustainable, you will get the best people, customers and regulators," says Christian Sinding, boss of EQT, a Swedish private-equity firm. These are the firms you will want to own in ten years' time, he adds.

ESG looks like a lifeline for active fund managers. "Active has a big advantage over passive when it comes to ESG," says Ashish Bhutani, chief executive of Lazard Asset Management. Passive funds can only tick boxes. Some environmental matters, such as a firm's carbon footprint, can be quantified, but others cannot. The social criterion requires qualitative judgment about a firm's hiring practices, its efforts to reduce inequality or the broader impact of investment projects. Governance is somewhere in between. Good analysts have a deep knowledge of companies and their management. They know things that are hard to quantify and cannot be found on a financial statement or a boilerplate disclosure.

The challenge for active managers is to show that sifting firms by ESG or

any other qualitative criteria will make for better portfolios that justify a fee premium over an index fund. A greater focus on the long term would be welcome for both companies and their shareholders. It is a stretch to claim that active managers in the main are great stewards. They are not. Most are (or at least have been) either transient owners, trading in and out of faddish stocks, or closet index-huggers.

The best-performing stockpickers are both patient and strong in their convictions. They hold stocks for long periods in a concentrated portfolio. It is in part a quest for these traits—commitment and patience—that has persuaded a lot of investors to flock into private equity and other closely held assets. ■



资本配置

管家的问询

如果投资者购买指数基金，谁来监督公司？【专题报道《资产管理》系列之一】

罗伯特·弗莱明（Robert Fleming）堪称主动资产管理的先驱。他的第一苏格兰（First Scottish）投资信托基金承诺将主要投资于美国证券，并根据实地研究做出选择。弗莱明认为，股东需要在其部分拥有的企业的治理中担任管家。因此，1873年时该基金甫一成立，他就直接坐船来到了美国。根据奈杰尔·爱德华·莫罗克罗夫特（Nigel Edward Morecroft）在《资产管理的起源》（The Origins of Asset Management）一书中的说法，这是后续50年许多横跨大西洋的实地考察之旅中的第一次。

资产管理的艺术是资本配置。在阿尔法和贝塔、主动和被动、私人和公共市场等令人困惑的说法中，这一点很容易被忘记。对于弗莱明这种类型的投资者而言，寻找最佳投资机会和与企业互动是分不开的。沃尔特·白芝浩（Walter Bagehot）认为，维多利亚时代中期经济的快速增长很大程度上归功于资本的有效引导。他在英格兰写道：“资本会可靠地、即时地流向最需要它的地方，流向最能利用它的地方，就像水会自己找到水平面那样。”

当今大多数金融从业者会说他们从事资本配置。有许多专门选股的人认真对待这一社会角色，并将其视为一种职业。但是在大多数情况下，资金的提供者和使用者之间的联系变得更加薄弱了。指数基金不会筛选最好或最差的股票。它持有指数中的一切。其他被动策略则根据狭窄的财务特征选择股票或债券。证券背后的实体的性质以及其管理人员履行职责的能力是次要的。这样的脱离要紧吗？一些证据表明，可能是的。

要了解原因，把资本配置的两个职能区分开来会有帮助。首先是把储蓄派上最好的用场。这涉及到寻找新的机会，比较它们的优点，决定哪些应该获得资金以及以什么条件获得。商业经济学家约翰·凯（John Kay）将这一角色称为“搜索”。第二个角色是尽职治理，确保过去的投资产生的资本

存量得到最好的利用。

两者都重要。在经济发展的早期阶段，搜索很重要，这时创意很丰富，企业需要大量资金而储蓄不足。19世纪末就是这样的时代。在弗莱明的猎场纽约，大多数债券是用来给铁路公司融资的。在英国，酿酒商、酒厂和矿场也渴望资金。1886年，当时已经有百年历史的啤酒公司吉尼斯在伦敦筹集了600万英镑。几年后，最初在澳大利亚上市的布罗肯希尔控股矿业公司（今必和必拓）的股票在伦敦被购买和交易。

当搜索职能运转良好并且资本流向“最能利用它的地方”时，相关信息就会迅速反映在资产价格中。从这个意义上说，指数投资的理由是，股票市场总体来说是高效的。价格是由积极参与且消息灵通的投资者进行的买卖确定的。但是随着更多的资金流向指数基金，市场的效率可能会下降。从理论上讲，是否真的会下降取决于被指数替代的投资者的素质。如果他们是依赖噪声的主动经理，凭自己的直觉来买卖，那么市场效率会更高，而不是更低。如果他们是有远见的选股者，那么市场定价的质量可能会受损。

一些实证研究暗示了一个问题。杰弗里·乌尔格勒（Jeffrey Wurgler）在2011年发表的一篇论文发现，股票是否属于指数的一部分会影响其价格。比起未被纳入指数的类似股票，被纳入的那些的价值会上涨。当股票被踢出指数时，它们往往会不成比例地下跌。一旦进入指数，股票的价格就会更加与其他同样在指数中的股票同步。犹他大学研究人员发表的另一篇论文发现，被纳入指数会导致与指数价格的相关性提高。纳入指数还会引发“信息产出”的减少：对公司申报材料的请求减少、谷歌搜索减少以及券商研究报告减少。即便如此，作者得出的结论是，剩下的主动投资者更为细致的努力或许可以抵消任何不利影响。

股价对资本如何配置可能不再那么重要。如今大多数大公司都自筹资金。吉尼斯（现为帝亚吉欧）和必和必拓至今仍是伦敦股市的主要股票。和许多企业一样，它们产生足够的现金来满足自己的投资需求。当一家公司利用资本市场时，通常是为了整理资本结构（比如延长债务期限或回购股票），或者在压力时期（例如现在）建立现金储备。现在，资本配置大多

由管理团队完成。

这使得尽职治理更加重要。当它起效时，投资者会与公司的主管互动，以验证业务运作良好。问题在于，成为好管家的动机很弱。资产管理要承担尽职治理的费用，却仅能获得一小部分收益。三位法学教授卢西恩·贝布丘克（Lucian Bebchuk）、阿尔玛·科恩（Alma Cohen）和斯科特·赫斯特（Scott Hirst）在2017年发表的一篇论文中发现，资产管理者大多避免提出股东建议、提名董事或发起代理权争夺以投票解雇管理层。指数基金的问题尤其大。它们的商业模式是避免承担公司研究和深度参与的成本。三位法学教授认为，三大资产管理公司每年仅花费不到一个工作人天在尽职治理上。

| 老板和代理人

指数投资的增长很可能增加了资产管理的代理成本。老板们可能会要么太胆小，要么太松懈——视情形而定，而不能根据股东的最大利益行事。他们可能会避开有利可图的项目，因为很难让那些参与不足的所有者相信回报配得上风险。或者他们可能对股东的钱漫不经心。一些研究发现，被动所有权加剧了这些问题。菲利普·阿吉翁（Philippe Aghion）、约翰·范·里宁（John Van Reenen）和路易吉·津格莱斯（Luigi Zingales）的论文发现，拥有更高比例的主动所有者的公司更具创新力。他们在指数所有权与创新之间并没有找到这种联系。其他研究表明，进入指数使管理层更有可能追求判断不当的合并。

投资者现在更加关心自己投资的是什么。环境、社会和治理（ESG）投资的增长反映了这一点，它选择公司的标准是它们在这些问题上的得分。一些资产管理者怀疑ESG只是一阵风潮，但许多人却不这样认为。一位资产管理者说，ESG评分很快将成为一项要求。另一位则说，对企业而言它最终将和信用评级一样重要。“可持续性”越来越被视为长期绩效的风险因素。“如果您的公司更具可持续性，那么您将获得最优秀的人才、客户和监管者。”瑞典私募股权公司EQT的老板克里斯汀·辛丁（Christian Sinding）说。他补充道，这些是您十年后想要拥有的公司。

ESG看起来像是主动基金经理的生命线。拉扎德资产管理公司的首席执行官阿希什·布达尼（Ashish Bhutani）表示：“在ESG方面，与被动相比，主动具有很大的优势。”被动基金只能打勾。某些环境问题（如公司的碳足迹）可以量化，而另一些不能。“社会”这个评价标准要求对公司的聘雇操作、其为减少不平等所做的努力或投资项目的广泛影响做定性判断。治理介于两者之间。好的分析师对公司及其管理层有着深刻的了解。他们知道那些难以量化、无法在财务报表或模板化披露中找到的东西。

主动管理者面临的挑战在于，如何证明按照ESG或其他任何定性标准筛选公司将有助于建立更好的投资组合，从而配得上它比指数基金更高的收费。对长期的更多关注是公司和股东都欢迎的。要说主动管理者大体称得上出色的管家是有点过了。他们不是。他们大多数目前（或至少曾经）短暂持股，买进卖出大热股票，或者暗地里拥抱指数。

业绩最好的选股者既有耐心，又有坚定的信念。他们在高度集中的投资组合中长期持有某些股票。一定程度上，正是对这些特质——投入和耐心——的追求，说服了许多投资者涌入私募股权和其他封闭持有的资产。■



Private markets

Taking back control

Privates are what listed assets are not: niche, illiquid and fee-rich

THE NOTION of the “first 100 days” as critical for a new administration goes back at least as far as Franklin Roosevelt. He first used the term in a radio address in 1933, shortly after becoming America’s 32nd president. Private equity has its own version. The 100-day plan sets priorities for a bought-out business. The new owner looks for “quick wins”—standard remedies for the most glaring operating problems. Fixes may include updating computing systems, slimming the array of products or closing loss-making divisions. The plan also prescribes the easiest ways to raise cash to pay off hefty debts used to acquire the firm.

The promise of private asset management (buy-out funds, private debt, venture capital and so on) is that endurance will be rewarded. Investors in private equity must lock up their money for years; they cannot easily sell out. Big stakes in private assets trade quite rarely. But there is an upside. Private managers are able to eke out better returns than would be possible if their assets were traded each day. Investors in the public markets like predictable short-term profits and strategic certainty. They are too skittish to invest in a corporate turnaround. If the boss of a listed company unveiled a 100-day plan, it might spark a run on the shares.

That is the sales pitch—and plenty of investors buy it. Desperate for returns, pension funds have piled into private markets in recent years. A survey by Morgan Stanley finds that 64% of institutional investors plan to increase their allocation to private equity this year and only 5% to reduce it—a net balance of 59%. The balance for venture capital was 39%; for private debt, 33%. For listed assets, the balance was negative. Private markets are at the niche end of asset management. Only around \$4trn or so

is invested in private equity, about half of total assets under BlackRock's management alone. But private assets are where the fees are. The question is whether performance and fees can be sustained.

Of several influences behind the growing interest in private assets, three stand out. The first is the example of successful pioneers. In the 1980s and 1990s the endowment funds of a handful of big American universities shifted much of their invested funds into private assets. The largest retirement schemes in Canada, led by the Ontario Teachers' Pension Plan (OTPP), have a similar approach: run the plan like a business, pay for good in-house fund managers and invest in lots of private assets. This model has been copied by sovereign-wealth funds in other parts of the world. The intellectual leader of such investing was David Swensen, at Yale. He argued that, since life-insurance funds, endowments and sovereign-wealth funds have obligations stretching far into the future, they can afford to take a long-term view. It is hard to be rewarded for diligence in listed stocks. Private markets, in contrast, are inefficient. Data are hard to come by, assets are complex and trickier to appraise and waiting for opportunities to pay off requires patience. But the right homework brings rewards.

A second factor is disenchantment with public markets. The age-old agency problem means that investing in projects with an uncertain payoff can be a career risk for managers of a listed business. It is easier to explain corporate strategy to a few committed backers than to lots of shareholders. Founders of technology firms who are used to getting their own way often struggle in the glare of public markets, and so prefer to stay private for as long as they can. And the costs and hassle associated with being a public company have grown. The Sarbanes-Oxley act, passed in 2002 in the wake of a slew of corporate scandals in America, introduced tougher disclosure and financial-reporting requirements for public companies. The regulatory requirements on private companies are significantly lighter. And the National Securities Markets Improvement Act of 1996 made it easier to set

up pools of private investors.

A third factor is changes to banking. The growth of private debt is, in large part, a response to the retreat of banks from lending to mid-sized businesses and their private-equity sponsors. Asset managers, starved of yield in the government-bond markets, are happy to fill the void. The bigger firms will even take souring loans off the books of banks looking to clean up their balance-sheets. In 2017 PIMCO, the fixed-income giant, led a buy-out of €17.7bn (\$20bn) of loans from UniCredit, an Italian bank. There are likely to be more such deals in Europe. China is another potential hunting-ground for distressed debt.

One of the fastest-growing areas of private credit is direct lending to companies which cannot (because they are too small) or will not (for reasons of confidentiality) tap the public markets. A private bond might be sold to only a handful of lenders, or even to just one. Borrowers may feel that they ought to know who their creditors are because they might have to renegotiate with them. That is the case for private-equity firms. Specialist private-credit funds also often prefer to be the sole financiers of a private-equity buy-out if they like the terms and judge the bought-out firm to be a good risk. They might even be the credit division of a buy-out outfit that has lost the bidding war for the borrowing company.

| *Private lives*

Do the results justify the hype? Private equity uses a lot of debt to make its acquisitions. One suspicion is that allocation to private equity is simply a way for pension funds to get around constraints on borrowing to enhance returns. But the buy-out industry has a decent story to tell on capital allocation. The academic literature finds that private-equity and venture-capital funds mostly add operational nous to businesses. They inspire better management habits than in entrepreneur- or family-owned firms. Buy-outs lead to modest net job losses but big increases in job creation and

destruction. They promote efficiency by taking capital off “sunset” firms and putting it into more promising “sunrise” firms.

And returns? Asset managers are adept at presenting statistics in the most favourable light. Duds mutual funds are often quietly merged or folded. Managers can then claim that most of their funds beat the market—these being simply the funds that have survived the cull of underperformers. The private-equity business is notorious for selecting metrics that flatter its performance. Nonetheless, over the long haul, the best private-equity funds do really well. A landmark study led by Steven Kaplan, of the University of Chicago, found that venture-capital and buy-out funds, on average, beat the S&P 500 index over the long term. The range was wide. Funds in the top quartile did much better than average; those in the bottom quartile did a lot worse. Pension-fund managers facing big deficits have an incentive to put money into private assets in the hope that their fund will be one of the winners.

As more capital chases opportunities, the evidence points to diminishing returns. Mr Kaplan and his colleagues find that returns in the buy-out industry beat the stockmarket in nearly all years before 2006, but broadly matched the S&P 500 afterwards. Private-equity funds used to buy businesses that were cheaper than listed firms. But the competition is keener now. The bigger beasts of private equity are becoming even bigger. They have large fixed costs—all those in-house rainmakers, lawyers, analysts and consultants. With so much capital yet to draw from their pension-fund partners, the pressure to do deals that might once have been shunned has increased.

Investors need to be cautious. “Focus and selection are very important” in private markets, says Jo Taylor, CEO of the OTPP. His fund is big enough, with C\$200bn (\$150bn) under management, to do its own buy-outs. This gives it a big advantage in choosing good managers as well as deals. In

general bigger schemes also have more muscle in fee negotiations. The surest way to irritate a private-equity boss is to say the curse words “two-and-twenty”, which was once a common fee arrangement for “alternative” asset managers, meaning a 2% annual fee and 20% of the profits. Private-equity bigwigs claim that such large fees are vanishingly rare. Big clients can usually negotiate lower charges by, for instance, taking a direct stake in an acquired business (a so-called “co-investment”). A typical management fee is “in the low- to mid-ones plus free co-investments”, says a private-equity boss. And, he insists, the 20% performance fee is paid only once returns have cleared a hurdle rate.

Fat fees, outperforming funds, happy clients: from the perspective of asset managers that invest in public equities the buy-out business looks too good to be true. “Hope-and-pray assets,” sneers one. But hope springs eternal in all parts of the asset-management business. A lot of it now rests on China.





私募市场

收回控制权

私募资产和上市资产颇有不同：利基、流动性差、费用高【专题报道《资产管理》系列之二】

认为“百日新政”对一个新政府至关重要的理念至少可以追溯到富兰克林·罗斯福。在成为美国第32任总统不久后，他于1933年在一次广播演说中首次使用了这个词。私募股权有其自己的版本。“百日计划”为收购业务设定了优先事项。新的所有者寻求“见效快”——针对最明显的运营问题的标准补救措施。解决方法可能包括更新计算系统、缩小产品范围或关闭亏损部门。该计划还制定了最简单的筹集现金方法，以偿还用于收购该公司的巨额债务。

私募资产管理（并购基金、私募债务、风险投资等）的承诺是，坚持会有回报。私募股权投资人必须将资金锁定多年；他们无法轻易卖出。私募资产中的大额股权很少交易。但有一个好处。与每天进行资产交易相比，私募管理者可以获得更高的回报。公共市场的投资者喜欢可预测的短期利润和战略确定性。他们太善变了，不愿投资于公司转型。如果一家上市公司的老板公布了一项百日计划，可能引发市场抛售股票。

这是一种销售话术——很多投资者都信了。迫切需要回报的养老金近年来已经涌入私募市场。摩根士丹利的一项调查发现，今年有64%的机构投资者计划增加对私募股权的配置，而只有5%的机构投资者计划减少——净差额为59%。风险投资的差额为39%；私募债务为33%。上市资产的差额则为负。私募市场处于资产管理的利基端。目前仅约四万亿美元的资金投资于私募股权，相当于贝莱德一家管理的资产总额的一半左右。但私募资产的收费高昂。问题在于其业绩和费用是否可持续。

有几种影响力推动了对私募资产兴趣的增长，其中三种十分醒目。首先是成功开拓者的榜样。在1980年代和1990年代，几家美国大型高校的捐赠基金将其大部分投资基金转移到了私募资产上。加拿大最大的退休计划由安

大略省教师退休金计划（OTPP）领导，也采用了类似的做法：像企业一样经营该计划，为出色的内部基金经理付费，并大量投资私募资产。这种模式已经被世界其他地区的主权财富基金效仿。此类投资的学术领袖是耶鲁大学的大卫·史文森（David Swensen）。他认为，既然人寿保险基金、捐赠基金和主权财富基金的责任都延续到遥远的将来，它们可以负担得起用长远的眼光看问题。勤奋研究上市股票很难得到回报。相反，私募市场效率低下。数据难以获得，资产复杂且难以评估，等待高额回报的机会需要耐心。但做好功课会有回报。

第二个因素是对公共市场的幻灭。古老的代理问题意味着，投资于收益不确定的项目对上市公司的经理人来说可能是个职业风险。向少数坚定的支持者解释公司战略要比向大批股东解释来得容易。习惯了自行其是的技术公司创始人往往在公开市场的瞩目中挣扎，因此更愿意尽可能长时间地保持私有。与上市公司相关的成本和麻烦也在增加。萨班斯-奥克斯利法案（Sarbanes-Oxley Act）在美国发生一系列公司丑闻之后于2002年通过，对上市公司引入了更严格的披露和财务报告要求。对私营公司的监管要求则要轻得多。1996年的《国家证券市场改善法》使建立私募投资者池变得更加容易。

第三个因素是银行业务的变化。在很大程度上，私募债务的增长是对银行减少向中型企业及其私募股权支持者贷款的一种反应。那些在政府债券市场收益匮乏的资产管理者乐于填补这一空白。其中较大的公司甚至会让那些想要清理资产负债表的银行从账簿中剥离不良贷款。2017年，固定收益巨头太平洋投资管理公司（PIMCO）牵头从意大利裕信银行（UniCredit）手中买入177亿欧元（200亿美元）的贷款。欧洲可能会有更多此类交易。中国是另一个对不良债务的潜在猎场。

私募信贷增长最快的领域之一是直接放贷给无法进入公共市场（因为规模太小）或不愿进入（出于保密的考虑）公共市场的公司。一种私募债券可能会只出售给少数几个贷方，甚至只出售给一个贷方。借款人可能认为自己应该弄清楚债权人是谁，因为他们可能必须与其重新谈判。私募股权公司就是这种情况。专业的私募信贷基金如果对条款满意并认为被收购的公

司算得上良好的风险，它们通常也更愿意成为私募股本收购中唯一的资金提供者。它们甚至可能是曾在追逐借款公司的竞购战中失败的收购机构的信贷部门。

| 私募生活

结果配得上炒作吗？私募股权公司使用大量债务开展收购。一种怀疑是，配置私募股权只是养老基金绕开借贷限制以提高回报的一种方式。但是，收购行业有一套不错的关于资本配置的叙事。学术文献发现，私募股权基金和风险投资基金大多改善了企业的经营判断。与创业者或家族拥有的企业相比，它们激发了更好的管理习惯。收购导致了一定的净职位流失，但大幅增加了岗位创造和毁灭的发生。他们通过从“日落”公司撤资并将其投入更有希望的“日出”公司提高了效率。

那么回报呢？资产管理善于以最有利的方式提供统计数据。糟糕的共同基金通常会悄悄合并或关门。然后，经理人可以声称其大部分资金表现都超越了市场——这无非是砍掉了那些表现不佳者后剩下的基金。私募股权业务选择使用能给业绩注水的指标这件事是出了名的。尽管如此，从长远来看，最好的私募股权基金确实做得很好。由芝加哥大学的史蒂芬·卡普兰（Steven Kaplan）领导的一个里程碑式的研究发现，平均而言风险资本和并购基金的长期表现击败了标普500指数。但业绩差异很大。前四分之一的资金表现远好于平均水平，后四分之一则差得多。面临巨额赤字的养老基金经理人有动力将资金投入私募资产，希望自己的基金成为赢家之一。

随着更多的资本追逐机会，证据表明收益在递减。卡普兰和同事发现，在2006年之前的几乎所有年份中，收购行业的回报都超过了股市，但此后大致与标准普尔500指数相当。私募股权基金过去曾购买比上市公司便宜的企业。但如今竞争更加激烈了。私募股权中的巨兽还在变得更大。它们的固定成本很高——想想所有那些内部“造雨人”、律师、分析师和顾问。鉴于养老基金合作伙伴那里还有这么多的资金可以争取，它们进行原本可能避开的交易的压力越来越大。

投资者需要谨慎。OTPP的首席执行官乔·泰勒（Jo Taylor）说，在私募市

场中“专注和选择非常重要”。他的基金管理着2000亿加元（1500亿美元）的资金，规模足以进行自己的收购。这在选择优秀经理人和交易方面具有很大的优势。一般而言，更大的计划在费用谈判中也更为强势。激怒私募股权老板的最可靠方法是说“2-20”这个诅咒词，这曾经是“另类”资产经理的常见费用安排，意味着年费2%加上利润的20%。私募股权投资界的大佬们声称，这种高额费用几乎已经消失了。大客户通常可以通过例如直接购买所收购业务的股份（所谓的“共同投资”）来协商较低的费用。一位私募股权老板说，典型的管理费是“中低端加免费共同投资”。而且，他坚持认为，只有在回报达到某个门槛后才需要支付20%的业绩费。

高额费用、超额回报的基金、满意的客户：从投资公共股票的资产管理者的角度来看，收购业务看起来简直好得不真实。其中一位嘲讽它是“希望与祈祷的资产”。但是，资产管理业务的方方面面总是有源源不断的希望。如今，很多希望都押注中国。 ■



China

The Shanghai Open

The future of finance is Chinese. But what will it look like?

ASSET MANAGEMENT is mostly a rich-world affair. North America, Europe, Australia and Japan between them account for around three-quarters of assets under professional management. The United States is far and away the single most important market. America sets the tone for capital markets everywhere else. Global trading starts when New York opens.

Yet just as London gave way to New York after economic supremacy passed from Britain to America, so it is not hard to imagine a future when the global trading day will begin in Shanghai. China already has the world's second-largest economy. Its heft in global finance lags, but it is putting much effort into catching up. It has opened its mainland markets to foreign investors in shares and bonds. It is relaxing regulations to allow foreign asset managers to operate more freely. Asset management is growing faster in Asia than in the West. The industry's balance of power is shifting inexorably. Time, size and momentum are on China's side.

What is not clear is precisely how asset management will develop in China. No asset manager can offer a global service unless it has a footprint in China and across Asia. If you are selling Chinese equity or bond mutual funds to Western investors, you need people on the ground in China. The same business logic applies to selling global assets to Chinese investors, once outgoing capital controls are relaxed. The big prize—and the big unknown—is “local to local” ie, selling Chinese mutual funds to Chinese investors. And the competition for this prize looks wide open.

China's financial markets are immature. Much household wealth is on deposit in banks or tied up in homes. The commonest kinds of pooled

investments resemble bank deposits: either money-market funds or “wealth-management products”, higher-yielding alternatives to bank deposits, which have a fixed term of a few months but are often used to finance long-term property projects. Stockmarket trading is dominated by retail investors, who trade directly in individual shares via brokerages. Only around a tenth of listed shares are owned through domestic mutual funds.

China’s stockmarket has a very high churn rate. But the market is becoming more institutionalised. Mostly this reflects buying by foreigners, following the inclusion of a selection of shares and bonds listed on China’s mainland markets in the benchmark indices compiled by MSCI and Bloomberg Barclays. The hope is that China’s domestic market will also come under the stabilising sway of asset managers.

If it does, it is an enticing fee pool. As China gets richer, households are likely to change their mix of wealth: less in bank deposits and wealth-management products (which regulators are keen to kill off for reasons of financial stability); more in traded securities, such as shares and bonds. More of those securities, it is hoped, will be held in diversified mutual funds, managed by professionals for a fee. Pension funds will mushroom. GDP is likely to continue to grow faster than in rich countries. A bigger economy implies more savings to be deployed—and more securities to be issued, by both companies and the government.

In short, managed assets will continue to grow faster in China. For active asset managers, it is a dream. Their concern is that fee revenue in America and Europe is diminishing, or at least cannot grow much further. China offers a new frontier. “These are very big and liquid markets that are also inefficient,” says the boss of one European fund. Many of the same conditions are found in other parts of emerging Asia. A secular fall in inflation in India, the other Asian giant, has encouraged the well-off out of inflation hedges like gold and property into the stockmarket.

China appears to want to graduate from a rickety system in which state-backed banks decide who gets capital. Its regulators plan to establish a professional class of asset allocators. They see foreign involvement as a means to this goal. Since 2018 foreign firms have been allowed to take majority stakes in asset-management joint ventures with domestic banks. From April this year, they have been permitted to set up wholly owned subsidiaries in China. Within days of this rule change, JP Morgan Asset Management paid \$1bn to buy out its minority partner. Others are moving to take advantage of China's opening up. Still, most Chinese asset managers have foreign partners. The foreigners bring with them expertise in building portfolios, trading, research, investment process, record-keeping and the management of highly skilled teams. Their partners bring customers and local know-how.

Everyone thinks that China will be a big deal. But industry bosses are not confident about how things will shake out in practice. There are broadly three areas of uncertainty. The first is how to acquire customers. Some of the world's biggest asset managers became that way partly from having a captive market. They are often offshoots of insurance companies, retail banks or investment banks. A foreign asset manager with no brand in China needs to find another way to build the business. For some a tie-up with a local bank is a good fit. Amundi is an offshoot of two European banks, Crédit Agricole and Société Générale, from whose customer base they have built a formidable market share in France. It has a joint venture with Agricultural Bank of China and another with Bank of China. These are lenders with hundreds of millions of customers. It also has a joint venture with State Bank of India, the country's largest commercial bank. From such strongholds, Amundi has accumulated an asset base of €300bn across Asia.

But banks are not the only money doctors in China. Some rich-world equity funds have emerged out of life-insurance businesses. They essentially sold equity risk under the guise of an insurance product. Something similar

might yet happen in China. China Life, for instance, has a sales force of 1.8m. The two tech giants, Alibaba and Tencent, have mobile-payment platforms that are widely used and trusted. These are potential launching pads for asset-management businesses.

| *Very big, China*

In 2013 Ant Group, an offshoot of Alibaba, created a fund for its customers to invest the cash piling up in their Alipay mobile-payment accounts. Within a few years it was the world's largest money-market fund. Vanguard now has a joint venture with Ant Group to offer investment advice. It signed up 200,000 clients in its first 100 days. The choice of distribution channel hinges on whom Chinese investors will ultimately trust. It is not mostly a matter of technology. "People make a distinction between tech platforms and bank networks," says Yves Perrier, chief executive of Amundi. "But it is a false distinction because the way we bank in France is both human and digital."

A second uncertainty is how the industry in China will evolve. The bet is that it will become more like America, a market in which mutual funds have the muscle. But there is no guarantee of this. Indeed, in recent months America's stockmarket has looked a lot like China's: retail-led, noisy and informed by social-media fads and a gambling mentality. China's market might stay that way. Or the market for pooled investments might be swiftly captured by index and other kinds of low-cost products.

A third source of uncertainty is policy in China. It is friendly now, but might not always be. "With distribution-driven JVs, sometimes you lose control of the factory," warns one industry bigwig. That is not the only risk. The prospect of selling rich-world securities to Chinese investors depends on China allowing capital to flow freely outwards. It has been loth to do this because it would mean ceding greater control of the yuan to market forces. China may balk at further opening up. A bigger question lies behind this.

One industry executive puts it bluntly: “How serious is it about allowing people to make money?”

Perhaps the trade-and-technology wars will make China inhospitable to American asset managers. Perhaps Europe has an advantage. If Shanghai is to follow London and New York, the yuan must become freely convertible. China has to be open. But economic and financial hegemony may be expressed differently. “Will we make money? We haven’t a clue,” says the executive. But like many of his peers, he sees China as a low-stakes bet with a potentially large payoff. “We still need to be there,” he says. “So we are there.” ■



中国

上海开市

金融的未来在中国。但它会是何模样？【专题报道《资产管理》系列之四】

资产管理这桩事主要存在于富裕世界。北美、欧洲、澳大利亚和日本总共占到全球受专业管理的资产总额的四分之三左右。美国作为最重要的市场遥遥领先，为其他地方的资本市场定下基调。纽约开市，全球交易开始新的一天。

但是，正如经济霸权从英国传给美国之后，伦敦让位给了纽约那样，不难想象未来某天，全球交易日会从上海开始新一天。中国已经拥有世界第二大规模的经济。它在全球金融方面的势力落后于人，但正在付出巨大的努力追赶。它已经向外国投资者开放了中国大陆的股票和债券市场。它正在放宽监管以允许外国的资产管理公司更自由地运作。资产管理行业在亚洲的增速快过西方。该行业的力量平衡正在发生势不可挡的变化。时间、规模和势头如今都在中国这一边。

目前尚不清楚资产管理在中国到底将如何发展。在中国和亚洲没有既有业务的资产管理公司不能在这里提供全球服务。若你要把中国的股票或债券共同基金出售给西方投资者，就必须在中国境内派驻人员。相同的业务逻辑也适用于把全球资产出售给中国投资者——一旦对资本流出的管制放宽的话。而大奖——也是最大的未知数——是“本地对本地”，即向中国投资者出售中国的共同基金。对这个奖项的竞争目前看起来没有哪方有明显的优势，一切皆有可能。

中国的金融市场还不成熟。大量的家庭财富放在银行存款里或被束缚在房产上。最常见的汇集投资和银行存款类似：货币市场基金或“理财产品”，它们是比存银行收益更高些的替代方案，有几个月的固定期限，但经常被用于为长期房地产项目融资。股市交易由散户主导，他们通过券商直接买卖单只股票。通过国内共同基金持有的上市股份仅占约十分之一。

中国股市的客户更迭率非常高。但这个市场正变得更制度化。这主要是外国人加入购买的结果——此前摩根斯坦利国际资本指数（MSCI）和彭博巴克莱指数（Bloomberg Barclays）将一批中国大陆市场股票和债券纳入其基准指数中。中国的国内市场也有望受到资产管理公司这股稳定性力量的影响。

若真如此，那将带来诱人的佣金收益。随着中国变得更富裕，中国家庭很可能会改变财富组合：减少银行存款和理财产品（监管机构出于金融稳定性的考虑迫切想要喊停这类产品）；增加投资股票和债券等可交易证券。业界希望这些证券将更多地由多元化的共同基金持有，由专业人士收费管理。养老基金规模会迅速扩大。中国的GDP增速很可能会继续超过富裕国家。经济规模更大意味有更多的储蓄可供配置，而企业和政府都会发行更多证券。

简言之，中国被管理的资产规模将继续加速增长。对于主动资产管理者来说这真是太棒了。他们担心美欧的佣金收入在减少，或者至少无法再增长很多。中国提供了一片新天地。一家欧洲基金的老板说：“这些市场很大，流动性很高，效率却很低下。”在新兴亚洲的其他地区也发现了许多相同的情形。在另一个亚洲大国印度，通胀长期下降鼓励了富人们从黄金和房地产等对冲通胀的投资转向股市。

中国看起来想要终结由国有银行决定谁获得资本的不稳固的体系。其监管机构计划建立一个资产配置者的专业阶层。它们认为外国参与是实现这个目标的手段之一。自2018年以来，外国公司被允许在其与国内银行的资产管理合资企业中持有多数股权。从今年4月开始，它们被允许在中国设立全资子公司。在这项新规发布后的几天内，摩根资产管理（JP Morgan Asset Management）就斥资10亿美元收购了其少数股东合资伙伴。其他外国公司也行动起来，争取抓住中国开始开放的机遇。不过，大多数的中国资产管理公司有外国合伙人。外国人带来了在打造投资组合、交易、研究、投资程序、交易记录和管理高技能团队方面的专业知识。本地合作伙伴则带来了客户和当地的门道。

所有人都认为中国将会非常重要。但业界老板们对事情实际会发展成什么样却心里没底。不确定性大致可以分成三个方面。首先是如何获得客户。世界上最大的一批资产管理公司之所以能实现这样的规模，一定程度上是因为它们拥有某种垄断市场。它们通常是保险公司、零售银行或投资银行的分支机构。一家在中国没有品牌的外国资产管理公司需要找到另一种方式来打开市场。对一些公司来说，和本地银行合作是一个不错的选择。东方汇理（Amundi）源自于两家欧洲银行——法国农业信贷银行（Crédit Agricole）和法国兴业银行（Société Générale），通过这两家银行的客户基础在法国建立了令人生畏的市场份额。它与拥有几亿客户的中国农业银行和中国银行分别成立了合资企业。它还和印度最大的商业银行印度国家银行建立了合资企业。通过这些据点，东方汇理已在亚洲各地累积起3000亿欧元的资产基础。

但银行不是中国唯一一批财务医生。一些富裕世界的股票基金已出现在人寿保险业务中。它们本质上是以保险产品的名义出售证券风险。在中国也可能会发生类似的事情。例如，中国人寿拥有180万名销售人员。两大科技巨头阿里巴巴和腾讯拥有被广泛使用和信任的移动支付平台。这些都可能是资产管理业务的“发射平台”。

| 非常大，中国

阿里巴巴的分支机构蚂蚁集团在2013年创建了一笔基金，让用户把他们的支付宝移动支付帐户中的余额拿来投资。几年内它就发展成了全球最大的货币市场基金。先锋集团（Vanguard）已与蚂蚁成立了一家提供投资咨询的合资企业。这家公司在开张的100天内就签下了20万名客户。分销渠道的选择取决于中国投资者最终会信任谁。这主要并不是一个技术问题。“人们会把技术平台和银行网络区分开来，”东方汇理的首席执行官伊夫·佩里耶（Yves Perrier）说，“但这是一种错误的划分，因为我们在法国做金融的方式既人性化又数字化。”

第二个不确定性是中国的这个行业会如何演变。它很可能会变得更像美国，共同基金在市场中具有强大的影响力。但这一点无法保证。实际上，近几个月来美国的股市和中国的很像：散户主导、充满噪音、受社交媒体

上的风向和赌徒心理的影响。中国的市场可能会继续处于这种状态。又或者，汇集投资市场可能会被指数和其他类型的低成本产品迅速占领。

第三个不确定性源头是中国的政策。它目前是友好的，但不一定总如此。一位行业大佬警告说：“成立分销驱动的合资企业，有时你会失去对工厂的控制权。”这不是唯一的风险。向中国投资者出售富裕国家证券的前景有赖于中国允许资本自由流出。中国一直很不乐意这么做，因为这意味着把人民币的控制权更多交给市场力量。中国可能对进一步开放犹疑不决。这背后有一个更大的问题。一位行业高管直言：“它对于让大家赚钱这事是认真的吗？”

或许贸易战和科技战会使得中国不欢迎美国的资产管理公司。或许欧洲有优势。如果上海要追赶伦敦和纽约，那么人民币必须能够自由兑换。中国必须要开放。但经济和金融霸权也可能以不同的方式展现。“我们会赚钱吗？我们毫无头绪。”这位高管说。但是，与许多同业一样，他视中国为一个低风险却有潜在高收益的赌注。“我们仍然需要在那儿，”他说，“所以我们在那儿。”■



Superbatteries

What do you get when you cross a hare with a tortoise?

Mixing supercapacitors and batteries may give electric cars what they need to overcome customer resistance

WHEN IT COMES to putting on pace, some electric vehicles rely not only on a battery to deliver the necessary wattage, but also on a second source of power called a supercapacitor. The battery serves as a marathon runner, providing a steady discharge over a long distance. The supercapacitor is a sprinter, unleashing a large amount of energy rapidly.

Speedy discharge is not the only advantage supercapacitors bring. They can be recharged more quickly, too. That makes them particularly useful in regenerative-braking systems, since they are able to absorb more of the electricity that is produced as a vehicle slows down. They can, though, store only a fraction of the amount of energy which a battery stuffs away. They therefore soon run out of puff. Because of this, engineers have been trying for a while to hybridise the best bits of a supercapacitor with the most useful features of a battery, to make a storage device with both speed and endurance. They are now having some success. Indeed, NAWA Technologies, near Aix-en-Provence, France, claims its supercapacitor-like battery could more than double the range of an electric car, allowing it to be driven for 1,000km on a single charge. This new device could also, NAWA says, be recharged to 80% of its capacity in as little as five minutes.

| *The science bit*

Capacitors and batteries work in different ways, so combining them is tricky. A capacitor stores energy physically, in the form of static electricity. This is easily and rapidly discharged, so capacitors have good power density (the rate at which they transfer energy, per unit of weight). A decent

modern supercapacitor has a power density of several kilowatts per kilogram.

Batteries store their energy chemically, in the form of reactive substances in their two electrodes. These electrodes are held physically apart, but are connected by a material called an electrolyte through which charged atoms, known as ions, can pass from one to the other, in order to permit a reaction to proceed. That, though, happens only when the ion flow is balanced by a flow of electrons through an external circuit between the electrodes. This electron flow is the electric current which is the reason for the battery's existence.

Controlled in this way, chemical reactions take time, so batteries have low power density. A lithium-ion (Li-ion) battery of the sort used in electric cars might thus muster only a tenth of a kilowatt per kilogram. But chemicals can hold a lot of energy, so batteries have high energy density (the amount of energy they can contain, again per unit weight). A Li-ion battery can store 200-300 watt-hours per kilogram (Wh/kg). Supercapacitors generally manage less than 10Wh/kg.

Capacitors, by contrast—whether basic or “super”—consist of a pair of electrically conductive plates placed either side of a separator material. When a voltage is applied to these plates, a positive charge builds up on the surface of one and a corresponding negative charge on the other. Connect the plates through an external circuit and, as with a battery, a current will then flow.

Making the leap from a basic capacitor to the super variety involves two things. One is to coat the plates with a porous material such as activated carbon, to increase the surface area available for energy storage. The other is to soak them in an electrolyte. This creates yet more storage area in the form of the electrolyte's boundary with the plates. But adding an electrolyte

to the mix also brings the possibility of adding a bit of battery-like electrochemistry at the same time. And Skeleton Technologies, an Estonian supercapacitor firm, plans to do just that.

| *Plate tectonics*

Skeleton has already developed plates composed of what it calls “curved” graphene, for a new range of straightforward supercapacitors. Ordinary graphene is a single layer of carbon atoms arranged in a hexagonal grid. It is highly conductive. Skeleton’s curved variety consists of crumpled sheets of the stuff. The consequent increase in surface area will, the firm hopes, push the energy density of its new products to 10-15Wh/kg—a good fraction of the theoretical maximum for a supercapacitor of 20-30Wh/kg.

That, though, is just the start of Skeleton’s plan. The firm’s engineers are now working with the Karlsruhe Institute of Technology, in Germany, to use curved graphene in what it calls its “SuperBattery”. Though this remains basically a supercapacitor, storing most of its charge electrostatically, the electrolyte will, says Sebastian Pohlmann, Skeleton’s head of innovation, also provide some chemical-energy storage. The company is keeping mum about the electrolyte it uses and the chemistry involved. “It is not comparable to the classic lithium-ion chemistry,” is all that Dr Pohlmann will say. But the overall consequence, he claims, will be something that is rechargeable within 15 seconds and has the ability to store 60Wh/kg. Skeleton aims to start producing this commercially by 2023.

Other groups, too, are working on ways to add chemical-energy storage to a supercapacitor. Researchers at Graz University of Technology in Austria, for example, have developed a version that has its electrical contacts coated with carbon which is pierced by tiny pores. One contact operates like a capacitor plate, the other like a battery electrode. Unlike Skeleton, the Graz group are open about their approach to electrolyte chemistry. They are using aqueous sodium iodide (ie, a solution of sodium ions and iodine

ions). At the electrode, the iodide turn into elemental iodine, which crystallises within the pores during discharge. This process then reverses itself when the device is charging. The pores in the plate serve to accommodate sodium ions similarly.

According to a paper its inventors published recently in *Nature Communications*, the Graz cell's performance exceeds that of a Li-ion battery. It is able, for example, to cope with up to 1m charge and discharge cycles, says Qamar Abbas, a member of the team. A Li-ion equivalent might be expected to manage a couple of thousand cycles.

Both Skeleton and the Graz group, then, are taking modified supercapacitor architecture and adding some bespoke electrochemistry. By contrast, although the offering from NAWA Technologies does indeed also employ modified supercapacitor plates as its electrodes, it uses tried and trusted Li-ion ingredients for the chemical donkey work.

Like Skeleton, NAWA already manufactures supercapacitors. The plates for these are created using a process which the firm calls VACNT (vertically aligned carbon nanotubes). This arranges those tubes in an array that resembles, in miniature, the bristles on a brush. Extreme miniature. A square centimetre contains about 100bn of them, all standing to attention. That greatly increases the surface area available to hold an electric charge.

To adapt VACNT plates to operate also as battery-like electrodes, NAWA's engineers have thinned the nanotube forest to make room for coatings of the chemicals which batteries employ for their reactions, and also for the movement of lithium ions into and out of the spaces between the tubes. This freedom of movement, the company reckons, will boost the arrangement's power density by a factor of ten.

To start with, the nanotubes of the invention's cathode (the positive

electrode in a battery) will be coated with nickel, manganese and cobalt, a mixture already widely used to make such cathodes. Conventional anodes (the negative electrodes) are already carbon based, so using that element in the form of nanotubes is not a big departure. Other, less commercially developed battery chemistries should, though, also work with VACNT electrodes. These include lithium-sulphur and lithium-silicon, both of which have the potential to increase energy densities.

Silicon is particularly promising, but it swells as it absorbs ions, and that can rupture a battery. The thicket of nanotubes in a VACNT electrode should operate like a cage to keep the silicon in check, says Pascal Boulanger, a physicist who helped found NAWA in 2013. The new electrode material could also be used with solid rather than liquid electrolytes, to make “solid-state” batteries. These are powerful and robust, but are proving tricky to commercialise.

| *Bristling to work*

In tests with a number of unnamed battery companies, Dr Boulanger says VACNT electrodes achieved an energy density of 500Wh/kg in one battery and up to 1,400 watt-hours per litre in another. This is roughly double what a typical Li-ion battery can manage in terms of weight and volume respectively. “We have done that very easily,” he adds, “so we believe there is more room for improvement.”

One firm that NAWA does admit to working with is Saft, a large batterymaker owned by Total, a French oil giant keen to diversify from fossil fuels. Among Saft’s customers are several Formula 1 teams which use some electric power in their racing cars. Saft has also teamed up with PSA group, a big European carmaker, to manufacture batteries for electric vehicles.

Naturally, the new device’s success will depend on the cost of

manufacturing it. NAWA is already constructing a mass-production line to make VACNT plates for its latest supercapacitors. The process used, which grows nanotubes on both sides of a roll of aluminium foil, would, says Ulrik Grape, NAWA's chief executive, transfer easily to an existing battery-production line and might even reduce battery-making costs. He expects the first versions of the supercapacitor-battery hybrids to be in production by 2023.

Whether such hybrid storage will be able to compete with conventional Li-ions remains to be seen. Li-ion batteries have the advantage of incumbency, and batterymakers have invested billions of dollars in huge "gigafactories" to turn them out in droves. Yet, for all the hype surrounding electric cars, doubts about Li-ions linger in many customers' minds. Range-anxiety, recharge rate and cost all combine to induce a hesitation to reach for the credit card. Mixing the spice of a supercapacitor with the stamina of a battery might overcome at least the first two of these objections, and thus, at last, truly launch an era of carefree electric motoring. ■



超级电池

龟兔杂交

把超级电容器和电池混合起来或许能让顾客不再抗拒电动汽车

在加速时，一些电动汽车不仅靠电池来提供所需的功率，还依赖于第二种电源——超级电容器。电池充当马拉松运动员，长距离稳定放电。超级电容器是短跑运动员，迅速释放大量能量。

快速放电不是超级电容器带来的唯一优势。它们也能更快地充电。这让它们在再生制动系统中特别有用，因为能在汽车减速时吸收更多电。但是，它们能够存储的能量只相当于电池的一小部分，所以很快就会没电。为此，过去一段时间里工程师们尝试把超级电容器的最强项和电池最有用的功能相结合，以制造出兼具速度与耐力的蓄电设备。他们现在取得了一些进展。位于法国普罗旺斯艾克斯城附近的NAWA Technologies声称，其类似超级电容器的电池将电动汽车的续航里程提高了一倍以上，一次充电能跑1000公里。NAWA说，这种新设备还可以在短短五分钟内充满80%的电。

| 科学部分

电容器和电池的工作原理不同，因此要把它们结合起来有难度。电容器以物理方式通过静电储能。它放电容易且迅速，因此电容器具有很好的功率密度（单位重量的能量传输速率）。一款质量不错的现代超级电容器的功率密度可达每千克好几千瓦。

电池则是以化学方式，通过两个电极中的反应性物质储能。这些电极保持分离，但用名为“电解质”的材料连接起来。带电的原子（即“离子”）可通过电解质从一个电极抵达另一个，让化学反应得以进行。但是，只有当这种离子流被电极间的外部电路里的电子流平衡时，这种反应才会发生。这种电子流就是“电流”，也就是电池之所以存在的原因。

通过这种方式控制的化学反应需要时间，因此电池的功率密度低。电动汽

车中使用的锂离子电池的功率可能仅为每千克一百瓦。但化学物质可以保持很多能量，因此电池具有很高的能量密度（单位重量容纳的能量多少）。锂离子电池每千克可存储200至300瓦时。超级电容器通常能容纳的不足10瓦时/千克。

相比之下，电容器（无论基本款还是“超级”款）由一对置于分隔材料两侧的导电极板组成。当在两块极板上施加电压时，其中一块的表面会积聚正电荷，另一块相应积聚起负电荷。和电池类似，通过外部电路连接两块极板时就会产生电流。

从基本电容器到超级电容器的飞跃涉及两件事。一是用诸如活性炭的多孔材料涂覆极板，以增加可用于存储能量的表面积。二是将它们浸泡在电解液中。电解液与极板的接触面创造了更大的存储面积。但是，将电解质添加进来还带来了一种可能性，即同时增加了一些与电池类似的电化学反应。爱沙尼亚的超级电容器公司骨骼科技（Skeleton Technologies）就计划这么做。

| 板块构造

骨骼科技已经开发出了它称之为“弯曲”的石墨烯构成的极板，用在它新系列的简单版超级电容器中。普通石墨烯是排列成六边形网格的单层碳原子，导电性非常好。骨骼科技所用的弯曲品种由许多层折皱的石墨烯组成。该公司希望，由此增加的表面积将把它的新产品的能量密度推高至10-15瓦时/千克，实现了超级电容器20-30瓦时/千克的理论极限的很大一部分。

不过，这只是骨骼科技计划的起点。该公司的工程师目前正与德国的卡尔斯鲁厄理工学院合作，在它所谓的“超级电池”（SuperBattery）中使用弯曲石墨烯。公司创新主管塞巴斯蒂安·波尔曼（Sebastian Pohlmann）说，尽管它基本上仍是一种超级电容器，以静电方式存储大部分电，但电解液也将提供一些化学储能。该公司没有透露所用的电解液和涉及的化学原理。波尔曼博士只说：“这没法与典型的锂离子化学相比。”但他声称，总体结果将是一款可在15秒内充满电并能存储60瓦时/千克的设备。公司

的目标是在2023年前开始商业化生产。

其他研究团队也在探索把化学能量存储添加进超级电容器的方法。例如，奥地利的格拉茨工业大学（Graz University of Technology）的研究人员开发的版本在电触点上涂上了带细孔的碳层。一个触点的工作方式类似于电容器的极板，另一个则类似电池的电极。与骨骼科技不同，格拉茨小组公开了所使用的电解液化学。他们用的是碘化钠水溶液（即钠离子和碘离子的溶液）。在电极这一端，这种碘化物会变成元素碘，在放电过程中在小孔内结晶。当设备充电时，整个过程逆转。这时极板上的小孔会以类似的方式容纳钠离子。

据研究人员近期发表在《自然-通讯》（*Nature Communications*）上的论文称，格拉茨电池的性能超过了锂离子电池。团队成员卡马尔·阿巴斯（Qamar Abbas）举例说，它能充放电多达一百万次。一款相当的锂电池只能应付两三千次。

由此可见，骨骼科技和格拉茨团队都采用了改进的超级电容器结构，添加了一些定制的电化学技术。相比之下，尽管NAWA Technologies的产品确实也采用改造过的超级电容器极板作为电极，但使用已被证明可靠的锂电池成分来执行乏味的化学反应。

和骨骼科技一样，NAWA本来就已经在生产超级电容器。它使用它称之为“VACNT”（垂直排列的碳纳米管）的工艺来打造其中用到的极板。管子的排列就好像一把袖珍刷子上的刷毛。非常袖珍。它每平方厘米包含约1000亿根管子，根根直立。这极大地增加了可用来存储电荷的表面积。

为了让VACNT极板也能用作类似电池的电极，NAWA的工程师缩减了这个纳米管丛林的规模，留出了一些空间来涂抹那些在电池中用来发生反应的化学物质，并方便锂离子进出管子之间的空隙。该公司估计让锂离子自由移动可使整套系统的功率密度提高十倍。

首先，这个发明的阴极（电池中的正电极）的纳米管将被镍、锰和钴涂覆，这种混合物已被广泛用于制造此类阴极。传统的阳极（负电极）本身

已经是碳基的，因此以纳米管的形式使用该元素不算改动太大。不过，其他在商业上还不那么成熟的电池化学应该也能和VACNT电极一起使用。这包括锂硫和锂硅，两者都有可能增加能量密度。

硅尤其有前景，但它在吸收离子时会膨胀，而这可能导致电池爆裂。在2013年帮助创建了NAWA的物理学家帕斯卡尔·布朗热（Pascal Boulanger）说，VACNT电极中的纳米管丛林应该能像笼子那样抑制硅的膨胀。这种新的电极材料还可与固体而非液体电解质一起使用，制造出“固态”电池。它们性能强大又耐用，但目前来看很难商业化。

| 能量丛林

NAWA与多家未透露名字的电池公司开展了测试。布朗热博士说，VACNT电极在一款电池中的能量密度达到了500瓦时/千克，在另一款中达到1400瓦时/升。这分别是典型的锂离子电池单位重量和单位容积的两倍。“我们很容易就做到了，”他补充道，“所以我们相信还有改进空间。”

NAWA确实透露了其中一家公司是Saft。这是一家大型电池制造商，隶属于法国石油巨头道达尔（Total），而道达尔很想从化石燃料中转向多元发展。Saft的客户中有几个一级方程式车队，在其赛车中用到一些电力。Saft还与欧洲大型汽车制造商标致雪铁龙集团（PSA）合作制造电动汽车电池。

自然，这种新设备的成功将取决于其制造成本。NAWA已经在建设一条大规模生产线来为它最新款的超级电容器生产VACNT极板。首席执行官乌里克·格雷普（Ulrik Grape）表示，所用的工艺在一卷铝箔的两面栽种纳米管，可以很容易地转移到现有的电池生产线上，甚至可能降低电池制造的成本。他预计首批“超级电容器-电池混合体”将于2023年投产。

这种混合蓄电是否能与常规锂电池竞争尚待观察。锂电池具有成熟优势，电池制造商已在大型“超级工厂”中投入几十亿美元来大规模生产。然而，尽管电动车被热炒，对锂电池的疑虑在许多顾客心中挥之不去。对续航里程的焦虑、充电的速度，还有开销的问题都让人们在掏信用卡时犹豫不

决。把超级电容器的火力和电池的耐力相结合或许至少能克服这些拖累因素的头两个，从而终于真正开启无忧无虑的电动车时代。 ■



Microsoft

After the reboot

The software giant has turned itself around. Now for the hard part

WHEN SATYA NADELLA became the third boss of Microsoft in 2014 one photograph captured the moment. It shows him flanked by Bill Gates, the co-founder and chairman, and Steve Ballmer, Mr Gates's successor as chief executive. The two white tech tycoons strike a confident pose in casual dress. Mr Nadella, an Indian-American, skulks in a suit, smiling awkwardly.

He had a reason for that awkward smile. The company was in a ditch. While it hunkered down at its headquarters in Redmond, Washington, Apple invented the iPhone, and Google and Facebook rose from Silicon Valley. Its share price barely budged for years. When he took over, says Mr Nadella, outsiders questioned if Microsoft will "make it to the other side".

It did—with aplomb. Mr Nadella dethroned the Windows operating system as its core product. He brought Microsoft's software and services to other operating systems, including "open source" Linux, as well as Google's and Apple's. Most important, he put Microsoft's cloud-computing arm, Azure, launched in 2010, at the heart of the business. The result has been double-digit revenue growth and a market capitalisation of \$1.6trn. Only Apple and Saudi Aramco, an oil colossus, are more valuable.

Microsoft succeeded in its reinvention where other tech firms seeking a second life, such as IBM and Oracle, have not. But nothing lasts for ever in the fast-changing world of technology. The old personal-computer (PC) business has slowed. The firm's products are not always the best or most popular. Azure is considered by many experts to be technologically behind the market leader, Amazon Web Services (AWS), which the e-commerce giant launched four years earlier. Many users prefer to make video calls on

Zoom and chat on Slack rather than use Microsoft's Teams. This year Microsoft failed to buy TikTok, which might have boosted its consumer-facing business that includes the Xbox games console and (less interestingly for TikTokers) LinkedIn, a careers network; the popular Chinese-owned short-video app inked a nebulous technology partnership with Oracle instead. And Microsoft has to square up not just to Amazon but to younger tech giants such as Alphabet (Google's parent) and China's Alibaba and Tencent.

The pressure to succeed is immense. The firm's shares have more than quintupled in value since Mr Nadella took over (see chart 1). They now trade at 37 times earnings, a higher multiple than those of Alphabet, Apple or Facebook (though far below Amazon's ratio of 123). The company is priced for perfection, says Mark Moerdler of Bernstein, a research firm. And for further expansion.

Mr Nadella acknowledges the challenge. "This is not some linear transition," he says. "When the first hockey stick plateaus the question is: have you got the other things?" In an effort to live up to the hype he is dusting off old weapons—bundling and licensing—the aggressive use of which got Microsoft in trouble with antitrust authorities from the late 1990s and earned it the moniker "evil empire". An insider since 1992, he remembers those days, when the firm narrowly avoided a forced break-up. Can it continue to grow while steering clear of the old pitfalls?

Until 2014 Microsoft had five different business areas. Most of the profit came from three of them: Windows, its Office software (spreadsheets, word-processing, PowerPoint and the like) and programs to run the servers used in data centres and corporate networks. Entertainment and devices, including the Xbox, made a bit of money. Online services such as the Bing search engine and MSN web portal did not.

Mr Nadella reconfigured this structure. Today Microsoft's 20 or so businesses fall into three big buckets: cloud, productivity software and business processes, and personal computing. Each contains one of the lucrative stalwarts—servers, Office and Windows—alongside lots of others such as Surface PCs and digital whiteboards, or Dynamics business software. Many of the businesses revolve around Azure, which has grown into the internal computing backbone for Microsoft's applications, as well as a product to sell to customers. Forays into futuristic quantum computing or virtual and augmented reality stand on their own, while boosting Azure's capabilities. So do artificial-intelligence (AI) algorithms, trained on data from Bing, LinkedIn and other places.

If any of those whizzy bets succeed at scale, they would sharpen Microsoft's innovative edge, which looks blunter than either Amazon's or Alphabet's. Even if they do not, Microsoft may succeed by commercialising products rather than inventing new ones. As insiders quip, the firm is never first to market and often not second, but “man, we will make all the money”.

That has certainly been true of Office. Excel was not the first spreadsheet (remember Lotus 1-2-3?). But it is deemed by many software engineers to be the most consequential program ever written, in part because it has been so widely adopted. Around 1.2bn workers use Office or Office365, a web-based version served up through Azure. Here, too, Microsoft lagged behind Google's G-suite software, which, among other things, enabled multiple users to work on one document at the same time. Googlers make digs at what they see as Microsoft's offline, “save as” mentality.

Still, managers prize Office—and especially Excel—from desk-jockeys at their peril. As a result, Microsoft controls 87.6% of the market for such software, to Google's 11.5%, according to Gartner, a research firm. To boost Teams, Microsoft has started bundling it with Office365 free of charge; by April Teams had 75m daily users. Unfair, rivals say; in July Slack launched

an antitrust suit against Microsoft. It calls Teams a copycat product aimed at killing it—just as Microsoft’s Internet Explorer vanquished Netscape, a rival web browser, which led to its battle with trustbusters.

Critically, Microsoft has been a superfast follower in the cloud. In Mr Nadella’s book about the firm’s transformation, “Hit Refresh”, he described how, by the time he took over, AWS had built a vast cloud business with no competition. “Amazon was leading a revolution and we had not even mustered our troops,” he wrote.

The stakes are huge. Over time most of the world’s companies are expected to move computing to the cloud. The share of IT spending going to the cloud is approaching 10%. But that already amounts to an annual market of \$240bn. Given expected annual growth rates of nearly 20% it could reach \$1trn before long.

In the cloud Azure faces two big rivals—AWS and Google Cloud Platform (GCP)—and two others—Oracle and Alibaba Cloud. Its market share has risen steadily, to 18% (see chart 2). Again, Microsoft’s rapport with firms’ IT departments has served it well. It still dominates parts of business software and nearly four in five personal computers run on Windows, as do 72% of all servers. It can offer corporate clients a single price that bundles Azure with Office and other software. That way Azure can end up costing only a fifth as much as AWS. And it is easier to use than Amazon’s offering, whose advanced features overwhelm even some IT professionals.

It is also easier to swallow for many clients than Amazon products. When Microsoft pitched for business, recalls a former executive, Azure would lose the technical evaluation but win out of customers’ fear that Jeff Bezos, Amazon’s insatiable boss, might use their money and data to invade their turf. Suspicion of Mr Bezos may explain why AWS lost a \$10bn Pentagon cloud contract to Microsoft, despite being tipped to win. Amazon believes

Microsoft benefited from Donald Trump's feud with Mr Bezos, who also owns the *Washington Post*, a newspaper the president does not like. Amazon has legally challenged the award, unsuccessfully so far.

Azure aims to match or overtake AWS in the cloud. Yet in Gartner's closely followed ranking of cloud providers Azure comes in well behind AWS and has lately slipped down (see chart 3). The way Microsoft has built its global cloud infrastructure, covering more geographical ground than AWS but more thinly, may make it less reliable. Gartner cites insufficient redundant capacity to deal with data centres knocked out by bad weather or other problems. Even without disruptions, capacity has proved problematic. As demand has surged in the pandemic, with millions of remote workers switching to the cloud, Azure has at times been unable to keep up. Microsoft Teams suffered a blackout in March. That month Microsoft put in place temporary resource limits on new Azure subscriptions. AWS has not needed to.

| *Azure blues*

Microsoft cannot afford to get Azure wrong. It is what drives its share price. Azure is estimated to make up only a tenth of Microsoft's \$53bn in annual operating profit. But every quarter Wall Street fixates on how fast the cloud is growing, notes Heather Bellini of Goldman Sachs, an investment bank. Recently analysts have been disappointed to see growth slow, from 59% year on year in the first three months of 2020, to 47% from April to June. (It is some comfort that AWS's growth has also slowed in recent quarters.)

Azure is sure to get a fillip from new licensing rules, just as Teams has from bundling. Up to now Microsoft let customers use its software on dedicated servers run by AWS or any cloud provider under a practice called "bring your own licence" (BYOL). That freedom enabled easy switching; of all cloud-based Windows software, 57% runs on AWS, nearly twice as much as on Azure.

Last summer Microsoft did away with BYOL and introduced restrictions for customers wishing to put its software on certain big clouds. If a client wanted to run desktop and server programs on those clouds after October 1st, it would have to buy a new subscription, rather than a one-off licence. Not to offend antitrust rules Microsoft put Azure on its list alongside AWS, GCP and Alibaba Cloud. But it separately offered customers a better deal to move to Azure, offsetting the extra cost.

Amazon said Microsoft was trying to restrict what clouds companies can use. Several neutral observers concur. “Microsoft is taking its arsenal of Windows Server, a massive installed software base, and using it punitively against competitors,” says Raj Bala, Gartner’s main cloud-infrastructure expert and author of its cloud ranking. It is the antithesis of Mr Nadella’s more open strategy, adds Wes Miller of Directions on Microsoft, a research firm. After all, he had eased Office’s move to non-Windows devices such as Apple’s iPad. “Satya wants to make people think he’s different, but he’s old-school Microsoft, just with a little softer exterior,” sums up an executive at a rival.

Microsoft is the only big cloud provider which also sells lots of programs that clouds host. “Is there a piece of software that Amazon or Google has built that runs on Azure? Zero,” Mr Nadella says. That also gives Azure a big advantage to exploit. Mr Nadella does not intend to repeat the mistake of letting Windows workloads all migrate to Amazon’s cloud, as happened early on. “We were stupid, not realising what was happening,” he says. “We will absolutely monetise our intellectual property on their clouds.”

Since the licensing changes went into effect Gartner has received several hundred inquiries about them. An executive from a *Fortune* 500 health-care company that had picked AWS as its cloud provider says that the new rules meant an extra annual cost of \$100m, forcing the firm to slow down its transition to the cloud. “They are writing licence terms to get customers

to believe their only choice is Azure,” complains a vice-president of a medium-sized firm in Wisconsin that felt forced to switch from AWS. “There is no law against it but it removes choice,” he adds. An IT chief at another midwestern firm likens the new rules to a long lease on a car where “the lessor says you can only use Chevron gas, not BP or Exxon”. Two of the three customers are set on writing Microsoft software out of their stacks over time.

| *Avoiding defenestration*

That points to a risk for the tech giant. By tugging reluctant customers onto Azure too aggressively Microsoft may put a lot of them off Windows—or, possibly, provoke mass flouting of rules, daring the software giant to enforce them. Takeshi Numoto, chief marketing officer of Microsoft’s commercial business, says the feedback Microsoft is receiving on cloud choice after the new rules is positive, adding that “We want to hear from all customers if there are ways we can improve our partnership and support of their businesses.”

How closely is Microsoft flirting with the kind of behaviour that got it in trouble in the late 1990s? After its bruising antitrust battle it is likely to proceed cautiously. If Europe proves sympathetic to Slack, the messaging firm could bring a similar case in America. If that happens, Microsoft may offer concessions to make it go away.

Mr Nadella resists the idea that Microsoft is overstepping the mark. “Look at the number of enterprise SAAS [software-as-a-service] and infrastructure firms,” he says—hardly suggestive of “a monopoly company collecting monopoly rent”.

In its defence Microsoft can certainly argue that Azure has brought competition to cloud computing, which AWS might otherwise have cornered. Tellingly, Mr Nadella was spared the indignity of testifying in

front of a congressional antitrust subcommittee, which recently grilled his opposite numbers at Alphabet, Amazon, Apple and Facebook. A congressional report on big tech's digital dominance did not finger Microsoft. America's trustbusters have gone after Google instead. Google denies wrongdoing.

Microsoft's rebuffed \$25bn-30bn bid for TikTok could have been a boon to competition. Had it succeeded, Microsoft would have challenged Google and Facebook in digital advertising in short order. TikTok's reams of data on its teenage users would have fuelled Microsoft's AI, which competes against algorithms being developed by all its big tech rivals in America and China. The purchase of ZeniMax Media, a games developer, for \$7.5bn to bolster its flourishing cloud-gaming platform does not make up for the failed bid.

Google's antitrust troubles could offer consolation. The case may shake up internet search, helping Bing. It is a tiddler despite having a quality of search results that is not all that different from Google's. In a hint that Microsoft might want to revive its search engine, in October it was rebranded as "Microsoft Bing".

Mr Nadella is confident about future growth, his early awkwardness long since replaced by a justified and resolute assuredness. "We're lucky enough to be in the tech business, and IT spending is going from 5% of GDP to 10% over the next ten years," he says. But competition for those IT dollars is white-hot. Microsoft's response—leaning heavily on customers not to defect—may work in the short run. But as the pace of change in the technology industry accelerates, thanks to abundant brainpower and oodles of capital, customers may put innovation ahead of loyalty to long-standing providers. One successful reinvention is unlikely to be enough. ■



微软

重启之后

这家软件巨头已经扭转了局面。现在困难才开始

当萨蒂亚·纳德拉（Satya Nadella）在2014年成为微软的第三任老板时，一张照片生动展现了那个时刻。站在他两边的分别是联合创始人兼董事长比尔·盖茨，和继盖茨之后担任首席执行官的史蒂夫·鲍尔默（Steve Ballmer）。两位白人技术大亨穿着休闲服摆出自信的姿势。印度裔美国人纳德拉则套着西装，局促地笑着。

他尴尬的笑容是有原因的。公司陷入困境。当它踞守在华盛顿州雷德蒙德的总部时，苹果发明了iPhone，谷歌和Facebook在硅谷崛起。公司股价几年来几乎没有动静。纳德拉说，当他接任时，外界质疑微软是否能“翻身”。

它做到了——云淡风轻地。纳德拉将Windows操作系统拉下了公司核心产品的宝座。他把微软的软件和服务引入了其他操作系统，包括开源的Linux以及谷歌和苹果的操作系统。最重要的是，他将2010年成立的微软云计算部门Azure置于业务的核心。其结果是两位数的收入增长和1.6万亿美元的市值。只有苹果和石油巨头沙特阿美的市值高过它。

微软的重塑成功了，而其他寻求第二春的科技公司——如IBM和甲骨文——都没能做到。但是，在瞬息万变的技术世界中，没有什么是永恒的。旧的个人计算机（PC）业务已经放缓。微软的产品并不总是最好或最受欢迎的。许多专家认为Azure在技术上落后于市场领先者亚马逊网络服务（AWS），后者是这个电子商务巨头在四年前推出的。许多用户更喜欢在Zoom上打视频电话，在Slack上聊天，而不是使用微软的Teams。今年，微软没能收购TikTok，而这原本可能促进其面向消费者的业务，包括Xbox游戏机和（TikTok用户没那么感兴趣的）职业人脉网络领英；这个广受欢迎的中资短视频应用改为与甲骨文建立了模糊的技术合作伙伴关系。而且，微软要抗衡的不仅是亚马逊，还有更年轻的科技巨头，例如谷歌的母

公司Alphabet，以及中国的阿里巴巴和腾讯。

要取得成功的压力巨大。自纳德拉接任以来，微软的股价已上涨了四倍多（见图1）。现在的市盈率为37倍，高于Alphabet、苹果或Facebook（尽管远低于亚马逊的123倍）。研究公司伯恩斯坦（Bernstein）的马克·莫德勒（Mark Moerdler）说，该公司的定价要求的是完美，以及进一步扩张。

纳德拉承认这种挑战。“这不是某种线性渐移，”他说，“当第一个L形平台期到来时，问题是：你还有别的东西吗？”为了配得上市场的炒作，他正在把昔日武器（捆绑和许可）重新搬出来——1990年代后期，微软激进地使用这种武器，惹上了反托拉斯当局的麻烦，并因此赢得了“邪恶帝国”的绰号。作为一个1992年就进入微软的内部人士，他还记得那些日子，当时公司勉强躲过了强迫拆分。微软还能继续增长而不落入旧陷阱吗？

在2014年之前，微软拥有五个不同的业务领域。大部分利润来自以下三个：Windows、Office软件（电子表格、文字处理、PowerPoint等），以及在数据中心和企业网络的服务器上运行的程序。娱乐和设备（包括Xbox）赚了一点点。诸如必应搜索引擎和MSN网络门户之类的在线服务没赚到钱。

纳德拉重新配置了这个结构。如今，微软的20多个业务可分为三大类：云、生产力软件和业务流程，以及个人计算。每个类别都有一个利润丰厚的支柱——服务器、Office和Windows——再加上Surface PC和数字白板或Dynamics商业软件等许多其他拳头产品。许多业务围绕Azure展开，它已成长为微软应用程序的内部计算骨干，也是可以向客户销售的产品。对未来主义的量子计算或虚拟现实和增强现实的尝试自成一家，同时也增强了Azure的功能。利用必应、领英和来自其他地方的数据训练的人工智能（AI）算法也是如此。

如果在那些新奇技术上的押注有任何一项大获成功，就可以把微软的创新刀刃磨得更锋利——它目前似乎比亚马逊或Alphabet的更钝一点。即使没

有，微软或许也能通过商业化产品而不是发明新产品来取得成功。正如一些内部人士打趣说，微软从来都不是第一个把产品推向市场的公司，通常也不是第二个，但是，“哇，我们会把所有的钱赚到手”。

就Office而言确实是这样。Excel不是第一个电子表格（还记得Lotus 1-2-3吗？），但它被许多软件工程师视为有史以来编写的最重要的程序，部分原因是它被应用得如此广泛。大约有12亿员工使用Office或Office365（通过Azure提供的网络版本）。在这一块，微软也落后于谷歌的G-suite软件，后者的新鲜功能包括可让多个用户同时处理一个文档。谷歌员工挖苦说微软是离线的“另存为”思维方式。

不过，经理们若非要把Office尤其是Excel从办公室员工手里夺走是要冒风险的。所以，据研究公司高德纳调查，微软控制了这类软件市场的87.6%，而谷歌占11.5%。为了推广Teams，微软已经开始免费将它与Office365捆绑在一起。到今年4月，Teams的每日用户达到7500万。竞争对手说这是不公平的。7月，Slack对微软发起了反托拉斯诉讼，它说Teams是山寨货，要把Slack置于死地——就像微软的Internet Explorer打垮了浏览器竞争对手网景一样，在当时引发了微软与反托拉斯检察官的斗争。

至关重要的是，微软在云计算领域是一个行动超快的追随者。在纳德拉关于公司转型的书《刷新》（Hit Refresh）中，他描述了在他接手公司时，AWS已经在没有竞争的情况下建立起庞大的云业务。他写道：“亚马逊当时在领导一场革命，而我们甚至还没有把部队召集起来。”

赌注很大。随着时间的推移，世界上大多数公司应该都会将计算转移到云中。云计算占IT支出的份额正逼近10%，但这意味着市场规模已经达到了每年2400亿美元。考虑到预期的近20%的年增长率，它很快就会达到1万亿美元。

在云上，Azure面对两大主要对手——AWS和谷歌云端平台（GCP），此外还有甲骨文和阿里云。其市场份额稳步上升，达到18%（见图2）。微软与

企业IT部门良好的关系又帮了它一次。它仍然主宰着商业软件的若干领域，有五分之四的个人计算机上跑着Windows，在服务器中的比例则是72%。它可以为企业客户提供把Azure与Office等软件捆绑在一起的打包价。这样一来，Azure最终的价格仅为AWS的五分之一。而且它比Amazon的产品更易于使用，后者的高级功能甚至让某些IT专业人员都应接不暇。

对于许多客户来说，微软的产品也比亚马逊的要容易接受。一位微软前高管回忆说，当微软推销业务时，Azure会输掉技术评估，但却会因客户的恐惧而胜出——他们担心亚马逊永不满足的老板杰夫·贝索斯可能会拿着他们的钱和数据入侵他们的地盘。对贝索斯的疑虑可能解释了为什么尽管AWS被看好，却最终让微软拿走了五角大楼价值100亿美元的云合同。亚马逊认为，微软受益于特朗普与贝索斯之间的夙怨，因为贝索斯拥有总统不喜欢的《华盛顿邮报》。亚马逊在法律上质疑这个合同的归属，但迄今尚未成功。

Azure的目标是在云服务上能和AWS匹敌或超越它。然而，在高德纳密切关注的云供应商排名中，Azure远远落后于AWS，并且最近还下滑了（见图3）。微软在全球的云基础架构比AWS覆盖更多地理区域，但摊得更薄，这可能让它不那么可靠。高德纳指出它冗余能力不足，在数据中心因恶劣天气或其他问题出故障时会难以应付。即使没有发生这类中断，容量也已显现出不足。疫情期间数百万远程工作者切换到云，需求激增之下Azure有时无法满足。微软Teams在3月停机了一次。当月，微软对新的Azure订阅实施了临时资源限制。AWS不需要这么做。

| 天蓝色忧伤

在Azure上失误是微软不能承受的。Azure是公司股价的驱动因素。据估计，Azure仅占微软530亿美元年营业利润的十分之一。但是，投资银行高盛的高瑟·贝利尼（Heather Bellini）指出，华尔街每季度都会关注Azure的增长速度。最近，分析师对增长放缓感到失望，它从2020年前三个月同比增长59%放缓到4月至6月的47%。（令人稍感安慰的是，AWS的增长在最近几个季度也有所放缓。）

就像Teams的捆绑销售一样，Azure一定会从新的许可规则中受益匪浅。到目前为止，微软允许客户按照“自带许可证”（BYOL）的惯例，在由AWS或任何云供应商运行的专属服务器上使用其软件。这种自由使切换变得容易。在所有云基Windows软件中，有57%在AWS上运行，几乎是Azure的两倍。

去年夏天，微软取消了BYOL，并对希望将其软件安装在某些大型云上的客户施加了限制。去年10月1日之后，如果客户想在这些云上运行桌面和服务器程序，就必须购买新的订阅，而不是一次性许可证。为了不违反反托拉斯规则，微软将Azure与AWS、GCP和阿里云放在了同一张列表上。但是，它单独为客户提供了更好的优惠来迁移到Azure，从而抵消了额外的费用。

亚马逊表示，微软试图限制云公司可以使用的东西。几位中立的观察者认同这种说法。高德纳的主要云基础架构专家和云排名的作者拉杰·巴拉（Raj Bala）说：“微软正在利用它安装基础庞大的Windows Server武器库来惩罚竞争对手。”研究公司“微软方向”（Directions on Microsoft）的韦斯·米勒（Wes Miller）补充说，这与纳德拉更加开放的战略背道而驰。毕竟，他放宽了Office向非Windows设备（如苹果的iPad）的迁移。“萨蒂亚想让人们认为他不同以往，但他是老派微软人，只是外表略软一些。”竞争对手的一位高管总结道。

微软是唯一一家同时也出售许多云上托管的软件的大型云供应商。“亚马逊或者谷歌有没有一个软件可以在Azure上运行呢？零。”纳德拉说。这也给Azure带来了很大的可利用的优势。纳德拉不想再犯早先发生的那种错误，即让Windows工作负载全部迁移到亚马逊的云中。“我们那会儿很愚蠢，没有意识到发生了什么，”他说，“我们绝对会把我们在他们云上的知识产权变现。”

自许可更改生效以来，高德纳已收到数百项有关这些问题的咨询。一家选择了AWS提供云服务的《财富》500强医疗保健公司的高管表示，新规定意味着每年需要额外支付1亿美元，这迫使该公司放慢了向云计算的转

移。“他们写许可条款的方式就是让客户相信自己唯一的选择就是 Azure，”威斯康星州一家感到被迫要离开AWS的中型公司的副总裁抱怨说，“它没有违法，但它拿走了选择。”另一家中西部公司的IT主管将新规定比作长期租车，但“出租方说你只能用雪佛龙汽油，而不能用BP或埃克森美孚的油”。这三位客户中的两位已决定逐渐把微软产品从其软件栈中撤出。

| 避免被抛出窗外

这给这家科技巨头带来了风险。过分激进地将不情不愿的客户拖到Azure上可能会导致许多客户弃用Windows，或者可能激起大批客户无视规则，就看这位软件巨人敢不敢去执行了。微软商业业务的首席营销官沼本健（Takeshi Numoto）表示，在新规则生效后，微软在云选择方面收到的反馈意见是积极的，并补充说：“我们希望听取所有客户的意见，看看是否有办法改善我们的合作伙伴关系并支持它们的业务。”

对于1990年代后期让它惹上麻烦的那种行为，微软试探得有多深呢？在那样头破血流的反托拉斯战役之后，它很可能会谨慎行事。如果欧洲对Slack表示同情，那么这家即时通讯软件公司可能会在美国提起类似诉讼。如果发生这种情况，微软可能会做出让步来避免麻烦。

纳德拉不同意微软已经过了线的看法。“看看企业SAAS（软件即服务）和基础设施公司的数量，”他说，这很难表明出现了“一家收取垄断租金的垄断公司”。

微软当然可以辩护说，Azure为云计算带来了竞争，否则这个领域可能被AWS垄断了。颇能说明问题的是，纳德拉躲过了在国会反托拉斯委员会面前作证的屈辱，该委员会最近拷问了他的竞争对手Alphabet、亚马逊、苹果和Facebook。国会一份关于技术巨头主导数字领域的报告也没有指摘微软。美国的反垄断监管者倒是盯上了谷歌，后者否认有不法行为。

微软以250亿至300亿美元收购TikTok的尝试失败了，而这项交易本可能促进市场竞争。如果它成功拿下，将可以在短期内在数字广告方面向谷歌和

Facebook发起挑战。TikTok在青少年用户上收集的大量数据将助力微软的AI——它要和美国和中国的所有大型科技竞争对手开发的算法竞争。微软斥资75亿美元收购了游戏开发商ZeniMax Media来巩固其蓬勃发展的云游戏平台，但这还是无法弥补未能收购TikTok的损失。

谷歌在反托拉斯方面麻烦上身可以带来些许安慰。这个案子可能会颠覆互联网搜索，这可以帮到必应。尽管必应的搜索质量与谷歌的差别不大，但它还只是一条小鱼。微软10月将其更名为“微软必应”，看起来可能是希望它的搜索引擎重整旗鼓。

纳德拉对未来的增长充满信心，他早年的局促早已被合理而坚定的自信所取代。他说：“我们很幸运能够从事科技行业，未来十年内，IT支出将从GDP的5%增长到10%。”但是，对那些IT资金的争夺异常激烈。微软的应对方式——在很大程度上依赖客户不“叛变”——短期内可能会奏效。但是，随着科技行业得益于充足的人才和海量的资本而加快变革步伐，客户可能重视创新超过对长期供应商的忠诚。一次成功的重塑很可能还不够。■



The end-game

Doctor's prescriptions

How will asset management look in 2030?

“THERE ARE two kinds of forecasters,” said the economist John Kenneth Galbraith. “Those who don’t know and those who don’t know they don’t know.” Asset management is a business built on the notion that the future is somewhat knowable, even if in large part it is not. So we must look for omens. Today’s “dishevelled” or “inchoate” borrower should not be expected to pay back its debts tomorrow, as *The Economist* warned in its editorial of March 28th 1868.

Speculations about the future are also often helpful in organising thoughts about the present. In this spirit, this special report finishes with some predictions tied to its main themes. Some are extensions of current trends. Others are more speculative—concerning, say, a trend that may reverse or one that could go in a surprising direction.

The first prediction is the least bold. By 2030 the sorting of the industry into a small club of giant asset managers and a bigger one of niche managers will be largely complete. Already in 2020, index-tracking funds and ETFs account for a majority of pooled investment funds in America. In a decade’s time they may make up the bulk of all stockholdings. Investors will mix beta, the market risk, with exposures picked from a menu of smaller specialists which, to survive the industry’s upheaval, must have a truly distinctive approach. These remaining funds might be thematic, based around increased longevity, say, or climate change. Or they could have a particular investment philosophy. Such specialist funds will be global or regional in scope.

A second prediction is that competition in asset management will revolve

around products designed for particular needs. The present-day industry is a creature of the baby-boom era. Many boomers have built up assets in workplace schemes in which benefits depend on the size of a pension pot at retirement. Their needs are changing. A challenge to which the industry has not responded well is to find ways for people to draw on their retirement savings without running out of money too quickly, says Mr Taraporevala, of State Street Global Advisors. Quite so.

Another challenge is to tailor products to millennials. Their share of wealth is still small, but it will grow. And their preferences are different. For baby-boomers a mutual fund was the only way to invest in equities at a reasonable cost. The technology now exists to buy and sell individual shares at virtually no cost. Low-fee “robo-advisers” mechanically allocate savings to a mix of bond and equity index funds according to preset rules. These advances appeal to a generation reared on smartphones. Millennials have less need of the money doctors who tended to the boomers.

A third forecast is that ESG will not be the saviour of active asset management. By 2030 it will be too mainstream to be a source of differentiation. There is likely to be a surfeit of choices for investors who want even the most exacting kinds of ESG. Despite the increased salience of corporate governance, the big passive funds may ultimately choose not to use their vast voting power to influence firms—a fourth prediction. Securities-market regulators will continue to push them to vote their shares, to fulfil their fiduciary duty to investors. But antitrust agencies will increasingly fret about the latent ability of big funds to soften competition among firms they indirectly own. Trustbusting is moving back to the “big is bad” assumption that governed it before the 1980s. It may prove costly and legally messy for funds to exercise their voting power in a way that satisfies all watchdogs.

Some popular predictions about private markets—that they will be

“democratised”, and fees will come under pressure—will turn out to be wrong (or premature). Private-equity fees do look out of whack and big pension-fund managers are more inclined to haggle over costs. Returns on private equity are likely to disappoint. Yet fees for public equity came down because there was a cheaper option: buy the index. Private-equity stakes are not as tradable as listed shares, so there is no index. So fees will stay high.

Other popular predictions will prove correct. Private debt will grow in importance. America will slowly lose its lead in venture capital. The big brand-name VCs of Silicon Valley will retain their lustre, thanks to their record of creating billionaire founders. But more new champions will emerge elsewhere.

Finally, there is China, where the uncertainty is perhaps greatest. Sceptics point to China’s record of allowing foreigners to profit only as long as it takes Chinese firms to copy and supplant them. Asset management is different. Unlike with makers of breakfast cereals, it is hard for consumers to judge the merits of an asset manager. It is equally hard for copycat firms to find out what works and what doesn’t.

That is not the only reason the foreign money doctors will stick around in China. Rich-world banks are increasingly contained by national borders. Businesses are less inclined to set up abroad. Offshoring is being replaced by onshoring. Almost by default, capital markets will become the main avenue for diversifying risk by geography. If China’s leadership wants Shanghai to be a global financial centre and the yuan to be an international currency, it needs to keep channels open. Foreign asset managers will be a crucial conduit.

In the quiet revolution of asset management, one thing will remain constant. Philip Rose’s investment trust was composed of exotic foreign bonds traded in London; his idea inspired Robert Fleming, who mostly

invested in America. From the start, asset management has been global.
Why change that now? ■



终局

医生的处方

到2030年时资产管理是一幅什么景象【专题报道《资产管理》系列之五】

“有两种预测者，”经济学家约翰·肯尼思·加尔布雷思（John Kenneth Galbraith）说过，“那些不知道的人，和那些不知道自己不知道的人。”资产管理这门生意基于一种观念，即未来在一定程度上是可知的，即使它有很大一部分并不可知。所以我们必须找寻预兆。正如本刊在1868年3月28日的社论中所警告的那样，不应指望今天“衣冠不整”或“初出茅庐”的借款方明天会还债。

对未来的推测通常也有助于整理对当下的思考。本着这种精神，本专题报道将以提出一些与其主题有关的预测作结。一些预测是当前趋势的延伸。另一些带有更多猜想的成分，比如有关某种趋势可能会逆转，或朝着令人意想不到的方向发展。

第一个预测是最保守的。到2030年，资产管理行业将基本完成一轮分化——由行业巨头组成的小俱乐部和利基者组成的大俱乐部。在2020年，指数追踪基金和交易所买卖基金（ETF）已经是美国汇集投资基金的大头。十年后它们可能占到所有持股的大部分。投资者将在使用贝塔值这一市场风险指数的同时，再从一批规模较小的专门化投资中挑选风险敞口。这些专门化投资必须真正独树一帜才扛得住行业动荡。存活下来的可能是围绕诸如老龄化和气候变化的主题性投资。或者它们可能有特定的投资理念。这类专门基金的投资范围可能会是全球的，也可能是区域的。

第二个预测是资产管理领域里的竞争将围绕为特定需求设计的产品展开。今天的行业现状是婴儿潮时代的产物。许多婴儿潮一代人在职场退休金计划中积累资产，其支付的福利取决于退休时养老金账户里有多少钱。他们的需求在变化。道富环球投资管理（State Street Global Advisors）的塔拉波瓦拉（Taraporevala）说，该行业尚未很好地应对一个挑战——如何让人们能够取用养老储蓄而又不会很快把钱花光。此言不虚。

另一个挑战是为千禧一代量身定制产品。这一代人目前在整体财富中占比仍然很小，但会扩大。而他们的偏好有所不同。对于婴儿潮一代来说，共同基金是以合理成本投资股票的唯一方式。而如今存在的技术让人们实际上可以分文不花地买卖单只股票。收费低廉的“机器人顾问”根据预设规则将储蓄机械地分配到债券和股票指数基金的组合中。这些技术进步吸引了在智能手机上成长起来的一代人。千禧一代不那么需要面向婴儿潮一代的财务医生。

第三个预测是，环境、社会和企业治理（ESG）不会成为主动资产管理的救星。到2030年它将变得过于主流而不再是一种差异性来源。即便是想要最严格的ESG的投资者都可能选择太多。尽管公司治理的重要性日益突显，但大型被动基金最终可能选择不使用其庞大的投票权来影响企业——这是第四个预测。证券市场的监管机构会继续推动它们使用股东投票权，以履行对投资者的信托义务。但反垄断部门会越来越担心大型基金有隐藏的力量来削弱它们间接拥有的公司间的竞争。反垄断行动正在回到1980年代之前主导它的“大即是坏”的假设上。基金若要以一种让所有监管方满意的方式行使其投票权，成本可能很高，法律上也十分麻烦。

对私募市场的一些流行预测——认为它们会被“民主化”而收费水平将承压——将被证明是错误的（或者为时过早）。私募股权基金的收费看起来确实失常，大型养老基金经理更倾向于对此讨价还价。私募股权的收益很可能令人失望。但是，公开上市股票的费用之所以下降是因为存在一种更便宜的选择：购买指数基金。私募股权不像上市股票那样可交易，因而不存在指数这种东西。所以费用降不下来。

其他常见的预测会被证明是正确的。私募债务会变得越来越重要。美国将逐渐失去它在风险资本里的领头羊地位。硅谷的大牌风投公司有创造亿万富翁创始人的记录，所以会保有其魅力。但更多新冠军会在其他地方崛起。

最后要说说中国，那里的不确定性可能是最大的。怀疑论者指出，中国允许外国人赚钱从来都是以能让中国公司复制并取代它们为条件的。资产管

理不一样。和早餐麦片制造商不同，消费者很难判断资产管理公司的优劣。同样地，山寨公司也很难弄明白什么能奏效，什么行不通。

这不是外国的财务医生会留在中国的唯一原因。富裕国家的银行正越来越多地被国界束缚。企业如今不那么愿意在国外设立公司了。离岸外包正被近岸外包取代。资本市场将近乎自动变成通过地理分布来分散风险的主要途径。如果中国的领导层希望上海成为全球金融中心、人民币成为国际货币，就需要保持金融管道的开放畅通。外国资产管理公司将成为至关重要的渠道。

在资产管理行业静悄悄发生的革命中，有一件事将保持不变。菲利普·罗斯（Philip Rose）的投资信托基金由在伦敦交易的稀奇古怪的外国债券组成；他的想法启发了罗伯特·弗莱明，后者主要在美国投资。从一开始，资产管理就是全球性的。为什么现在要改变这一点？ ■



Italian business

How the leopard lost its spots

The fate of Italy SpA offers an object lesson in corporate decline

FEW WORKS of literature capture the challenges of managing decay better than “The Leopard”, Giuseppe Tomasi di Lampedusa’s masterpiece about Sicilian blue bloods struggling to adapt to the changes ushered in by Italian unification in the 1860s. Replace the “shabby minor gentry” with Silicon Valley parvenus and recently impoverished but now monied masses with emerging China, and the novel also serves as an apt metaphor for the decline of once-princely corporate Italy.

“We had the richest and most perfect region of the world but we are old aristocrats who are losing our momentum,” sighs Marco Tronchetti Provera, boss of Pirelli, a 148-year-old tyre maker based in Milan. Many of his fellow chief executives echo di Lampedusa’s Don Fabrizio, who pined for the days when “We were the leopards, the lions.” Like the fictional patriarch, they see the world in upheaval but find themselves unable to do much about it.

Ironically, when di Lampedusa’s novel was published in 1958 Italy was the opposite of decaying. Its GDP doubled between 1951 and 1963, and by 1973 added another two-thirds. Gianni Agnelli, Fiat’s dashing owner, hobnobbed with the Kennedys. The Red Brigades’ campaign of terror launched in 1970 shook business for over a decade but did not cripple it. Olivetti became the world’s second-biggest computer-maker, behind IBM. Montedison was its seventh-largest chemicals firm. Mediobanca rivalled Lehman Brothers and Lazard in merchant-banking prowess. Benetton brought colourful sweaters to the masses; Giorgio Armani, Gianni Versace and Dolce & Gabbana shoulder-padded Wall Street and Beverly Hills.

These days Italy SpA is out of style. The country's doldrums aren't news; *The Economist* called it "the real sick man of Europe" 15 years ago. "It escapes no one, and certainly not business," says Carlo Bonomi, head of Confindustria, Italy's main business lobby. Even before covid-19, its economy was smaller than it had been before the financial crisis of 2007-09. Its stockmarket is worth under €500bn (\$590bn). It accounts for 3.7% of the MSCI index of European stocks, down from 6.2% in 2000, according to Morgan Stanley, a bank (see chart). Only seven Italian firms feature among the world's 1,000 biggest listed ones. The €77bn market capitalisation of the most valuable, Enel, an electric utility, is a rounding error relative to that of America's trillion-dollar tech titans.

Rather than confront these challenges, plenty of Italian tycoons have been flogging the family silver. Treasured Italian brands that have gone into foreign hands in the past decade include Bulgari, a jeweller (sold to LVMH, a French luxury group); Luxottica, which makes Ray-Ban shades (and merged with Essilor, a French spectacles firm) and Versace (bought by Michael Kors, an American fashion house). Since 2015 Pirelli's biggest shareholder has been ChemChina, a state-owned giant. In 2018 Federico Marchetti sold Yoox Net-a-Porter, his online luxury startup and Italy's rare tech success, to Richemont, a Swiss group.

Others have been departing *il bel paese*. After merging with Chrysler in 2014 Fiat moved its headquarters to London and legal seat to the Netherlands; it is now combining with PSA Group, a French carmaker. (Exor, the Agnelli family's Dutch-domiciled investment vehicle which owns 28.9% of Fiat-Chrysler's shares, is also a shareholder in *The Economist's* parent company.) Ferrero, the maker of Nutella, has decamped to Luxembourg. This year Campari, producer of the bitter apéritif owned by the Garavoglia clan, picked the Netherlands. It may be joined by Mediaset, Italy's biggest private broadcaster controlled by Silvio Berlusconi, a scandal-prone former prime minister, which is seeking to move the

headquarters of its holding company there. “I keep less than 5% of my total wealth in Italy. I am very careful with this country,” confessed Francesco Trapani, scion of the Bulgari dynasty, in 2018.

Many other firms are shadows of their former selves. In 20 years the market value of Generali, an insurer, has more than halved, to €19bn. Telecom Italia’s has shrivelled by nearly 90%, to €7bn. Intesa Sanpaolo and UniCredit, two big banks, tried their hand at consolidation with ambitious deals in Europe, only to retrench.

Three main reasons explain corporate Italy’s slide into irrelevance. They have to do with a self-reinforcing lack of financial, social and human capital.

According to the OECD, a club of industrialised countries, 40% of Italian corporate assets are financed by short-term debt, more than among big European peers. Credit is granted on a basis of history, so new firms find it hard to raise money. Political risk—embodied by the rise to power in 2018 of the antibusiness Five Star Movement (M5S)—plays on the nerves. Reliance on banks means that when they get into trouble—as in the financial crisis and the ensuing euro crisis—all their corporate clients suffer, not just the delinquent ones.

All this constrains investment and makes Italian companies more vulnerable to macroeconomic shocks—of which the covid-19 pandemic is the latest. Cerved, a ratings agency, reckons that even in the best case perhaps 7% of non-financial firms are at risk of default this year. In the worst case that could rise above 10%.

Italy’s capital markets are shallow compared with the rest of Europe, let alone America. It has no venture-capital industry to speak of. Business elites grumble about Italians’ aversion to investing in their own

stockmarket, despite being among the world's most prodigious savers. Domenico Siniscalco, a former finance minister, likens it to “an oil producing country without an oil industry”. Investors are wary of putting money into listed firms controlled by founding families or the state, which dominate Italy's shareholder registers—and which prevent their companies from raising new shares, fearing dilution.

Confidence in big business is further eroded by a constant gusher of scandals. Every few months a business bigwig gets into hot water. In July prosecutors requested an eight-year prison sentence for the boss of Eni, an oil major, for allegedly bribing Nigerian officials to secure an oil block. He and the company deny wrongdoing.

| *Roman tragedy*

Disenchantment with corporate Italy sows more mistrust, depleting its already thin social capital. A recent report found that nine in ten Italians want caps on executive pay, the highest share among seven Western countries. That would add to already baroque red tape that is a barrier for upstart firms. Italy ranks 58th out of 190 countries in the World Bank's “Doing Business” survey. It comes a dismal 97th on securing building permits, 98th for starting new businesses, 122nd at enforcing contracts and 128th on tax rules.

Rather than improving the physical and legal infrastructure that would help all firms, government money goes to bailing out perennial failures. This year the state once again rescued Alitalia, the endlessly loss-making flag-carrier. Italy has no equivalent of the Fraunhofer institutes that help Germany's medium-sized firms stay at the cutting edge of their fields, observes Fabrizio Barca, an economist and former development minister. “If we had the infrastructure of the Germans we would be six or seven times more competitive,” says Marco Giovannini, boss of Guala Closures, a global leader in the niche market for bottle tops. “We have to compete against

inefficiency.” In 2017 he opened Guala’s main research centre not in its Piedmont home but in Luxembourg.

Di Lampedusa’s characters might recognise the third shortage—of human capital—as the flipside of pride. In the post-war era, when it fuelled founders’ devotion to their creations, this was a virtue (as to some extent it is today in Silicon Valley). Now it looks like obstinacy. Bankers talk of multiple failed attempts to persuade Mr Armani to build a bigger group in the mould of LVMH. During Italy’s lockdown a photo of him dressing the windows of his Milan store added to the myth of Italian creative genius. LVMH’s billionaire owner, Bernard Arnault, gets others to do that menial task, so he can focus on business.

In 2017 Guido Corbetta of Bocconi University estimated that half of first-generation Italian firms have an owner-boss who is over 60, and a quarter have one who is at least 70. Italian boardrooms’ denizens seem almost as ancient as the Renaissance art adorning their walls. Italy’s most prominent businessmen—they are almost exclusively male—are octogenarians: Mr Berlusconi (84), Leonardo Del Vecchio of Luxottica (85), Luciano Benetton, the clothing clan’s patriarch (85), Mr Armani (86).

No wonder Italians feel the system is rigged in favour of a few ageing billionaires and plump for populists like the M5S. Talented youngsters shy away from a career in the unloved business world. “There is now little opportunity anywhere in Italy, even for the wealthy and well-connected,” says Andrea Alemanno of Ipsos, a research firm.

Despite this self-perpetuating cycle, examples of Italy’s post-war industrial vigour persist. Enel is a world leader in clean energy. In certain areas “pocket multinationals”, as Vittorio Merloni, an entrepreneur, dubbed them in the 1990s, churn out wares admired the world over: Lavazza and Illy (coffee), Moncler and Ermenegildo Zegna (fashion), IMA and Marchesini

(packaging), or Technogym (fitness kit)

And Italy remains a country of enterprise. The OECD reckons nearly a quarter of Italian firms are high-growth, more than in most big European countries. Johann Rupert, the South African financier behind Richemont, has mused that Italy's craftsmen might benefit from a failure to adapt to globalisation as the world comes to prize their old-fashioned skills. Pirelli's Mr Tronchetti Provera praises the deal with ChemChina, which let the tyre maker's headquarters and technology stay in Milan, as "an opportunity to further strengthen our position in China without giving up Italian roots". Some see Italy's less hard-edged capitalists as an antidote to Wall Street; last year Jeff Bezos made a pilgrimage to Brunello Cucinelli, founder of a posh-sweater company who advocates a humanistic capitalism.

In 2011, shortly before he became governor of the European Central Bank, Mario Draghi warned fellow Italians that Venice in the 17th century and Amsterdam in the 18th century planted the seeds of their collapse by putting elite privilege ahead of innovation. Corporate Italy can hang on to what is left of its sheen. But, as Don Fabrizio's thrusting nephew, Tancredi, told his uncle, "If we want things to stay as they are, things will have to change." ■



意大利商业 豹失其势

“意大利股份公司”的命运提供了一本有关企业衰落的活教材

很少有哪部文学作品比《豹》（The Leopard）更好地捕捉了直面衰落之艰难。朱塞佩·托马西·迪·兰佩杜萨（Giuseppe Tomasi di Lampedusa）的这部杰作描述了西西里王国的贵族如何挣扎适应1860年代意大利统一带来的变化。如果把书中“粗鄙的乡村贵族”代之以硅谷的新贵和崛起的中国在不久前脱贫致富的大批民众，那么这部小说也是对曾经高贵的“意大利企业王国”的衰落恰如其分的隐喻。

“我们曾拥有世上最富裕、最完美的地区，但我们是正在失势的老贵族。”倍耐力（Pirelli）的老板马可·特罗凯蒂·普罗韦拉（Marco Tronchetti Provera）叹道。这家总部位于米兰的轮胎制造商拥有148年历史。普罗韦拉的许多CEO同辈让人想起兰佩杜萨笔下那个怀念“我们是豹，是狮子”的日子的唐·法布里齐奥（Don Fabrizio）。和这位虚构的亲王一样，他们看到世界正处在剧变之中，但意识到自己对此无能为力。

讽刺的是，当兰佩杜萨的小说于1958年出版时，意大利恰是衰落的反面。1951年至1963年间它的GDP翻了一番，到1973年又增长了三分之二。菲亚特风度翩翩的老板詹尼·阿涅利（Gianni Agnelli）和肯尼迪家族往来密切。“红色旅”自1970年发起的恐怖活动冲击商界十多年，但没能摧毁它。好利获得（Olivetti）成长为仅次于IBM的全球第二大计算机制造商。蒙特爱迪生（Montedison）是当时世界第七大化学品公司。米兰投资银行（Mediobanca）在企业 and 投行业务方面可与雷曼兄弟和拉扎德相匹敌。贝纳通（Benetton）给人们带去了色彩斑斓的毛衣；乔治·阿玛尼、范思哲和杜嘉班纳（D&G）为华尔街和比佛利山庄添范儿。

如今，“意大利股份公司”已经过时。这个国家的萎靡不振不是新闻；本刊在15年前称其为“真正的欧洲病人”。意大利主要商务游说团体意大利工业家联合会（Confindustria）的负责人卡洛·博诺米（Carlo Bonomi）说：

“没人能从中逃脱，商界当然就不用说了。”甚至在新冠疫情爆发前，意大利的经济规模就已经小于2007至2009年金融危机前的水平。其股市总值目前不到5000亿欧元（5900亿美元）。摩根士丹利的数据显示，它占MSCI欧洲指数的3.7%，而2000年为6.2%（见图表）。全球1000家最大的上市公司中只有七家来自意大利。意大利国家电力公司（以下简称Enel）770亿欧元的市值为其中最高，但相比万亿美元的美国科技巨头不过是一个可忽略不计的零头。

许多意大利大亨没有直面挑战，而是仓促贱卖传家宝。过去十年间，流入外国人手中的意大利珍贵品牌包括珠宝商宝格丽（卖给了法国奢侈品集团路威酩轩）、生产雷朋眼镜的罗萨奥蒂卡（Luxottica，与法国的依视路眼镜公司合并），以及范思哲（被美国时装品牌迈克·科尔斯收购）。自2015年以来，倍耐力最大的股东是中国国有巨头中国化工集团。2018年，费德里科·马尔凯蒂（Federico Marchetti）把他的奢侈品电商创业公司Yoox Net-a-Porter这个意大利罕见的科技成功案例出售给了瑞士的历峰集团（Richemont）。

其他公司则离开了“美丽国度”。2014年和克莱斯勒合并后，菲亚特把总部迁到了伦敦，把注册地转到了荷兰；现在它正在和法国汽车制造商标致雪铁龙集团（PSA Group）合并。（拥有菲亚特克莱斯勒28.9%的股份的阿涅利家族 [Agnelli] 在荷兰注册的投资集团Exor也是《经济学人》母公司的股东。）巧克力榛子酱Nutella的生产商费列罗集团（Ferrero）已经迁到卢森堡。今年，由加拉沃利亚家族（Garavoglia）掌控的苦味餐前酒生产商金巴利公司（Campari）选择了荷兰。意大利最大的私营广播公司Mediaset可能也会如此操作，这家由频暴丑闻的意大利前总理西尔维奥·贝卢斯科尼（Silvio Berlusconi）掌控的公司正寻求将其控股公司的总部搬到那里。宝格丽王朝的继承人弗朗切斯科·特拉帕尼（Francesco Trapani）在2018年吐露：“我把我不超过5%的身家留在意大利。我对这个国家非常谨慎。”

其他许多公司辉煌不再。20年间，保险公司忠意（Generali）的市值减少了一半以上，跌至190亿欧元。意大利电信缩水近90%，仅剩70亿欧元。

两家大型银行联合圣保罗银行（Intesa Sanpaolo）和裕信银行（UniCredit）尝试在欧洲展开大型合并交易未果，结果只是紧缩了业务。

令意大利商界丧失重要地位的原因主要有三个：缺乏财务、社会和人力资本，而这种匮乏会自我强化。

工业化国家俱乐部经合组织（OECD）称，意大利公司资产中有40%通过短期债务融资，超过大型欧洲同业的这一比例。贷款是基于信用历史发放的，因此新公司很难筹到资金。反商业的“五星运动”（M5S）于2018年的崛起所显现的政治风险令人不安。对银行的依赖意味着当银行陷入困境时（例如在金融危机和随之爆发的欧债危机中），它们所有的企业客户都会遭殃，而不仅仅是那些违约的客户。

所有这些都限制了投资，使意大利公司更易受到宏观经济冲击的影响——新冠疫情是最新的一轮。评级机构Cerved估计，即使在最好的情况下，今年仍有7%的非金融公司有违约风险。而最糟的情况下可能会超过10%。

意大利的资本市场深度不及欧洲其他地区，更不用说和美国比了。它没有值得一提的风投行业。商界精英抱怨意大利人不愿投资自己的股票市场，尽管他们是全世界存钱最多的人群之一。前财政部长多梅尼科·西尼斯卡科（Domenico Siniscalco）把意大利比作“没有石油产业的产油国”。投资者对于把资金投到由创始家族或国家控股的上市公司心存警惕，这些控股方雄霸意大利的股东名册，因为担心自己的股权稀释而阻止其企业增发新股。

丑闻迭起进一步削弱了人们对大企业的信心。每隔几个月就有一个商界大佬惹上麻烦。7月，意大利检方要求将石油巨头埃尼公司（Eni）的老板判处八年刑期，指控他贿赂尼日利亚官员以取得一块油田的开采权。他和公司否认有不法行为。

| 罗马悲剧

对意大利企业的不满情绪加剧了人们的不信任感，耗尽了本已薄弱的社会

资本。最近一份报告发现，九成意大利人希望限制高管的薪酬，是七个西方国家中比例最高的。这将在已堪称巴洛克式的繁文缛节上再添一笔，给新兴企业设置了重重门槛。在世界银行的“营商环境”调查中，意大利在190个国家中排名第58位。它在建筑许可核批这一项排名低至第97位，注册新公司排名第98，合同履行排名第122，税法规章第128。

政府的资金没有花在改善能帮助所有企业的实物和法律基础设施上，而是拿去救助那些常年失败者。今年，政府再度援助了无休止亏损中的国有意大利航空公司（Alitalia）。前经济发展部长、经济学家法布里佐·巴萨（Fabrizio Barca）指出，意大利没有像弗劳恩霍夫协会（Fraunhofer）那样能帮助德国中型企业保住行业领先优势的机构。“如果我们拥有德国人的基础设施，我们的竞争力将提高六七倍。”瓜拉瓶盖公司（Guala Closures）的老板马可·焦万尼尼（Marco Giovannini）说。这家公司是瓶盖这个利基市场的全球领军者。“我们必须与效率低下竞争。”2017年，他选择在卢森堡而不是位于皮埃蒙特大区的公司总部开设了瓜拉的主要研发中心。

兰佩杜萨笔下的人物可能认得出来，第三种短缺——人力资源的短缺——是自尊的一体两面。在战后时代，当这种尊严感激发创始人对其创造成果的热忱时，它是一种美德（某种程度上在今天的硅谷也是如此）。如今它看来却是一种执拗。银行家们谈论曾多次劝说阿玛尼先生建立像路威酩轩那样更大的集团无果。意大利因疫情封锁期间，一张他在米兰专卖店布置橱窗的照片增添了意大利创意天才的神话色彩。路威酩轩的亿万富翁老板伯尔纳·阿尔诺（Bernard Arnault）则把这种“粗活”留给其他人，这样他就可以专注在公司经营上。

博科尼大学（Bocconi University）的圭多·科尔贝塔（Guido Corbetta）在2017年估计，意大利第一代企业中有半数有一位超过60岁的控股CEO，四分之一有一位至少70岁的。意大利董事会的成员看起来简直和会议室墙上挂着的文艺复兴时期绘画那样古老。意大利最著名的商人（几乎清一色男性）都已是八旬老人：贝卢斯科尼（84岁）、罗萨奥蒂卡的莱昂纳多·德尔·韦基奥（Leonardo Del Vecchio，85岁）、时尚巨头贝纳通家族的大

家长卢西亚诺·贝纳通（Luciano Benetton，85岁）、阿玛尼（86岁）。

难怪意大利人会觉得商业系统被操纵了，而只对少数老迈的亿万富翁有利。他们选择支持五星运动这样的民粹主义者。有才华的年轻人不愿在失宠的商界谋职。研究公司Ipsos的安德烈亚·阿莱曼诺（Andrea Alemanno）说，“即便是对富人和人脉广阔的人来说，如今在整个意大利都没什么机会可言。”

尽管存在这种自我延续的恶性循环，战后意大利那种工业活力的例子依然存在。Enel是清洁能源领域的全球领头羊。在某些领域，“口袋跨国公司”——企业家维托里奥·梅洛尼（Vittorio Merloni）在1990年代创造的称呼——生产出了在全世界备受喜爱的商品：拉瓦萨（Lavazza）和意利（Illy）的咖啡、盟可睐（Moncler）和杰尼亚（Ermenegildo Zegna）的服饰、意马（IMA）和马克西尼（Marchesini）的包装机械，或泰诺健（Technogym）的健身器材。

而且意大利仍然是一个充满企业家精神的国度。经合组织（OECD）估计，近四分之一的意大利公司在高速增长，数量超过了大多数欧洲大国。执掌历峰的南非大金主约翰·鲁珀特（Johann Rupert）曾经思考过，意大利的工匠们可能会因为没能适应全球化而受益，因为世界开始珍视他们的传统技能。倍耐力的特龙凯蒂·普罗韦拉（Tronchetti Provera）称赞和中国化工的交易是“一个让我们进一步在中国立足却不放弃意大利根基的机会”，因为这笔交易把这家轮胎制造商的总部和技术都留在了米兰。有些人认为意大利不那么残酷的资本家是华尔街的解药。去年，杰夫·贝索斯专程拜访了他推崇备至的毛衣奢牌创始人、提倡“人道资本主义”的布鲁内洛·库奇内利（Brunello Cucinelli）。

在2011年出任欧洲央行行长的前不久，马里奥·德拉吉（Mario Draghi）提醒自己的意大利同胞，17世纪的威尼斯和18世纪的阿姆斯特丹都因为将精英特权置于创新之上而埋下了自己衰落的种子。意大利企业王国可以紧拽着自己的余辉不放。但是，正如唐·法布里齐奥那个年轻气盛的外甥坦克雷迪（Tancredi）告诉他叔叔的那样，“如果我们想要事情保持原样，那

么它们必须改变。”■



Climate change and innovation

Greenbacks for greenery

Climate-conscious venture capitalists are once again placing big bets on clean technology. Can they make money and protect the planet?

“TO SOME EXTENT, we try to scare off investors,” admits Mateo Jaramillo, co-founder of Form Energy. The startup is trying to solve one of renewables’ knottiest problems. Solar and wind power are intermittent, so green utility firms must store excess energy and release it when no sun shines or breeze blows. Large lithium-ion batteries can discharge energy for up to four hours. Form Energy, founded in 2017, wants to extend that to days with a different, and undisclosed, battery technology. In May it announced a pilot project with Great River Energy, a Minnesotan utility. So star-studded is its team of founders that a rival’s boss calls it “the Travelling Wilburys of energy storage”, in reference to the 1980s supergroup featuring George Harrison and Bob Dylan. Still, Mr Jaramillo does not expect to start scaling up until 2025.

The combination of long wait times and unproven technology would give many venture capital (VC) investors the jitters. Most want to see returns in five to seven years. Form Energy has more patient backers. They include Breakthrough Energy Ventures (BEV), a fund set up by Bill Gates and supported by other billionaires; Eni Next, the Italian oil firm’s VC arm; and The Engine, a fund run by the Massachusetts Institute of Technology. This reflects the evolving nature of the green VC ecosystem, which is teeming again after years in relative hibernation.

In 2019 investors poured a record \$36bn into climate-related technology, up from \$17bn in 2015, according to Cleantech Group, a research firm. Half the money flowed into North American startups (see chart 1). China accounted for between 15% and 30%, depending on how the sector is defined, and

Europe for another 15%. This should spur innovation and, hopefully, lower the relative price of climate-friendly technology even in the absence of regulations making carbon-heavy ones dearer. And it needs to happen across the board, not just in energy and transport. “When we think about decarbonisation we have to remind ourselves that this is the entire industrial economy”, says Mr Gates.

The International Energy Agency (IEA), a global forecaster, predicts that a quarter of the reductions in emissions needed to put Earth’s climate on a sustainable path by 2070 come from mature technologies, such as hydropower. A further 41% come from relatively new technologies with less than 1% of a given market, such as offshore wind in electricity generation. Technology at the demonstration or prototype stages (battery-powered ships or aircraft, respectively) account for 17% apiece. That presents a huge opportunity for investors—so long as they have a strong stomach.

Green VC has a chequered past. In the late-2000s it experienced a boom and bust cycle in America and, to a lesser extent, Europe. VC funds took a financing model designed for software firms and applied it to companies producing physical products, mostly solar panels and biofuels, that take plenty of time and money to generate revenues. Many companies went bust. Their VC backers lost more than half of the \$25bn they had bet. Capital dried up.

Now it is flowing again. This time investors are looking at a broader range of clean tech. About half the deals by value go to low-carbon transport, encouraged by Tesla’s credulity-stretching success. In 2004 Elon Musk bought a 14% stake in the electric-car maker for \$6.5m. Six years later it went public and is today worth \$385bn, more than any other carmaker. Mr Musk’s stake alone is worth perhaps \$72bn, just shy of General Motors and Ford combined.

Investments are not confined to Tesla wannabes. Impossible Foods, a \$4bn plant-based-protein firm backed by Mr Gates and Google, and Beyond Meat, its listed rival now worth \$10bn, have whetted investors' appetite for agricultural technology. Form Energy and other developers of grid-scale storage are also in demand.

So is software. PwC, a consultancy, estimates that of the biggest 5% of early-stage VC deals between 2013 and 2019, one in ten involved pure software firms. Another six in ten involved startups that integrate clever algorithms with clean hardware. The falling cost and commoditisation of things like solar panels or batteries, the price of which has dropped by 82% and 87%, respectively, between 2010 and 2019, allows such firms to offer auxiliary goods and services. Software innovations make it possible to take this cheaper hardware and push it beyond its previous limits, observes Varun Sivaram of Columbia University. Some startups are, for instance, trying to use clever programming to aggregate distributed energy sources, such as rooftop solar panels or batteries, and provide electricity to the grid like a virtual power plant.

Investors, too, have grown more diverse. VC firms are increasingly rubbing shoulders with governments, corporations, climate-conscious billionaires and private-equity (PE) firms.

In 2015, 24 countries, including America, China and Germany, and the EU pledged to double R&D spending on clean energy over five years. Many will fall short of that goal. But the decline in spending in the mid-2010s appears to have been reversed. Last year taxpayer-funded green-energy R&D around the world rose for the third consecutive year, to a record \$25.4bn, according to the IEA.

Governments are trying to fill funding gaps at a later stage, too, when deep-pocketed banks are reluctant to hand out \$50m for a factory-scale project

and less risk-averse VC firms cannot afford to do so, observes Emily Reichert of Greentown Labs, an incubator. Initiatives such as the EU's long-standing innovation fund and a new scale-up fund within ARPA-E, an American programme for advanced energy technology, aim to help startups escape this "valley of death".

Corporations, for their part, are on the lookout for new technologies to help them decarbonise or cut energy costs. According to Cleantech Group, big business is involved in about a quarter of deals, up from 16% in 2010. They either invest through their VC arms or by providing capital directly. Oil majors including ExxonMobil have created a clean-investment fund (though it pales in comparison to their oily capital spending). Energy Impact Partners is trying to set one up on behalf of two dozen utilities, such as Southern Company, an American one, and Britain's National Grid. This year non-energy firms have announced around \$5bn-worth of climate VC. Amazon, an e-commerce empire, has backed five firms, including Rivian, an electric-van startup, and Redwood Materials, a battery-recycling firm. Microsoft, a software colossus, Unilever, a consumer-goods giant, and IKEA, a furniture-maker, have also loosened their purse strings.

| *High net-zero worth*

So have rich individuals, who, like corporate VC funds, tend to represent more patient capital. Family offices participate in around 8-10% of deals, up from 4% in 2010. Many act in concert, as with Mr Gates's BEV. Launched in 2015, the \$1bn vehicle invests only in startups with the potential to cut annual greenhouse-gas emissions by at least the equivalent of half a gigatonne of CO₂—some 1% of the world's total. Mr Gates has enlisted about 20 fellow plutocrats, among them the richest men in America (Jeff Bezos), China (Jack Ma) and India (Mukesh Ambani). The fund is backing 40 firms and will last for 20 years.

Régine Clément, who heads Clean, Renewable and Environmental

Opportunities (CREO), a network of 200 or so family offices, says that many families are trying to be “catalytic”. Some support risky prospects and when a product is established, as is happening with low-carbon protein, they take their capital and move to the next nascent market. The Emerson Collective, a foundation founded by Laurene Powell Jobs, the ex-wife of Steve Jobs, Apple’s late boss, has invested in perhaps a dozen climate-tech startups through an incubator. Mr Gates has separately founded TerraPower, a company developing advanced nuclear reactors, and invested in Carbon Engineering, a firm that builds machines which suck carbon dioxide from the air.

Green innovators are also attracting innovative financing methods. PE firms like Spring Lane Capital and Generate Capital are using new funding models to help startups escape valleys of death. In 2019 Generate lent \$100m to Plugpower to install its hydrogen-powered forklift trucks in warehouses of Amazon and Walmart. The retailers pay Plugpower for the service, and it uses the proceeds to repay the loan. Specialised insurance firms, such as New Energy Risk, an affiliate of AXA, a giant insurer, help financiers manage the risk.

In September QuantumScape, a battery startup which counts Mr Gates and Volkswagen among its investors, said it planned to list through a reverse merger with a special-purpose acquisition company (SPAC) of the sort that have been all the rage on Wall Street this year. SPACs allow startups to negotiate the purchase price directly. Deals are faster and more predictable. So are exits, which may encourage climate-tech VCs to support more startups.

Many are already heartened by the rapid rise of green stocks. In the past year the S&P clean-energy index, which tracks around 30 firms, outperformed the S&P 500 index of big American companies (see chart 2). Liqian Ma, of Cambridge Associates, a consultancy, notes that between

2014 and 2018 green VC investments around the world generated annual returns of 20%. That is double what typical VC firms manage, and a vast improvement over the mid-2000s, when the average green VC lost money.

Deep decarbonisation will mean changing heavy industries, too, says Mr Sivaram of Columbia. For that, says Mike Perry, the chief technology officer of VIONX Energy, “You need someone with deep pockets.” His company, which makes large-scale flow batteries and has struggled to get financing to build its fourth plant, is now going through a restructuring process. “This is not-for-the-faint-of-heart investing,” Mr Perry concedes.

Part of the problem is that, as Mr Gates explains, “the demand side for innovation is missing.” That is particularly the case for high-emitting products bought by businesses, such as cement (which accounts for around 8% of global greenhouse-gas emissions) and steel (7-9%). Unlike software, which is easy to differentiate from rivals, “green steel is not going to be any better than steel,” notes Mr Gates. “So there is no market for early innovation.”

Targeted government procurement could boost green products, as happened when the Pentagon enlisted Silicon Valley to make computers. In the private sector Mr Gates is planning a fund that uses auctions to buy clean tech with the lowest price. This, he argues, will stimulate demand and lower costs. With ideas like this the latest green-VC boom may protect the planet—and avoid another bust. ■



气候变化与创新

绿色钞票

关心气候变化的风险资本家再次大举押注清洁技术。他们能赚到钱又保护地球吗？

“在某种程度上，我们是在努力吓跑投资者。”Form Energy的联合创始人马特奥·加拉米洛（Mateo Jaramillo）承认。这家创业公司正试图解决可再生能源最棘手的问题之一。太阳能和风能是间歇性能源，因此绿色电力公司必须存储多余的电能，在没有阳光或不刮风的时候释放它们。大型锂离子电池的放电时间最长四小时。成立于2017年的Form Energy希望用另一种它未透露细节的电池技术把放电时间延长到几天。5月，它宣布与明尼苏达州的电力公司大河能源（Great River Energy）开展试点项目。它的创始人团队大腕云集，一家竞争对手的老板用1980年代由乔治·哈里森和鲍勃·迪伦等人组成的超级乐团作比，称之为“能源储存界的Travelling Wilburys”。不过，加拉米洛预计要到2025年才会开始扩大规模。

漫长的等待加上未经验证的技术会让许多风险投资人不安。他们大都希望在五到七年内看到回报。而Form Energy的投资者更有耐心。其中包括由比尔·盖茨设立并获得其他亿万富翁支持的突破能源风投基金（Breakthrough Energy Ventures，以下简称BEV），意大利石油公司埃尼集团（Eni）的风投部门Eni Next，以及由麻省理工学院管理的基金“引擎”（The Engine）。这反映了绿色风投生态系统不断演变的特性：在经过多年相对蛰伏的状态之后，它又再度焕发生机。

根据研究公司美国清洁技术集团的数据，2019年投资者向气候相关技术投入了创纪录的360亿美元，高于2015年的170亿美元。其中一半的投资流向了北美的创业公司（见图表1）。中国占了15%至30%（视如何界定产业而定），欧洲占15%。这应该能刺激创新，也有望降低气候友好型技术的相对价格——即使在没有法规增加高碳排放技术成本的情况下。而且创新需要全面铺开，而不仅仅是在能源和运输业。“在考虑脱碳时，我们必须提醒自己，是要让整个产业经济全面脱碳。”盖茨说。

全球预测机构国际能源署（IEA）预计，要在2070年之前让地球气候走上可持续的轨道，所需减排量的四分之一要倚赖水力发电等成熟技术。还有41%要依靠海上风能发电等相对较新的技术，它们在既定市场的份额还不到1%。示范阶段或原型阶段的技术（例子分别是电池供电的船舶和飞机）各占17%。这为投资者提供了巨大的机会，只要他们心理够强大。

绿色风投在过去有成有败。十多年前它在美国经历了一轮兴衰，在欧洲也是，不过波动幅度相对较小。风投基金采用了一种为软件公司设计的融资模型，却把它用在了生产实体产品（主要是太阳能电池板和生物燃料）的公司上，这些公司需要投入大量的时间和金钱才能产生收益。许多公司破产了。风投向它们押注的250亿美元损失了一半以上。资本枯竭。

现在资本又流动起来。这次，投资者正在放眼更广泛的清洁技术。按价值计算，约有一半交易发生在低碳运输领域，这是受到了特斯拉难以置信的成功的推动。2004年，伊隆·马斯克以650万美元的价格收购了这家电动汽车制造商14%的股份。六年后特斯拉上市，如今它的市值达3850亿美元，高于任何其他汽车制造商。仅马斯克所持的股份可能就价值720亿美元，略少于通用汽车和福特市值的总和。

投资对象不仅限于那些想复制特斯拉的成功公司。投资方包括盖茨和谷歌、估值40亿美元的植物蛋白公司Impossible Foods及其市值已达100亿美元的上市竞争对手Beyond Meat激发了投资者对农业技术的兴趣。Form Energy和其他电网级储能技术开发商也很受欢迎。

还有软件。咨询公司普华永道估计，2013年至2019年间，规模居前5%的早期风投交易中有一成涉及纯软件公司。另有六成涉及将智能算法与环保硬件相结合的创业公司。太阳能电池板或电池等产品的成本不断下降，商品化程度不断提高（它们的价格在2010年至2019年间分别下降了82%和87%），让此类公司可以提供辅助产品和服务。软件创新使得人们有可能利用这些更便宜的硬件并让它们突破以前的极限，哥伦比亚大学的瓦伦·西瓦拉姆（Varun Sivaram）指出。比如，一些创业公司正尝试用巧妙的程序来整合屋顶太阳能电池板或电池等分布式能源，像虚拟发电厂一样向

电网供电。

投资者也越来越多元化。风投公司正越来越多地同政府、企业、关心气候变化的亿万富翁和私募股权公司打交道。

在2015年，包括美国、中国、德国在内的24个国家和欧盟承诺在五年内将清洁能源的研发支出增加一倍。许多国家将达不到这个目标。但2015年前后支出下降的趋势似乎已经被扭转。根据国际能源署的数据，去年全球受政府资助的绿色能源研发连续第三年增长，达到创纪录的254亿美元。

孵化器Greentown Labs的艾米丽·赖希特（Emily Reichert）指出，各国政府也在试图填补清洁能源项目后期的资金缺口。到了这个阶段，财力雄厚的银行不愿为工厂级的项目提供5000万美元之多的贷款，而风险厌恶程度较低的风投公司又拿不出这么多钱。欧盟创立已久的创新基金，以及美国先进能源技术计划ARPA-E下设的新的扩大基金，都致力于帮助创业公司走出这个被称为“死亡谷”的阶段。

企业这一边则正在寻找新技术来帮助自己脱碳或削减能源成本。根据美国清洁技术集团的数据，大企业参与了大约四分之一的风投交易，2010年这一比例为16%。它们要么通过自己的风投部门投资，要么直接提供资本。包括埃克森美孚在内的石油巨头成立了一只清洁投资基金（尽管与它们的石油资本支出相比还是小巫见大巫）。Energy Impact Partners正尝试代表美国的南方电力公司（Southern Company）和英国国家电网公司

（National Grid）等约20家电力公司设立一只基金。今年，非能源公司已经公布了价值约50亿美元的气候风投。电子商务帝国亚马逊投资了五家公司，包括电动货车创业公司Rivian和电池回收公司Redwood Materials。软件巨头微软、消费品巨头联合利华和家具制造商宜家也都松开了钱袋子。

| 高净值

富有的个人也在投资清洁技术，他们和企业风投基金一样，一般代表的是更有耐心的资本。家族办公室参与了大约8%至10%的交易，2010年的比例为4%。很多家族办公室是共同行动，就像盖茨的BEV那样。这个10亿

美元的投资基金于2015年推出，仅投资有潜力每年把温室气体排放量减少至少五亿吨二氧化碳当量（约为全球总量的1%）的创业公司。盖茨联合了包括美国的杰夫·贝索斯、中国的马云和印度的穆克什·安巴尼（Mukesh Ambani）等各地首富在内的20位富豪。该基金正在投资40家公司，投资年限为20年。

在全球有约200个成员的家族办公室网络“清洁、可再生和环境机遇”（CREO）的负责人雷吉娜·克莱门特（Régine Clément）说，许多家族都在试图发挥“催化”作用。其中一些投资有风险的项目，在新产品成熟之后（比如低碳蛋白质），它们就会带着自己的资金转战下一个新生市场。由苹果公司已故老板史蒂夫·乔布斯的遗孀劳伦娜·鲍威尔·乔布斯（Laurene Powell Jobs）创立的基金会Emerson Collective已通过一个孵化器投资了大概十几家气候科技创业公司。盖茨另外还出资成立了开发先进核反应堆的公司TerraPower，并投资了生产从空气中吸收二氧化碳的设备的Carbon Engineering。

绿色创新者也正在吸引创新的融资方式。像Spring Lane Capital和Generate Capital这样的私募股权公司正在利用新的融资模式来帮助创业公司走出死亡谷。2019年，Plugpower从Generate获得了一亿美元的债务融资，在亚马逊和沃尔玛的仓库中安装它的氢动力叉车。这两家零售商就这项服务向Plugpower付费，后者用收益来偿还债务。大型保险公司安盛（AXA）的子公司New Energy Risk等专门的保险公司可以帮助金融家管理风险。

投资者包括盖茨和大众汽车在内的电池创业公司QuantumScape在9月表示，计划通过反向合并一家特殊目的收购公司（SPAC）来完成上市，这类SPAC今年在华尔街风靡一时。它让创业公司可以直接谈判收购价格。交易更快也更可预测。退出也是如此，这可能会鼓励气候技术风投投资更多的创业公司。

许多风投公司已经因绿色股票的迅速增长受到鼓舞。在过去的一年中，追踪约30家公司的标普全球清洁能源指数的表现优于追踪美国大企业的标普500指数（见图表2）。咨询公司康桥汇世（Cambridge Associates）的马

里千指出，2014年至2018年间，全球绿色风投的年收益率为20%。这是一般风投公司收益率的两倍，比起十几年前绿色风投公司普遍亏损的状况有了很大的改善。

深度脱碳意味着重工业也会发生变化，哥伦比亚大学的西瓦拉姆说。要实现这样的变化，VIONX Energy的首席技术官麦克·佩里（Mike Perry）说：“需要有雄厚资金的人。”他的公司生产大型液流电池，一直难以筹到资金来建设第四家工厂，目前公司正在重组。“神经脆弱的人可做不了这样的投资。”佩里承认。

部分问题在于，正如盖茨所解释的那样，“对创新缺少需求”。企业购买的高排放产品尤其如此，例如水泥（约占全球温室气体排放量的8%）和钢铁（占7%至9%）。与容易和竞争对手形成差异化的软件不同，“绿色钢铁不会比普通钢铁性能更好，”盖茨指出。“所以早期创新没有市场。”

有针对性的政府采购可以促进绿色产品的发展，五角大楼委托硅谷制造计算机时就是如此。在私营领域，盖茨正计划设立一项基金，利用拍卖以最低价格购买清洁技术。他认为，这将刺激需求并降低成本。有了这类新点子，最新一轮绿色风投热潮或许能够保护地球，并避免在大起之后再次大落。■



The outlook for corporate America

Still ailing

Look beyond the frothy stockmarket and booming tech giants and you will find that much of American business is still in a sorry state

ON THE HUSTINGS, both Donald Trump and Joe Biden promised to revive America's economy from its pandemic-induced funk. Doing so will require a turnaround for corporate America, which has suffered a savage downturn. When the occupant of the White House starts his four year term in January, in what state will American business be?

Some recent vital signs may look promising. America's economy expanded at a record pace of 33%, on an annualised basis, in the third quarter. Total profits for the big firms of the S&P 500 index have surpassed analysts' expectations by roughly a fifth, with 85% beating forecasts for the quarter. Michael Wilson of Morgan Stanley, a bank, calculates that revenues for the median S&P 500 firm rose by 1% year on year. Small wonder that the Conference Board, a research organisation, published a survey on October 20th finding that its measure of confidence of bosses at big companies has jumped to 64 from 45 in the previous quarter—a figure above 50 indicates more positive than negative responses.

Yet anyone tuning into big firms' quarterly update calls with Wall Street investors could not help but pick up the tentative tone and frequent dour notes of executives. Visa, a payments company, for example, called the recovery "uneven". Caterpillar, a maker of industrial machinery, admitted it is "holding more inventory than we normally would" because of the uncertainties resulting from the pandemic. And a close analysis of the figures suggests that the corporate recovery is very patchy, with some industries and smaller firms still in big trouble. Meanwhile, corporate balance-sheets are under strain, which could hold back investment and

lead to an eventual rise in defaults.

America's economic boom in the latest quarter would be impressive had it not come on the heels of a comparable decline in GDP in the previous three-month period. The economy remains 3.5% smaller than it was at the end of 2019, reckons the Conference Board, and it is not likely to return to its pre-pandemic level until the tail end of 2021 or possibly later (see chart). As for the large proportion of companies where profits exceeded expectations this quarter, Tobias Levkovich of Citi, a bank, is unimpressed: "Beating lowered earnings expectations is not that great a feat." It is now clear that analysts were too pessimistic when they pencilled in their forecasts earlier in the year. He adds that many firms managed to improve profits not by boosting sales but by slashing their expenses. The business outlook remains "squishy", he reckons, as "you can't cost-cut your way to prosperity."

The more you peer into the numbers, the more inconsistent the recovery looks. One source of differentiation is where a company's customers are based. Jonathan Golub of Credit Suisse, another bank, estimates that the companies in the S&P 500 reported an aggregate revenue decline of 2.8% and a fall of 10.2% in profits in the third quarter compared with a year earlier. But he estimates that at American firms focused on exports profits plunged by over 14%, whereas those companies more reliant on the domestic market suffered a drop of less than 9%.

Size is another lens which reveals the uneven recovery. Binky Chadha of Deutsche Bank argues that it is "a tale of two stockmarkets". The market capitalisation of the five biggest tech giants (Facebook, Amazon, Apple, Microsoft and Alphabet) has fallen in recent weeks from its peak of roughly a quarter of the entire value of the S&P 500 index. Even so, they have generated returns of 39% for shareholders this year and without them the 495 others have produced a return of -1%.

Small and medium-sized firms (SMEs) have been crushed. The proportion of them that are making losses—based on the Russell 2000, an index of SMEs—has declined a bit from its peak of above 40%, but it remains well above 30%. SMEs are nearly four times as likely to be losing money as big firms, a far worse situation than during the recession of 2001 or the global financial crisis a decade ago.

The mood in the board rooms of small companies is foul. The latest survey of executives at SMEs, published by the *Wall Street Journal* and Vistage, an executive-coaching organisation, found sentiment “stalled in October 2020 due to increased concerns about an economic slowdown amid a resurgence in covid-19 infections.” The gloomy outlook, the most pessimistic in six years, may be explained by the fact that 42% of small firms believe they will run out of cash in under six months.

If the inconsistency of the recovery is one worry, the other is the state of firms’ balance-sheets. Corporate debt was rising before the pandemic, and many firms have piled on more borrowings in order to cover the shortfall in revenue they have experienced this year. Edward Altman of NYU Stern School of Business is worried about what he calls “the enormous build-up of non-financial corporate debt.” By his estimation, firms have issued more than \$360bn in high-yield debt (ie, junk bonds) so far this year, surpassing the previous record of \$345bn in all of 2012. With debt-earnings ratios reaching critical levels, and a resurgence in corporate defaults, Mr Altman reckons that 6.5% to 7% of junk bonds, by dollar value, will default in 2020.

His fears are echoed by S&P Global, a credit-rating agency. It calculates that the “distress ratio” (distressed credits are junk bonds with spreads of more than ten percentage points relative to US Treasuries) for American companies had come down to 9.5% in September from its peak of 36% in March but that it remains above pre-pandemic levels. Corporate America already leads the world in the tally of corporate defaults this year, with 127

by the end of October. Nicole Serino of S&P Global notes that corporate credit quality is deteriorating, with the number of firms rated a lowly CCC+ or below now 50% higher than at the end of 2019. For such firms, she worries that “excess liquidity and low interest rates are only postponing the inevitable.”

With a large share of firms still making losses and given the weakening of balance-sheets it is far from clear that American business is in the clear. What happens next depends on three unknowns. One is the fallout from the presidential vote. A prolonged period of post-election uncertainty would weigh on the mood, notes Mr Levkovich. He points to the 11% fall in the S&P 500 index after the election in 2000 while legal wrangling decided the outcome of the contest for the presidency between George W. Bush and Al Gore.

Another unknown is the timing and size of the next package of fiscal stimulus from Congress, which at the moment is frozen by partisan gridlock in Washington, DC, and which could be limited if the Republicans keep firm control of the Senate. This matters to companies because, as Mr Golub puts it, “the government has effectively said, ‘We do not want market forces to drive firms out of business right now and so we are going to backstop a large part of the economy.’” Mr Wilson believes that the number of companies going bankrupt so far this year has been much lower than otherwise feared because of generous stimulus measures.

The biggest unknown, though, is the pandemic. Moody’s, a credit-rating agency, predicts that corporate-debt defaults will continue to rise until March 2021. The reason it gives is “economic recovery remains fragile amid risks of another pandemic resurgence leading to another round of countrywide lockdowns”. That should serve as a sober reminder to the next president and corporate bosses alike that, despite a rebound, there may yet be difficult days ahead for USA Inc. ■



美国企业的前景

依然病弱

放眼红火的股市和繁荣的科技巨头以外，会发现大部分美国企业都还在挣扎

特朗普和拜登在各自的竞选活动中都承诺要重振因新冠疫情而低迷的美国经济。要做到这一点，就要扭转遭受了严重衰退的美国企业界的颓势。当新一任总统明年1月入主白宫，开始他的四年任期时，美国企业会是什么状态？

最近显露出的一些生机可能让人觉得前景光明。第三季度，美国经济的环比年化增长率达到创纪录的33%。标普500指数公司的总利润比分析师的预期高出约五分之一，有85%的公司第三季度盈利超出预期。摩根士丹利的迈克尔·威尔逊（Michael Wilson）估算，标普500指数公司的收入中值同比增长了1%。难怪研究机构世界大型企业联合会（Conference Board）10月20日发布的一项调查发现，它衡量大公司老板信心的指标从上一季度的45跃升到64——数字高于50表明乐观多过悲观。

但是，任何人若去听一听大公司和华尔街投资者的季度财报电话会议，都会觉察到高管们迟疑的语气和常常流露出的阴沉情绪。比如，支付公司Visa称此次复苏“不均衡”。工程机械制造商卡特彼勒（Caterpillar）承认，由于疫情带来的不确定性，自己的“库存高于正常水平”。仔细分析相关数据会发现，企业复苏的情况非常参差不齐，一些行业和小企业仍然处于水火之中。与此同时，企业的资产负债表也面临压力，这可能会抑制投资并最终导致债务违约率上升。

如果不是发生在第二季度GDP出现了同等幅度下滑的基础之上，美国第三季度的经济增长本可以说是非常亮眼。世界大型企业联合会认为，与2019年底相比，美国经济仍然缩减了3.5%，并且可能要到2021年底或更晚才能恢复到疫情前的水平（见图表）。对于本季度大部分公司的利润超过预期这一点，花旗银行的托拜厄斯·列夫科维奇（Tobias Levkovich）不以为然：“超过已经下调的盈利预期并不是什么了不起的事情。”现在很清楚的

是，分析师在今年早些时候所做的预期过于悲观了。他补充说，许多公司提高利润不是靠增加销售额，而是大幅削减开支。他认为，企业前景仍然“不明朗”，因为“你不能靠削减成本来实现繁荣”。

越细看数据，就越会感觉到经济复苏的不均衡。造成差异化的一个原因是公司客户的地区分布。瑞信（Credit Suisse）的乔纳森·戈卢布（Jonathan Golub）估计，标普500指数公司公布第三季度总收入同比下降2.8%，利润同比下降10.2%。但他还估计，主打出口的美国公司利润下降超过14%，而那些更依赖国内市场的公司利润下降不到9%。

复苏的不均衡也体现在企业的规模上。德意志银行（Deutsche Bank）的宾基·查德哈（Binky Chadha）认为这简直就是“股市双城记”。五大科技巨头（Facebook、亚马逊、苹果、微软和Alphabet）的市值在最高峰时约占标普500指数总市值的四分之一。最近几周这一比例已有所下降，但今年它们还是创造了39%的股东回报率，而其余495家公司的回报率为-1%。

中小企业已经被碾压。在代表中小企业的罗素2000指数中，亏损的中小企业的比例已从最高峰时的超过40%略有下降，但仍远高于30%。中小企业亏损的几率几乎是大企业的四倍，比2001年美国经济衰退或10年前全球金融危机时的情况糟糕得多。

小公司的董事会议室里弥漫着糟糕的情绪。由《华尔街日报》和高管培训机构伟事达（Vistage）发布的针对中小企业高管的最新调查发现，情绪“在2020年10月萎靡不振，因为疫情卷土重来加剧了对经济放缓的担忧。”这种灰暗的预期是六年来最悲观的，可能是因为42%的小企业认为自己手头的现金扛不过接下来六个月。

如果说此次复苏的不均衡是一件令人担忧的事，那么企业资产负债表的现状是又一件。疫情之前公司债务就已经在增长，许多公司为了弥补今年遭遇的收入缺口又扩大举债。纽约大学斯特恩商学院的爱德华·奥特曼（Edward Altman）担心会出现他所说的“非金融企业累积起巨额债务”。据他估计，今年迄今为止，企业已经发行了超过3600亿美元的高收益债券

（即垃圾债券），超过了2012年全年创下的3450亿美元的纪录。随着债券收益率达到临界水平，以及公司违约再次抬头，奥特曼估计，按美元价值计算，将有6.5%到7%的垃圾债券在2020年违约。

他的担忧得到了信用评级机构标普全球（S&P Global）的印证。标普全球估算，美国公司的“困境比率”（困境债务是与美国国债的利差超过10个百分点的垃圾债券）已经从3月最高峰时的36%下降到9月的9.5%，但仍高于疫情前水平。今年，美国公司的违约数量已经高居全球首位，截至10月底达到127家。标普全球的尼科尔·塞里诺（Nicole Serino）指出，公司债的质量正在恶化，目前被评为低等级的CCC+或以下的企业数量比2019年底增加了50%。对于这些公司，她担心“流动性过剩和低利率不过是让不可避免的事情延迟发生”。

由于大批公司仍在亏损，加上资产负债表恶化，美国企业是否能渡过危险期还远未可知。接下来事态如何发展取决于三个未知数。一是总统选举的余波。列夫科维奇指出，选举之后的长期不确定性会加重这种情绪。他指出，2000年大选后，在裁定乔治·布什和阿尔·戈尔的总统竞选结果的法律纠纷期间，标普500指数下跌了11%。

另一个未知数是国会批准新一轮财政刺激计划的时间和规模，该计划目前因华盛顿的两党分歧而陷入僵局，而如果共和党牢牢控制参议院，计划的规模可能会受限。这对企业很重要，因为正如戈卢布所说，“政府实际上已经说过，‘我们不希望企业现在被市场力量逼迫倒闭，因此我们将会为很大一部分经济提供支持’。”威尔逊认为，由于慷慨的刺激措施，今年迄今为止破产的公司数量远低于人们原本担心的程度。

不过，最大的未知数还是疫情。信用评级机构穆迪（Moody's）预测，2021年3月之前，公司债违约率将继续上升。它给出的理由是，“经济复苏仍然很脆弱，因为疫情有可能再次爆发，导致另一轮全国性封锁”。这对下一任总统和企业老板们应该是个警醒——尽管经济有所反弹，但美国公司往后的日子可能还是不好过。■



American society

All for one

Robert Putnam and Michael Sandel diagnose America

THE RANCOUR of American politics, say these two distinguished scholars, is a symptom of an even deeper malaise. Robert Putnam charts a rise in economic inequalities, cultural tribalism and frayed social connections since the 1960s—when, he recalls, the spirit of solidarity and reform was by contrast strong. Michael Sandel focuses on the meritocratic rat-race and its justifications, which create, in his words, “hubris among the successful and resentment among the disadvantaged”.

Both blame the ills they identify on widespread acceptance of egotistical go-getting at a cost to common purpose. Their bleak picture of private indifference to public welfare prompts an equally sweeping solution. America needs nothing less, they think, than a recovery of community and rededication to the common good.

Mr Putnam, a political scientist, is well-known for “Bowling Alone” (2000), which reported a drop of clubbability in a nation of joiners. Written with Shaylyn Romney Garrett, “The Upswing” is a reprise that answers critics and laments a yet broader retreat to private concerns. It offers a historical account of trends in public commitment over 120 years.

The narrative arc is simple. A dog-eat-dog Gilded Age at the end of the 19th century prompted ever greater social engagement and reform in three stages—Progressivism, the New Deal and the 1960s. Soon, however, dog-eat-dogism returned and is now again uppermost. To support that analysis, a mass of survey data and statistics is mapped onto what Mr Putnam calls “I-we-I” curves, which show a rise and fall in economic equality, political co-operation, social solidarity and a sense of shared American culture.

“The Upswing” ranges widely, yet its scrupulous survey-mining and curve-fitting is not wholly persuasive, or indeed necessary. Up on the latest research and impeccably open to counterargument, Mr Putnam tends to take away with one study what he has just offered with another. A heartfelt communitarian essay, “What ails America”, without the social-science apparatus, might have been just as convincing.

Mr Sandel’s focus is tighter. His target is meritocratic society and the ideal it aims to realise, equality of opportunity. For true egalitarians, who want fairer outcomes, a uniform starting line has always seemed a fudge. To some rugged conservatives, promising equal opportunity is necessary lip-service to unmeetable popular demands. Mr Sandel, a political philosopher, ends up on the fence. He is not an out-and-out egalitarian, but nor does he dismiss hopes for some degree of genuine civic equality.

He recognises that gauges of performance and success often measure the wrong things—or measure the right things badly. His critique of over-reliance on paper credentials in hiring and university placements is telling. (Similar flaws of ranking mania in medicine, policing, schooling and the armed forces were expertly exposed in Jerry Muller’s “The Tyranny of Metrics”.) Mr Sandel’s larger concern, however, is not whether achievement is properly calibrated but whether its rewards are rightly merited. As he says, that ethical question runs back to theological disputes about the arbitrariness or earnability of God’s grace. These days, free-marketeers and redistributionists tussle over whether and how to offset the lottery of talent and energy that underlies supposedly merited rewards.

Like Mr Putnam’s, the solutions Mr Sandel suggests call for profound changes in prevailing attitudes: acknowledgment of luck in the share-out of rewards, recognition that all work has dignity, new commitment to the public good, and readiness to argue such matters out in a healthier, more deliberative democracy. A sceptic may share the pair’s concerns about

American society yet wonder if, in such a vigorously competitive, capitalist place, those profound changes in thinking are probable. And whether, given how long the arguments over unmerited disadvantage have lasted, they are likely to end soon. ■



美国社会

人人为我

罗伯特·帕特南和迈克尔·桑德尔为美国把脉【《上扬》、《功绩的暴政》书评】

这两位杰出的学者称，美国政治中的仇恨反映了一种更深层次的弊病。罗伯特·帕特南（Robert Putnam）记录了自20世纪60年代以来经济不平等、文化部落主义以及社会关系破裂愈演愈烈的进程。而在60年代，他回忆道，团结和改革的精神很强烈。迈克尔·桑德尔（Michael Sandel）聚焦精英制度下的激烈竞争及对此的辩护，用他的话说，这造成了“成功人士的傲慢和弱势群体的怨憎”。

两人都将他们发现的弊病归咎于社会普遍认同的一味追求自我成功而罔顾共同目标。他们描绘了一幅个人对公共福利漠不关心的灰暗景象，提出了同样影响广泛的解决方案。他们认为，美国需要的正是社区的复兴和重新致力于公共利益。

政治学家帕特南因2000年出版的《独自打保龄》（Bowling Alone）闻名。书中指出在一个“社团参与者”的国度，人们不像往日那么积极社交了。他和莎琳·罗姆尼·加勒特（Shaylyn Romney Garrett）合著的《上扬》（The Upswing）老调重弹，回应了各界评论，哀叹“各人自扫门前雪”的现象变得愈加普遍。它回顾了120多年来公共奉献精神如何变化的历史。

书中的叙事弧很简单。19世纪末弱肉强食的“镀金时代”促发了社会参与和改革不断扩大的三个阶段——进步时代、罗斯福新政和1960年代。然而，无情的竞争主义很快卷土重来，如今又再次占据主导。为了支持这一分析，帕特南利用了大量调查数据和统计分析，绘制出了他所称的“I-we-I”（个人-集体-个人）曲线，显示了经济平等、政治合作、社会团结和美国文化认同感的兴衰起落。

《上扬》的内容涉及广泛，但它细致的调查发掘和曲线拟合并不完全令人

信服，或确有其必要。帕特南熟悉各种最新研究，对于反驳意见的开放态度也无可挑剔，结果就是往往刚依据一项研究提出的观点又被另一项研究削弱。真情实感地写一篇《美国得了什么病》（What ails America）的社群主义文章，舍弃社会科学论证的那套，或许说服力也差不多。

桑德尔的关注点更加集中。他瞄准的是精英治理的社会及其意图实现的理想——机会均等。在那些追求更公平结果的真正的平等主义者看来，统一的起跑线从来都像是一种敷衍。而在一些顽固的保守派看来，面对不可能满足的大众诉求，承诺机会均等是一种必要的空头支票。政治哲学家桑德尔最终持观望态度。他不是个彻头彻尾的平等主义者，但也没有放弃对实现某种程度上真正的公民平等的希望。

他指出，对业绩和成功的衡量指标往往把关注点放错了地方——或者有时虽切中要害却又衡量得过于拙劣。他强有力地批评了在企业招聘和大学招生中对书面证书的过度依赖。（杰里·穆勒[Jerry Muller]在《指标的暴政》[The Tyranny of Metrics]一书中巧妙地揭露了医疗、治安、教育和军队等领域中存在同样问题的“排名狂热”。）不过，桑德尔更关心的不是对成就的衡量是否恰当，而是其奖赏是否理所应得。正如他所说，这个伦理问题可以追溯到神学上的争议——上帝的恩典究竟是随意赐予的，还是可以通过修行赢得？如今，自由市场主义者和再分配主义者还在争论是否以及如何对才能与精力的天生差异做出弥补——这种运气因素是所谓应得奖赏的基础。

和帕特南一样，桑德尔提出的解决方案也意味着当前的主流态度需要发生深刻的变化：承认在奖赏分配中存在运气的成分，认识到所有工作都有尊严，重新致力于公共利益，并且愿意在一个更健康、更审慎的民主制度下讨论这些议题。怀疑论者或许与这两位学者一样对美国社会感到忧虑，但他们会寻思，在这样一个竞争激烈的资本主义国家，这些深刻的思想变革有可能发生吗？再说，鉴于对“不应得的劣势”的争论已经持续了那么长时间，也不知道是否能很快争出一个结论。■



Alternative 5G technology

Open sesame

A new technology could be the answer to the Huawei dilemma that many countries are still torn over

THE SIGNAL was easy to miss amid the noise of new lockdowns and America's elections. Earlier this month, Vodafone, a mobile operator, announced that in Britain it would use a technology called OpenRAN to replace some gear made by Huawei, a Chinese firm whose products are considered too much of a security risk to be used in the new 5G mobile networks. It is a sign that the much-discussed Huawei dilemma is not as intractable as it may seem—and a reminder that OpenRAN deserves more private-sector and government support.

In recent years America has conducted a campaign against Huawei, which it worries poses a threat to Western interests and which has built a commanding position in 5G systems globally. Australia, Canada and Japan have already in effect banned Huawei from their 5G networks. In July Britain said it would phase out its gear, and on October 20th Sweden said it would impose a ban, too. More countries may follow.

The trouble is that the costs of ditching Huawei are high: you risk becoming reliant on two big Nordic firms, Nokia and Ericsson, the other main suppliers of 5G gear. In the long run a duopoly is bad for competition and innovation. And in the short run neither firm is infallible. Nokia, in particular, is in trouble. On October 29th it announced a drop in sales of 7% year on year, and its shares plunged by almost 20%. Its new boss said that it had been “clearly behind” on 5G.

OpenRAN is an alternative to relying on either Huawei or the Nordic duo. Along with a related technology called network virtualisation, it changes

the rules of the game. To understand why, compare an old tethered telephone with a modern smartphone. One is a dedicated piece of hardware made of customised parts, whereas the other is a general-purpose computer controlled by software that can accommodate any type of app, provided it complies with certain technical rules.

Similarly, conventional mobile networks are made out of specialised equipment, whereas the new OpenRAN kind use mostly off-the-shelf hardware, with lots of code defining what it can do. Because all the gear connects up using standard interfaces, carriers can mix and match products from different suppliers—something that they cannot do today. Operators have more insight into what is going on in their networks and can avoid components they do not trust, such as Chinese chips. They could also save a lot of money and become quicker on their feet.

OpenRAN is gaining momentum. Last month Rakuten Mobile launched the world's first 5G network based on OpenRAN—which helped the Japanese carrier cut investment by 40%. It can also put together new services within minutes instead of months, as is the case with conventional networks. In September Telefónica, which has 260m mobile subscribers in Europe and Latin America, teamed up with Rakuten to deploy OpenRAN more widely in its networks by 2025. In America Dish has started to build a 5G network based on the technology. With the notable exception of Huawei, even equipment-makers are coming on board. Ericsson has just announced its first related product.

Yet OpenRAN still has problems. The supply chain is untested and may face bottlenecks if demand suddenly surges as more mobile operators sign up. Notwithstanding its roll-out in urban parts of Japan, experts fear that the technology may not yet function well in densely populated cities; most carriers, including Vodafone, want to test it in rural areas first. Integrating the many different products that make up an OpenRAN network is hard.

And although the technology lowers the potential security threat from China, it creates new openings for hackers.

All this means that governments still have a role to play. They should help tackle bottlenecks by, for example, encouraging investment in the development of specialist chips that power antennae, as well as laboratories that test integration of a network's components, as lawmakers in America have proposed. They should also follow Japan by promoting a common set of standards among equipment-makers and network-operators that deals with security and mandates at least some compliance with OpenRAN. The choice between relying on a monolithic Chinese firm that is not fully trusted or on a doddering Western duopoly is a rotten one. It would be a lot better to give a new type of technology a chance to thrive. ■



【首文】5G技术替代方案

芝麻开门

一项新技术可能破解令多国仍然左右为难的华为难题

在封城新令和美国大选的喧嚣中，很容易错过这个信号。本月初，移动运营商沃达丰（Vodafone）宣布将在英国使用一项名为OpenRAN的技术来取代一些华为制造的设备——这家中国公司的产品目前被多国认为安全风险太大而不能用于新的5G网络。这个消息透露出备受热议的华为难题并没有看起来那么棘手，也提醒人们OpenRAN值得私营部门和政府提供更多支持。

近年来，美国针对华为发起连串攻势，担心已经在全球5G系统中建立了领军地位的华为对西方国家的利益构成威胁。澳大利亚、加拿大和日本实际上已经禁止华为进入其5G网络。7月，英国表示将逐步停用华为的设备，瑞典也在10月20日表示将对华为实施禁令。接下来可能还会有更多国家加入这个队列。

问题是抛弃华为的代价高昂。各国可能会变得依赖诺基亚和爱立信这两大北欧公司，它们是5G设备另两个主要供应商。从长远来看，双头垄断不利于竞争和创新。而在短期内，这两家公司无一绝对可靠，特别是深陷困境的诺基亚。10月29日，诺基亚宣布销售额同比下降7%，股价暴跌近20%。它的新老板表示，诺基亚在5G方面已经“明显落后”。

OpenRAN是依赖华为或北欧两巨头之外的另一种选择。和一项名为网络虚拟化的相关技术一道，它改变了游戏规则。要了解何以如此，可以比较一下老式有线电话和现代智能手机。前者是由定制部件组成的专用硬件，后者则是由软件控制的通用计算机，能容纳任何类型的应用，只要它们符合一定的技术规则。

同样地，传统的移动网络由专门的设备构成，而新的OpenRAN网络主要使用现成的硬件，用大量的代码定义其功能。由于所有的设备都通过标准

接口相连，所以运营商可以将不同供应商的产品混搭使用——它们在目前的网络中无法这么做。运营商可以更深入地了解自己的网络正在运行的情况，还能避免使用它们不信任的组件，比如中国的芯片。它们还能节省大笔资金，更加随机应变。

OpenRAN势头渐盛。上个月日本运营商乐天移动（Rakuten Mobile）推出了全球首个基于OpenRAN的5G网络，帮它削减了40%的投资。该网络还能在几分钟内将新服务聚合起来，而不用像传统网络那样需要数月之久。9月，在欧洲和拉美拥有2.6亿移动用户的西班牙电信（Telefónica）与乐天达成合作，计划到2025年在其网络中更广泛地部署OpenRAN。在美国，Dish已经开始建设基于该技术的5G网络。除了华为这一明显的例外，就连设备制造商也纷纷加入。爱立信刚刚宣布推出首款相关产品。

不过，OpenRAN仍然存在问题。其供应链未经考验，随着更多移动运营商加入，一旦需求突然激增，可能面临瓶颈。虽然OpenRAN已经在日本的城区推广，但专家担心这项技术在人口稠密的城市可能还无法很好地发挥作用；包括沃达丰在内的大多数运营商也都希望先在乡村地区测试。整合构成OpenRAN网络的许多不同产品很难。虽然该技术降低了来自中国的潜在安全威胁，但它也给黑客创造了新的机会。

所有这些意味着仍需要政府发挥作用。它们应该帮助消除瓶颈，例如鼓励投资研发专门的天线驱动芯片，以及用于测试网络组件集成的实验室，正如美国的议员们提议的那样。它们还应效仿日本，在设备制造商和网络运营商中推广一套共同标准，以应对安全问题，并要求至少在一定程度上遵循OpenRAN。是依赖一家不被完全信任的中国巨头，还是依赖一个老化的西方双头垄断，这个二选一实在糟糕。给一项新技术一个腾飞的机会要好太多了。■



Free exchange

Turning inward

Why the old development strategy of import substitution has gained a new lease of life

FOR THE past quarter-century, growth came so easily to the developing world that it can be hard to remember it was ever otherwise. Fuelled by globalisation, real GDP per person in emerging economies more than doubled from 1995 to 2019, in purchasing-power-parity terms. In advanced countries, by contrast, it grew by only 44%. The burst of growth consigned to the scrapheap decades' worth of arguments about whether and how poor countries could catch up with rich ones. But explosive trade growth has ended, and the industrialised world is turning inward. Some governments are therefore dusting off old ideas. Among them is “import-substituting industrialisation” (ISI), a strategy that seeks to develop industrial capacity by shielding domestic producers from foreign competition. Many countries may feel they have little choice but to give the idea a try, but as the conditions that might allow it to succeed are generally absent in the poorest of economies, the revival seems doomed to fail.

Between 1990 and 2008, global trade as a share of GDP rose from 39% to 61%. This “hyperglobalisation”, as Martin Kessler and Arvind Subramanian of the Peterson Institute for International Economics dubbed it, facilitated rapid, broad-based economic expansion. After the late 1990s growth in incomes per head in nearly three-quarters of developing countries outpaced that in America, by an average of more than three percentage points a year. Global supply chains proliferated. Countries with a small industrial base, or none at all, could export manufactured goods by finding niches in production chains, following a shortcut to industrialisation.

The era of openness, however, is drawing to a close. The share of trade in world GDP fell after the global financial crisis; last year it was still below its

2008 peak. The level of world trade is forecast to fall by more than 9% this year. In America and Europe shortages of medical supplies and a souring relationship with China have rekindled interest in protecting domestic producers. But it is the biggest winners of hyperglobalisation, such as China and India, that are leading the way back to ISI. The share of foreign value-added in China's exports fell by almost ten percentage points from 2005 to 2016; its government's "Made in China 2025" campaign aims to make it self-sufficient in the production of many key goods. In India, Narendra Modi, the prime minister, unveiled a campaign for self-reliance as part of his pandemic-recovery package in May.

As poor-country politicians often point out when pressed by rich-world leaders to liberalise, many of today's advanced economies practised elements of an ISI strategy as they industrialised. Alexander Hamilton, America's first treasury secretary, used tariffs to protect domestic manufactures and reduce its dependence on Britain. In the 19th century European rivals worried that abundant British manufactures would stunt industrial development and leave them at a permanent military disadvantage. Governments erected tariff barriers and mobilised domestic capital, often squeezed out of the agricultural sector, towards state-supported industry. Russia and Japan followed western Europe in promoting domestic industry as a matter of national security.

Still, past experience also shows why the renewed interest in ISI may be misguided. Its intellectual heyday was in the 1950s, when economists like Raúl Prebisch and Gunnar Myrdal (the latter a Nobel prizewinner) argued against a laissez-faire approach to trade in developing economies. Their views were informed by the constraints of their era. Poor countries were desperately short of hard currency with which to obtain imports after the second world war. The replacement of some imports with domestic production was seen as a way to ration foreign exchange. More generally, advocates for ISI rejected the idea that specialisation and trade would leave

every economy better off. Poor countries that stuck to their comparative advantage would remain exporters of primary products for ever, it was thought, never making the leap to industrialisation and the higher incomes it would bring.

The flaws of ISI rather quickly became apparent, though. Many governments used it to bestow favours upon domestic industries based on political self-interest rather than rational economic calculation. The enthusiasts among economists lost interest. Tariff barriers left some countries nearly closed off to trade. Meanwhile, import-substituting economies in Latin America and South Asia fell behind a handful of others that opted instead to promote exports made with abundant cheap labour. Export-orientation was not a sure route to development; success stories like South Korea and Taiwan were rare before the emerging-market acceleration of the 1990s. Nor was it a laissez-faire endeavour; the governments of the Asian Tigers meddled extensively in their economies, subsidising favoured industries and firms. But global competition placed relentless pressure on exporters, forcing them to become more efficient and encouraging the acquisition of technical know-how. Those in ISI economies, sheltered behind high tariffs, tended instead to be small, inefficient and complacent.

| *A matter of great imports*

What does all this mean for the revival in ISI today? In economies with large domestic markets and capable states, import substitution may well allow governments to achieve strategic goals without nudging firms into growth-sapping complacency. China probably fits the bill. In India, with its poorer and less integrated domestic market, the strategy is riskier.

In smaller economies with weak institutions, however, ISI-related policies are doomed to fail. The consumers, competition and technologies that developing economies can only find on global markets are a crucial

prerequisite for their industrialisation. If the world's biggest economies focus on their own strategic interests alone, they will deprive others of access to these precious resources—and the golden age of emerging-market growth will become an ever more faded memory. ■



自由交流

向内转

进口替代这一老发展战略为何获得了新生

过去25年里，发展中国家的增长实在是轻松，让人很难记起曾有过另外的情形。在全球化的推动下，按购买力平价计算，1995到2019年间新兴经济体的人均实际GDP增长逾一倍。相比之下，发达国家同期的增长率仅为44%。猛烈的增长使得几十年来关于穷国能否及如何赶上富国的争论变得毫无意义。但爆炸式的贸易增长已经结束，工业化国家正在向内转。因此，一些政府正把一些旧法子重新捡起来。其中之一是“进口替代工业化”，这种策略通过保护本国生产商免受外国竞争来发展自己的工业生产能力。许多国家可能觉得自己别无选择而只能一试，但由于最贫穷的经济体普遍缺乏可能让它成功的条件，这一旧策略的复兴似乎注定要失败。

在1990至2008年间，全球贸易占GDP的比重从39%上升至61%。彼得森国际经济研究所的马丁·凯斯勒（Martin Kessler）和阿尔温德·苏布拉曼尼安（Arvind Subramanian）称之为“超全球化”（hyperglobalisation），它促进了快速且广泛的经济扩张。90年代末以后，近四分之三的发展中国家的人均收入增速超过了美国，年均超出三个百分点不止。全球供应链激增。工业基础薄弱或根本没有工业基础的国家可以在生产链中寻找生态位而出口制成品，以此走上工业化的捷径。

然而，开放的时代行将结束。全球金融危机后，贸易占全球GDP的份额下降，到去年仍低于2008年的峰值。今年世界贸易水平预计将下降超过9%。在美国和欧洲，医疗用品短缺以及与中国关系恶化令政府重燃保护本国生产商的兴趣。但是，最先重拾进口替代战略的是那些“超全球化”的最大赢家，如中国和印度。2005至2016年，国外附加值在中国出口中所占份额下降了近十个百分点。中国政府制订了“中国制造2025”计划，力求在许多关键商品的生产上实现自给自足。5月，印度总理莫迪推出了一项“自力更生”运动，作为其疫情恢复一揽子计划的一部分。

富国领导人要求穷国的政客开放其经济，但正如后者常常指出的那样，今天的许多先进经济体在自己工业化的过程中也实践了进口替代战略的要素。美国第一任财政部长亚历山大·汉密尔顿（Alexander Hamilton）利用关税保护本国工业品，减少对英国的依赖。19世纪，欧洲的竞争对手担心大量的英国工业品会阻碍本国工业发展，令自己在军事上永远处于劣势。政府遂设立关税壁垒，并调动国内资本（通常是从农业部门挤出来的）使之流向政府扶植的工业部门。俄罗斯和日本曾效仿西欧，把促进本国工业发展当作攸关国家安全的事情来做。

不过，历史经验同样也告诉我们为什么对进口替代战略重燃兴趣可能是错的。这项政策在学术界的高光期是上世纪50年代，当时劳尔·普雷维什（Raúl Prebisch）和诺贝尔奖获得者纳纳·缪达尔（Gunnar Myrdal）等经济学家反对发展中经济体对贸易采取自由放任的态度。他们的观点受到自身所处时代的局限。二战后，穷国极度缺乏硬通货来获取进口商品，用国内生产替代部分进口被认为是一种节省外汇的办法。更普遍地看，进口替代战略的支持者反对专门化和贸易会让每个经济体都变得更富裕的观点。他们认为，固守自身相对优势的贫穷国家永远都会是初级产品出口国，永远不会实现向工业化的飞跃和随之而来的收入增长。

然而，进口替代战略的缺陷很快就显现出来。许多政府用它来扶持本国产业，但却是出于政治私利，而非理性的经济考量。经济学家中积极支持该政策的人变得意兴阑珊。关税壁垒使得一些国家几乎与贸易隔绝。与此同时，拉美和南亚实施进口替代政策的经济体落在了其他少数几个经济体后面，后者选择借助大量廉价劳动力来促进出口。出口导向并不是发展的可靠途径。90年代新兴市场加速发展之前，像韩国和台湾这样的成功案例少之又少。而且出口导向也不是在践行自由放任：亚洲四小龙的政府都对本国经济做出了广泛的干预，补贴自己看重的产业和企业。但全球竞争给出口商带来了无情的压力，迫使它们提高效率，激励它们获得技术诀窍。而在实行进口替代政策的经济体中，那些躲在高关税背后的出口商往往规模小、效率低、故步自封。

| 事关重大

这一切对于进口替代战略在今天卷土重来意味着什么？对国内市场广阔、政府有能力的经济体而言，其政府很可能会借助进口替代实现战略目标，同时又不让企业陷入会削弱增长的自满情绪之中。中国很可能满足这些条件。而在国内市场更贫穷、一体化程度更低的印度，这种策略的风险更大。

然而，在规模更小、制度薄弱的经济体中，与进口替代相关的政策注定行不通。发展中经济体实现工业化的先决条件是消费者、竞争和技术，而这些只能在全球市场上找到。如果世界上最大的经济体只关注自己的战略利益，它们将剥夺其他经济体获得这些宝贵资源的机会——而新兴市场增长的黄金时代也将成为一段越来越模糊的记忆。■



Economic policy

Circling back

China's new "dual-circulation" strategy means relying less on foreigners

AT THE HEADQUARTERS of Deli, one of China's biggest makers of glassware, display shelves hold hundreds of drinking glasses of all shapes, sizes and colours. Some are stubby. Others are impossibly thin wine goblets, marketed as having a "feminine body curve". But it is another curve—the steep upward one that Deli's mastery of the business has traced—that ought to command more attention. Founded in 1996, the company initially churned out cheap, easily chipped glasses. Little by little it has raised its game, nearly tripling its exports over the past decade. It once had no choice but to import equipment for crafting its finest glassware. Now it can use China-made machinery. "Apart from branding, there's not much that separates us from the world's best," says Cheng Yingling, a senior executive.

Deli's evolution—which has involved getting better and more Chinese at the same time—is what the government wants for the broader economy. These are not exactly novel ideas. For years officials have declared that China must grow more innovative and more resilient. To a certain extent it has achieved this naturally, as a result of its fast-paced economic development. But these goals have taken on far greater urgency as tensions with America have mounted. American restrictions on exports of critical components, notably semiconductors, have shone a harsh light on the gaps in China's industrial abilities. Drinking glasses may be much simpler to make—requiring not much more than sand and sodium carbonate plus some relatively basic machinery—but China is not about to stop there. Xi Jinping, China's leader, has described the creation of fully domestic supply chains as a matter of national security.

The question is how to build them. Chinese officials know that they cannot turn their backs on the world. Exports are still an important source of revenue for many firms such as Deli. And China must attract technology and investment from abroad. Pushing too transparently for “indigenous innovation”, a term once bandied about by the government, only makes foreigners wary. Striking the right balance is tough.

Enter the newest of China’s big economic policies: the “dual-circulation” strategy. At its most basic it refers to keeping China open to the world (the “great international circulation”), while reinforcing its own market (the “great domestic circulation”). If that sounds rather vague, it is: the government has not spelled out the details. Nevertheless, it has fast emerged as the most talked-about economic policy in China, with analysts and businesspeople jostling to put their spin on it. The strategy lies at the heart of the five-year plan for 2021-25, an outline of which was released by the Communist Party on November 3rd. Its implementation—especially how China resolves the tension between the two kinds of circulation—will be critical to the way that China’s economy develops.

The term “international circulation” was coined in 1988 by Wang Jian, a government researcher who argued that China should pursue an export-led growth strategy, plugging its vast pool of cheap labour into global production networks. Well into the early 2000s, this was a guiding principle for China’s economic planners. Yet circumstances have changed. Exports have shrunk as a share of GDP—from 36% in 2006 to 18% last year. The government has repeatedly vowed to make consumption within China a bigger engine of growth. So scholars have been turning their attention more to the domestic kind of circulation.

In May it became evident that this academic debate had reached official ears. At a meeting of the Politburo, Mr Xi described dual circulation as the framework for economic policy. Initially, jaded veterans of Chinese official

rhetoric were tempted to dismiss this as just another way of phrasing the long-stated goal of rebalancing towards domestic demand. But it has become clear that something bigger is afoot. More recent comments by Mr Xi on the economy have been less about promoting consumption and more about bolstering China's defences. China needs "self-developed, controllable" supply chains, with at least one alternative source for vital products, he said in a speech published on October 31st. Even more striking was his inversion of the idea of international circulation. Instead of talking about it in terms of the economic benefits China reaps from globalisation, he emphasised only the strategic purpose of opening China's doors to foreign firms, ie that making them more dependent on the Chinese market would deter foreign powers from putting pressure on the country.

That combination—the pursuit both of economic self-reliance and of greater economic leverage over foreign countries—now describes much of what China is doing. Mr Xi refers to changes "unseen in a hundred years" sweeping the global order—a way of saying that, while China is rising, America is declining and trying to stop the new power. "Where linkages with the global economy create vulnerabilities, China wants to minimise them," says Andrew Polk of Trivium China, a research firm. "Where the linkages create benefits, China wants to expand them."

Chinese officials tailor their remarks on dual circulation to please foreign ears. In a video address on November 4th at the opening of the China International Import Expo, an annual jamboree in Shanghai, Mr Xi said the concept would involve opening China more widely to the rest of the world. "This is not just what China needs for its development, but something that will enrich the people of all countries," he said. But businesses in China see the concept more as an indication that the government will step up support for favoured industries at home, says Zhu Ning of the Shanghai Advanced Institute of Finance. They are hungry for news of handouts.

In its outline of the new five-year plan (a fleshed-out final version will be adopted next year at the annual session of China's parliament, probably in March), the party did not specify industries to be coddled. Instead it referred more generally to a need to develop critical technologies at home. But other policies already in train suggest that China will prop up any high-tech sector threatened by global vicissitudes. In August it announced tax breaks and loan support for semiconductor and software firms. China currently produces about 30% of the chips it consumes (see chart 1). Its goal is to reach 70% by 2025. Another focus is on green technology and renewable energy. That is not just for the sake of the environment (China recently pledged to halt the rise of its carbon emissions by 2030). Investment in such businesses will also limit China's thirst for imported oil.

In the past, when publishing outlines of five-year plans prior to their adoption by parliament, the party has often announced a goal for average annual GDP growth during the plan period (see chart 2). There was no such figure this time. In separate comments, Mr Xi said it was entirely possible that China could double the size of its economy by 2035. That would require average annual growth of 4.7% over the next 15 years. Such a rate would be readily attainable for the first half of that period, but may become much harder thereafter.

China has good reason to abandon such targets. They lead to an overemphasis on investment in infrastructure and other short-term measures to boost growth, rather than on social policies such as those relating to health care or education which can promote growth but may take longer to show results. But de-emphasising targets may relate to the new dual-circulation strategy in a way that the government has left unspoken. Making the economy less reliant on global supply chains could crimp its ability to grow.

Arguably China has been the world's main beneficiary of globalisation, which has enabled it to dominate ever-bigger segments of manufacturing. Turning inward could be costly. It may result in less foreign technology flowing into China, less of the competition that has spurred on Chinese firms, and more wasteful investment as the government throws money at favoured industries. Shaun Roache, an economist with S&P, a credit-rating agency, forecasts that China's average annual growth will be 4.6% in the 2020s. But he reckons it could be about 3% if the drive for self-reliance is overdone. The country's "tolerance for slower growth may well be tested in the years ahead", he says. The party, ever fearful that a stagnating economy could trigger social unrest, may find it hard going.

Optimism is a stubborn trait, so some inveterate China-bulls think that emphasising domestic circulation may create a new wave of reforms aimed at making the country's markets function more efficiently. Take the semiconductor industry. *Caixin*, a Chinese financial magazine, reported last month that Huawei, a tech giant, was rushing to create a "not-made-in-America" supply chain by 2022. Initially, however, that would enable it to make chips with transistors spaced 28 nanometres (billionths of a metre) apart, far less dense than the most advanced ones. The bullish case is that China, realising how long it will take to catch up in such areas, will try to boost productivity by cracking on with hitherto slow-moving reforms. Analysts with Huatai Securities, a brokerage, think that could include doing more to loosen the household-registration system known as *hukou*, which impedes the movement of rural labour to the country's biggest and most productive cities.

In the meantime, companies are getting on with their work. Mr Cheng at Deli, the glassware firm, says he will not give up on foreign markets despite the pandemic's impact on demand. But he will mainly focus on brighter prospects at home. His team is refining their product range for younger consumers, who are pickier about style and more demanding about quality

than their parents. That mix of emphasis, your correspondent ventures, sounds a lot like a corporate version of the dual-circulation strategy. “We’re not too clear about what all that means,” he says with a sigh. “We’re just following the market.” ■



经济政策

绕回去

中国“双循环”的新战略意味着减少对外依赖

在中国最大的玻璃器皿制造商之一德力股份的总部，陈列架上摆放着成百上千个形状、尺寸和颜色各异的玻璃杯。有些杯身矮墩墩的，有些是纤薄得不可思议的红酒杯，具有“优美的女性曲线”是其中一个卖点。但是，应该引起更多关注的是另一条曲线：德力的业务实力走出的陡峭的上升曲线。这家成立于1996年的公司一开始大批量生产廉价、易碎裂的玻璃器皿。渐渐地它提升了实力，过去十年出口增长了近两倍。以前它只能靠进口设备来生产最精致的那部分产品，现在可以用国产机器了。“除了品牌知名度，我们和世界顶级公司已经差不多了。”高管程英岭说。

德力的演变——在提升自我的同时也变得更本土化——也是政府对更广泛的经济期望。这算不上什么新想法。多年来，官员们一直都在宣讲中国必须变得更具创新力也更有韧性。经济的快速发展使它在一定程度上自然而然地实现了这一目标。但是，与美国愈发紧张的关系大大增加了这些目标的紧迫性。美国对关键零部件特别是半导体出口的限制无情地凸显了中国在工业能力上的不足。生产玻璃杯可能要简单得多，只需要沙子、碳酸钠和一些相对基本的设备，但中国不会止步于此。中国国家领导人习近平曾表示打造完整的国内供应链事关国家安全。

问题是如何打造这样的供应链。中国官员知道他们不能放弃世界。出口仍然是德力等众多企业的重要收入来源。而且中国必须从国外吸引技术和投资。太过明晰地推动曾被政府大肆宣扬的“本土创新”只会让外国人警惕。要取得适当的平衡很难。

中国重大经济政策中最新的一项应运而生：“双循环”战略。从最基本的层面说，它指的是继续保持对外开放（“国际大循环”），同时加强国内市场（“国内大循环”）。如果这听起来很含混，那么确实如此，因为政府尚未阐明细节。尽管如此，它已迅速成为中国最受热议的经济政策，分析师和

企业界人士争相发表自己的见解。该战略是2021至2025年十四五规划的核心，共产党在11月3日发布了这一规划的纲要。它的实施——特别是中国如何解决两个循环之间的矛盾——对中国经济的发展道路至关重要。

“国际大循环”一词由政府研究员王建于1988年提出，他认为中国应奉行以出口为导向的增长战略，将其大量廉价劳动力接入全球生产网络。直到21世纪的头几年，这一直是中国经济规划者的指导原则。但情况已经发生改变。出口占GDP的比重从2006年的36%下降到去年的18%。政府已经反复誓言要让国内消费成为更大的增长引擎。因此，学者们将注意力更多地转向了国内循环。

这场学术辩论官方听在了耳朵里——这一点在5月显现出来。在一次政治局会议上，习近平阐述了将双循环作为经济政策的框架。最初，听腻了中国官方言辞的人不禁以为这不过是又换了一种说法，实际上说的还是长期宣传的扩大内需促进再平衡的目标。但后来一件事变得清楚了：某种更大的转变即将发生。在更近期的关于经济的讲话中，习近平说的更多的不是促进消费，而是加强中国的防御能力。他在10月31日发表的讲话中说，中国需要打造“自主可控”的供应链，重要产品至少要有一个替代来源。更引人注目的是他反转了关于国际循环的思路。他没有谈中国从全球化中获得的经济利益，而只强调向外国企业敞开中国大门的战略目的，也就是让它们更加依赖中国市场，从而遏阻其他大国向中国施压。

既追求经济上的自力更生，又要争取对其他国家有更大的经济影响力——这两者的结合基本描述了中国现在的做法。习近平提到全球秩序正处于“百年未有”的大变局，实际说的就是中国在崛起，而美国在衰落并且试图遏制这个新的大国崛起。“与全球经济的连接造成脆弱的地方，中国想要尽可能地减少，”研究公司策纬咨询（Trivium China）的安德鲁·波克（Andrew Polk）表示，“能带来好处的地方，中国希望尽可能扩大。”

中国官员对双循环的言论斟字酌句，好让其他国家觉得更中听。11月4日年度盛会进博会在上海开幕，习近平在视频讲话中说，双循环的理念是要让中国更加开放。“这不仅是中国自身发展需要，而且将更好造福各国人

民。”他说。但上海高级金融学院的朱宁说，中国的企业更多地把这一理念看作是政府将加大对国内重点行业支持力度的信号。它们渴望听到政府要扶持它们的新消息。

在新的五年规划纲要中（将在可能于明年3月举行的全国人大会议上通过更详细的终稿），共产党并未明确要重点支持的行业，而是更笼统地指出需要在国内发展关键技术。但从已经开始实施的其他政策可以看出，中国将扶持任何因全球性局势变化而受到威胁的高科技产业。8月，中国宣布对半导体和软件企业减免税费，加大贷款支持力度。目前中国自产的芯片约占其消费总量的30%（见图表1），其目标是到2025年提高到70%。另一个重点领域是绿色技术和可再生能源。这不仅是为了环境（中国在近年承诺到2030年前停止增加碳排放），投资这类企业也将降低中国对进口石油的需求。

过去，在发布尚未由人大通过的五年规划纲要时，共产党经常会宣布五年内的GDP年均增长目标（见图表2）。这次的纲要没有这样的数字。习近平在其他讲话中表示，到2035年，中国经济规模完全有可能翻一番。这就要求在未来15年实现年均增长4.7%。这在前七八年可能容易实现，但再往后可能会困难得多。

中国有很好的理由放弃这样的数字目标。它们会造成过分强调基础设施投资和其他促进增长的短期措施，而不是与医疗或教育相关的社会政策，后者也能促进增长，但可能需要更长的时间才能见效。但是，不再强调增长目标可能与新的双循环战略有关，而此间关系政府并未明言。降低经济对全球供应链的依赖可能会削弱其增长能力。

中国可以说是全球化的主要受益者，全球化让中国在越来越多的制造业领域占据了主导地位。向内转可能会代价高昂。它可能会导致流入中国的外国技术减少、鞭策中国企业的竞争减少，并且由于政府将资金投向重点扶持行业，投资浪费的情形会增多。信用评级机构标普的经济学家肖恩·罗奇（Shaun Roache）预测，今后十年中国的年均增长率将为4.6%。但他认为，如果过分追求自力更生，增长率可能会在3%左右。中国“对增长

放缓的容忍度很可能会在未来几年受到考验”，他说。一直担心经济停滞可能引发社会动荡的共产党可能会发现这不好应对。

乐观主义是一种顽固的心理特质，因此一些坚持看好中国的人认为，强调内循环也许会引发新一轮旨在提高中国市场运转效率的改革。以半导体行业为例。中国的金融杂志《财新》上个月报道称，科技巨头华为正加紧赶在2022年之前建立起一条“不含美国技术”的供应链。但是，一开始这样的供应链只能让它制造出28纳米（一纳米等于十亿分之一米）制程的芯片，远不如目前世界上最先进的芯片那么精密。乐观主义者的预期是中国意识到要在这些领域迎头赶上需要很长的时间，因此将加速推进迄今为止进展缓慢的改革，以提高生产率。券商华泰证券的分析师认为，这可能包括进一步放松户籍制度，这项制度阻碍了农村劳动力向中国最大的、生产率最高的城市转移。

与此同时，企业继续做着自己的事。德力的程英岭表示，尽管疫情影响了需求，但他不会放弃国外市场。不过他的主要精力会放在前景更光明的国内市场上。他的团队正在为年轻消费者调整产品系列，他们对款式和质量的要求比父母一辈更高。本专栏作者冒昧评论道，如此“内外兼重”听起来很像企业版的双循环战略。“我们也不太清楚那都是什么意思，”他叹了口气说，“我们只是在跟着市场走。”■



Space exploration

Mandate of heaven

China plans to bring back the first Moon rocks for 40 years

IN JANUARY 2019, when a Chinese spacecraft called *Chang'e 4* visited the Moon, the mission broke new ground, figuratively speaking, by landing on the far side of that orb, which is perpetually invisible from Earth and thus also out of direct radio contact. This meant communications had to be relayed by a satellite which had been cunningly located for the purpose at a place where the interaction of the gravitational fields of Earth and Moon meant it could orbit a point in empty space.

China's current lunar mission, by contrast, will break ground literally. *Chang'e 5*, successfully launched earlier this morning, is intended to drill two metres down into the Moon's surface, retrieve about 2kg of rock, and then return this to Earth. If successful, it will be the first lunar sample-return mission since 1976, when a Soviet probe called *Luna 24* sent back a mere 170g of the stuff. And it will be another step forward in China's space programme.

The *Chang'e* missions, named after a Chinese Moon goddess, have had their ups and downs. *Chang'e 5* was originally scheduled for blast off in 2017, but the failure in July of that year of an otherwise-unrelated project that was, like *Chang'e 5*, using a Long March 5 as its launch vehicle, caused a delay. (*Chang'e 4* used a different sort of launcher, a Long March 3B.) The "go" was finally given however. State media reported on November 17th that the rocket with *Chang'e 5* on board has been moved to its launch pad at Wenchang space centre, on Hainan island.

Assuming the launch goes to plan, success will then depend on a complex ballet involving the craft's four components. These are a service module, a

return-to-Earth module, a lunar lander and an ascender—a configuration originally used by America’s Apollo project. Once the mission is in lunar orbit, the lander and the ascender will separate from the orbiting mother ship of service and return modules as a single unit and go down to the surface. The landing site is in the northern part of a vast expanse of basalt called Oceanus Procellarum, a previously unvisited area. Researchers hope rocks collected here will confirm that volcanic activity on the Moon continued until far more recently than the 3.5bn years ago that is the estimate derived from studies of currently available samples.

Once the new material has been gathered, which will take several days, the ascender will lift off, dock with the mother ship and transfer its haul to the return module. The service module will then carry the return module back to Earth, releasing it just before arrival to make a landing at a recovery site in Inner Mongolia, also used for China’s crewed missions, in December.

Digging into the lunar surface may, however, pose problems. *InSight*, an American rover now on the surface of Mars, has struggled to operate a drill nicknamed “the mole” that is designed to reach three metres below ground level. According to NASA, America’s space agency, this is because the mole has encountered clumpier regolith than its designers were expecting, causing it to bounce rather than burrow.

If *Chang’e 5* does manage to overcome such hazards and return samples to Earth, China has said little so far about which foreign countries, if any, will be granted access to them. But America is likely to be last in the queue. For the past couple of decades American governments of all stripes have been reluctant to co-operate with China in space-related matters, largely because of fears about giving away secrets useful for designing ballistic missiles. In space, as in so much else, the two powers are not-so-friendly rivals. China’s stated goal is to establish a crewed base near the Moon’s south pole, where water is available in the form of ice perpetually shielded from sunlight by

crater walls. America has similar plans. Watch, as it were, this space. ■



太空探索

天命

中国计划取回40年来的第一块月球岩石样本

二〇一九年一月，中国的“嫦娥四号”探测器造访月球。这一旅程可谓“开天辟地”，因为它是在月球的背面登陆，这一面在地球上永远看不见的，也因此无法直接和地球进行无线电通信。这意味着必须利用中继卫星。这颗卫星被巧妙地置于环绕地月引力平衡点的运行轨道上。

相比之下，中国眼下的登月任务是真的要“辟地”了。“嫦娥五号”于今晨成功发射，计划在月球表面向下钻探两米深，取出约两公斤岩石样本带回地球。如果成功，这将是自1976年以来的首次登月采样返回任务，那一年苏联的“月球24号”（Luna 24）探测器仅带回了170克月岩样本。而这也将是 中国太空计划向前迈出的又一步。

以中国月亮女神的名字命名的嫦娥系列航天计划历经起落。“嫦娥五号”原定于2017年发射，但当年7月一个项目的发射失败造成了延误。那个项目原本与“嫦娥五号”无关，但和“嫦娥五号”一样使用“长征五号”运载火箭发射。（“嫦娥四号”用的是长征三号乙运载火箭。）不过，“嫦娥五号”最终获准“奔月”。中国官方媒体11月17日报道称，载有“嫦娥五号”的火箭运抵海南文昌航天中心的发射台。

假设发射一切顺利，接下来的成功将有赖“嫦娥五号”的四个组件跳好一场复杂的“芭蕾舞”。这些组件是服务舱、返回器、着陆器、上升器——美国阿波罗计划最早使用了这种结构。进入月球轨道后，着陆器和上升器将与由服务舱和返回器构成的在轨母舰分离，然后作为一个组合体着陆月球表面。着陆点位于一片名为风暴洋（Oceanus Procellarum）的广阔玄武岩平原的北部，是一片从未被踏足的区域。研究人员希望，从这里采集的岩石将会证实，月球上的火山活动远不止于持续到根据现有样本所估计的35亿年前。

采集新样本要花几天时间，完成后上升器将升空，与母舰对接，把样本移至返回器内。然后服务舱将带着返回器飞回地球，在到达前释放返回器，让它于12月降落在内蒙古的一个着陆场，那里也用于中国的载人太空任务。

不过，钻探月球表面可能会出现问題。眼下停留在火星表面的美国探测器“洞察号”（InSight）搭载的钻头“鼯鼠”本来设计能下探火星地面以下三米，但实际操作时屡屡失败。据美国国家航空航天局（NASA）的说法，这是因为“鼯鼠”遇到的土层比设计者预期的更容易结块，使它被弹回，无法向下探挖。

假如“嫦娥五号”能克服这类风险，成功采样返回地球，而外国又能获准参与研究这些样本的话，会有哪些国家？到目前为止中国对此还没有太多表态。但美国很可能会排在最后。过去二三十年里，历届美国政府都不愿在太空项目上与中国合作，主要是担心泄露与弹道导弹设计相关的机密。就像在其他许多方面一样，这两个大国在太空里也不是那么友好的竞争对手。中国已经明确宣称的目标是在月球南极附近建立一个有人值守的基地，那里某些区域的阳光被环形山永久遮蔽，因此有水冰存在。美国也有类似的计划。那么，静观太空里的风云变幻吧。■



Chinese private enterprise

The intimidation game

The humbling of Jack Ma wasn't a one-off. Xi Jinping is determined to assert more Communist Party authority over China's glittering tech industry

AT A SUMMIT with China's richest entrepreneurs in late 2018 Xi Jinping sought to allay concerns that the state had declared war on the country's private sector. Although officials in Beijing had spent the previous year bringing to heel unruly tycoons, China's president insisted that rumours of a forceful push for party influence in the private sector were untrue. He exhorted the business leaders to "take a pill of reassurance".

The medicine has been hard to swallow. Since then the Communist Party has sought a more active hand in recruitment and business decisions. And after subduing a band of headstrong bosses at overextended financial conglomerates, the state is now taking aim at China's tech billionaires, making it clear that outspoken critics will not be tolerated.

Mr Xi's preoccupation has always been maintaining China's social and financial stability. Keeping big business in check is part of that plan. It should come as no surprise that the state is now homing in on tech, which has expanded rapidly (see chart). Six of China's 20 most valuable listed companies are tech firms and with billions of users they touch the lives and wallets of almost all citizens.

A reckoning for the sector began with what looked like a shot across the bows of China's largest financial-technology group. The suspension by regulators on November 5th of Ant Financial's \$37bn initial public offering with less than 48 hours' notice was at first interpreted merely as a warning to its founder, Jack Ma, who had previously criticised China's state-owned banks. But on November 10th the publication of an extensive draft of new

rules for technology groups laid bare the state's ambitions to bring to heel not just Ant, but the whole of China's tech industry.

Mr Xi's relationship with China's tycoons has always been troubled. When he became president in 2013, he inherited a corporate system replete with fraud, patchy regulation and surging debt. After the success of an anti-corruption campaign that mostly targeted officials, Mr Xi took aim at a group of businessmen who were ploughing huge sums into risky overseas investments. Purchases included SeaWorld, an American amusement-park group, and the Waldorf Astoria, a swish hotel in New York. Officials argued that many of these acquisitions were thinly disguised means to divert capital out of China.

Many of the businessmen who once fancied themselves as a Chinese Warren Buffett are in prison or worse. Wu Xiaohui, the chairman of Anbang, which bought the Waldorf among other assets, was handed an 18-year prison sentence in 2018 for financial crimes. Ye Jianming, who attempted to buy a \$9bn stake in Rosneft, a Russian oil producer, was detained in early 2018. His whereabouts is still unknown. Xiao Jianhua, a broker for China's political elite who once controlled Baoshang Bank, was kidnapped by Chinese agents from his flat at the Four Seasons Hotel in Hong Kong in 2017 and is thought to be co-operating with authorities in the unwinding of his financial conglomerate.

The crackdown has put an abrupt end to a boom in global spending by Chinese firms: in 2016 there were \$200bn-worth of overseas mergers and acquisitions, the figure in 2019 was less than a fifth of that. And under government pressure private groups have divested assets worth billions of dollars. HNA, an airlines and logistics group that bought a large stake in Deutsche Bank and Hilton Worldwide, a hotel group, has sold assets worth over \$20bn in recent years. Anbang Insurance was nationalised, putting the Waldorf under the ownership of China's Ministry of Finance. Baoshang was

taken over by the state and allowed to file for bankruptcy in August. Acquisitions of European football clubs by Chinese groups have all but ended.

Analysts have praised the way in which systemic risks posed by companies such as Anbang and HNA appear to have been reduced on Mr Xi's watch. Within China few dare to criticise him for his failings. Those who have done so have been dealt with severely. Ren Zhiqiang, a senior member of the Communist Party who once ran a state-owned property firm, penned a missive to friends earlier this year in which he referred to Mr Xi as a "naked clown". He was sentenced to 18 years in prison in September for bribery and embezzlement.

The party has also been increasing its influence over private firms in more subtle ways. Under a strategy referred to as "party building", firms have been asked to launch party committees, which can opine on whether a corporate decision is in line with government policy. The number of committees in publicly traded but privately controlled companies is still low. According to a survey of 1,378 Chinese listed firms by Plenum, a consultancy, of the 61% that were privately controlled only 11.5% had party-building clauses in their charters compared with 90% of state-owned firms.

| *Party invitation*

Yet the prevalence of such committees looks likely to grow. In September Mr Xi asked for the private sector to "unite around the party". A day later Ye Qing, vice-chairman of the All-China Federation of Industry and Commerce, a powerful organisation controlled by the Communist Party, issued a more detailed list of demands. He called for private groups to establish human-resources departments led by the party and monitoring units that would allow the party to audit company managers.

This might not affect all firms equally. "For big companies, there's no

negotiation. The party approaches you and you say yes,” says Joe Zhang, a business consultant who has sat on the boards of Chinese private and state corporations. However, he also argues that for most smaller firms, less visible and not as economically important, party cells are little more than a rubber stamp as profits will trump state influence on decision-making. Their influence may not necessarily be unwelcome either. One executive, whose company has a party committee, argues that by growing closer to the thinking of the party leadership, “we can steer the company accordingly”. This heads off potential clashes with the state.

So far there is little evidence to suggest that party committees have hurt profitability, says Huang Tianlei of the Peterson Institute for International Economics, a think-tank. But increased party influence could inhibit some operations. “Innovation may be suppressed. More red tape can emerge. A firm can turn from profit-driven to goal-driven, sacrificing profitability,” says Mr Huang.

It is possible that party committees may soon play a larger role in tech firms. A raft of new regulations presents a more immediate threat. Ant is connected to hundreds of millions of people through its payments and lending platforms. Like other Chinese tech giants it holds precious data on customers as well as controlling a pipeline through which hundreds of billions of dollars are lent and spent. That such power lies in private hands is a source of tension between the party and entrepreneurs.

“These resources need to be tightly controlled and the political loyalty of the firms and entrepreneurs, not only to the regime but also to individual political leaders, needs to be strictly maintained,” says Sun Xin, an academic at King’s College London. “The case of Ant is just one manifestation of this underlying logic.”

The halting of Ant’s IPO was triggered by new draft regulations aimed at

online micro lending. For Ant, the rules can only be interpreted as an attack on the firm's lending platform, its biggest source of revenue. Mr Ma may regret comparing China's banks to pawnshops in a speech in October. The comments infuriated senior officials and played a part in the hasty suspension of Ant's IPO. But Mr Ma is not to blame for the latest onslaught of antitrust rules, although he may have sped up their arrival.

| *vie-ing for influence*

The new rules, under consideration for some while, will for the first time explicitly apply monopoly controls on internet and e-commerce firms. For many years China's antitrust laws have not exempted the groups but they have also not been targeted in monopoly cases. This has allowed a few companies to control large swathes of the digital economy. They also take aim at the structures that have allowed Chinese tech firms to raise capital overseas. Barred from allowing foreign investors to take direct stakes, for two decades virtually all capital-hungry tech groups have skirted the rules by using a "variable-interest entity" (VIE) to link foreign cash to the Chinese market. The structure creates an offshore holding company into which foreigners invest. That company has a contractual agreement with an onshore firm to receive the economic benefits of the underlying assets.

The VIE structure has long been tolerated by Chinese authorities, but without full legal recognition. Foreigners have virtually no recourse in China to claim rights to the assets they have invested in. Foreign funds have long been wary of the framework but most Chinese tech companies still use it to structure their overseas listings. The new antitrust rules could require companies to seek approval for such arrangements, calling into question whether VIEs will be permitted in the future and so the way that foreign capital will reach Chinese tech firms. The threat of withdrawing tacit approval for a VIE is another way the state can intimidate firms and their owners.

Perhaps the new rules will humble the outspoken Mr Ma. He has not spoken publicly on the matter, but Ant has bent the knee and agreed to embrace the new regulations. Mr Xi has made clear that no company is too big, and no IPO too valuable, to be allowed to challenge the state. ■



中国的民营企业

威吓游戏

打压马云不是孤立事件。习近平决心在中国耀眼的科技产业中加强共产党的权威

在2018年末与中国最富有的企业家的一次座谈会上，习近平试图缓解他们对政府向民营部门宣战的担忧。尽管北京的官员在之前的一年里制服了一些桀骜不驯的大亨，但习近平坚称，有关党要在民营经济中强力施加影响的传言是虚假的。他竭力劝说企业领导人“吃下定心丸”。

这定心丸却一直难以下咽。从那时起，共产党试图更积极地影响人员招聘和经营决策。而在驯服了过度扩张的金融企业集团里一批犟头老板之后，政府现在又瞄准了中国的科技亿万富翁，清楚表明自己不会容忍直言不讳的批评者。

维护中国的社会和金融稳定一直都是习近平的头等大事。制约大企业是这个维稳计划的一部分。如今政府会盯上扩张迅速的科技巨头（见图表）也就不足为奇了。中国市值最高的20家上市公司中有六家是科技公司，它们的用户以十亿计，几乎触及所有民众的生活和钱包。

政府对中国最大的金融科技集团发出了貌似警告的信息，对科技行业的清算由此开始。11月5日，距蚂蚁集团上市不到48小时，监管机构对这次370亿美元的IPO按下了暂停键。人们最初以为这只是为了警告一下之前批评了国有银行的蚂蚁集团创始人马云。但在11月10日，政府发布了针对科技集团的内容广泛的新规草案，将它强烈的控制意图显露无疑，对象不仅是蚂蚁，而是整个中国科技产业。

习近平与中国大亨们的关系一直不睦。2013年他成为国家主席时，接手的是一个充斥欺诈、监管不力、债务激增的企业体系。在主要针对官员的反腐运动取得成功之后，习近平瞄准了一批向海外高风险投资项目投入巨资的商人。他们收购的对象包括美国游乐园集团海洋世界（SeaWorld）和纽约的豪华酒店华尔道夫（Waldorf Astoria）。政府官员称，许多这类收购

一眼就能看出是为了把资本转移出中国。

许多曾经幻想自己是“中国巴菲特”的商人如今身在狱中甚至落入更糟的境地。收购了华尔道夫酒店等资产的安邦董事长吴小晖在2018年因金融犯罪被判处18年有期徒刑。试图以90亿美元入股俄罗斯国家石油公司（Rosneft）的叶简明在2018年初被拘留，至今下落不明。肖建华曾是中国政治精英的代理人，曾经掌控包商银行。2017年，他在香港四季酒店的公寓被中国特工绑架，据信他正在配合当局拆解他的金融集团。

这番严打骤然终结了中国企业在全球大举撒钱的局面：2016年海外并购交易达2000亿美元，2019年的数字还不到那一年的五分之一。在政府施压之下，民营集团已经剥离了数以十亿美元计的资产。近年来，航空物流集团海航出售了价值超过200亿美元的资产，它曾收购了德意志银行和希尔顿全球酒店集团的大量股权。安邦保险被国有化，这将华尔道夫酒店置于中国财政部的掌控之下。包商银行被政府接管，在今年8月获准申请破产。中国企业对欧洲足球俱乐部的收购已基本停止。

分析师们赞扬说，在习近平治下，安邦和海航等公司造成的系统性风险似乎已经得到了缓解。在中国国内，没有人敢说他的过错。批评他的人都受到了严厉处置。曾执掌一家国有房地产公司的老党员任志强今年早些时候给朋友写了一封长信，信中称习近平是“剥光了衣服的小丑”。他于9月因受贿和挪用公款被判入狱18年。

共产党也通过更加微妙的方式加强对民企的影响力。根据“党建”的策略，企业需要成立党委，党委可以就公司决策是否符合政府政策发表意见。设有党委的上市民营企业仍然较少。咨询公司Plenum对1378家中国上市公司的调查显示，在占比61%的民营上市公司中，只有11.5%的公司章程中有党建条款，在国有上市公司中是90%。

| 党的邀请

不过，党委的普及度看来会提高。9月，习近平发表讲话要求民企“团结在党的周围”。一天后，共产党控制的强大组织全国工商联的副主席叶青公

布了更详细的要求。他呼吁民企建立由党领导的人力资源部门，以及让党可以审查公司管理层的监察审计部门。

这对不同企业可能有不同的影响。“对大企业来说，没有商量的余地。党来找你，你就得答应。”在中国民企和国企都担任过董事的商业顾问张化桥说。不过他也认为，对于大多数知名度没那么高且对经济不那么重要的小企业而言，基层党组织不过就是一枚橡皮图章，因为企业在决策时会更多考虑盈利而非政府的影响。而且党组织的影响也未必不受欢迎。一家设有党委的公司的高管认为，通过更贴近党领导层的思想，“我们可以相应地调整公司方向”。这可以避免与政府产生冲突的可能。

到目前为止还没有证据表明党委损害了企业的盈利能力，智库彼得森国际经济研究所（Peterson Institute for International Economics）的黄天磊说。但党影响力的增加可能会抑制某些经营活动。“创新可能会受到抑制。可能会出现更多的官僚做派。企业有可能从利润导向转为目标导向，从而牺牲盈利能力。”他说。

党委可能很快就会在科技公司里扮演更重要的角色。而大量的新法规构成了更近在眼前的威胁。蚂蚁集团通过其支付和贷款平台连接到几亿人。和其他中国科技巨头一样，它拥有宝贵的客户数据，并控制着有数千亿美元在其中流动的贷款和消费渠道。这么大的影响力掌握在私人手中，是党和企业家之间关系紧张的一个根源。

“这些资源需要被紧密控制，还要严格确保企业及企业家的政治忠诚，不仅是对政权，还是对政治领导人个人，”伦敦国王学院（King's College London）的学者孙鑫说，“蚂蚁的事不过是这种隐含的根本逻辑的一次显现。”

叫停蚂蚁集团上市是由针对网络小额贷款的新规草案触发的。对蚂蚁而言，新规只可能解释为是对蚂蚁借贷平台的打击，这个平台是蚂蚁最大的收入来源。马云可能会后悔在10月的一次演讲中把中国的银行比作当铺。他的言论激怒了高层官员，是决定紧急叫停蚂蚁上市的原因之一。但是最

近反垄断规则的迅猛来袭并不是因为马云，尽管他可能加快了它们的出台。

| 争夺影响力

这些已经酝酿了一段时间的新规将首次明确地把互联网和电子商务公司列为反垄断目标。多年来，中国的反垄断法并没有豁免这些企业，但它们也从来没有成为反垄断案件的目标。这让少数公司得以控制了很大一部分数字经济。新规还瞄准了让中国科技公司得以在海外融资的结构。由于外国投资者不得直接持有股份，20年来几乎所有急需资金的科技集团都利用“可变利益实体”（VIE）来规避限制，让海外资金挂钩中国市场。在这种结构下，企业会创建一个接受外国人投资的离岸控股公司。这个公司与境内公司有合同约定，可以获得标的资产的经济收益。

VIE结构长期以来被中国当局所容忍，但没有被法律充分认可。外国人在中国几乎无从追索对所投资资产的权利。外国资金对这一结构一向态度谨慎，但大多数中国科技公司仍在使用这种方式安排在海外的上市。新的反垄断规则可能会要求企业对此类结构申请批准，令人怀疑未来VIE是否还能被允许，外国资本又将以什么方式进入中国科技公司。威胁撤回对VIE的默许是政府可能用以威吓企业及其所有者的另一种方式。

也许新规将使直言不讳的马云服软。他尚未就此公开表态，但蚂蚁已经屈膝，并同意拥抱监管新政。习近平已经表明，企业规模再大，IPO融资额再高，也不能挑战政府。■



The Western mind

Value judgments

Joseph Henrich's study of WEIRD societies

IT TAKES MORE than a decent constitution to build a democracy, as anyone who has tried to steer a country out of anarchy or tyranny can attest. And it takes more than well-turned commercial laws to make a healthy market economy. For either to happen, certain values must be widely accepted—yet defining them can be tricky.

Joseph Henrich, a professor of human evolutionary biology at Harvard, has devised a teasing term to describe societies where rules and values have come together with benign results: Western, educated, industrialised, rich and democratic. The acronym, WEIRD, neatly makes his point that these attributes, and the mindset that goes with them, are the exception not the rule in human history.

The values that underpin WEIRDness, he writes, include a tough-minded belief in the rule of the law, even at the risk of personal disadvantage; an openness to experimentation in matters of scientific knowledge or social arrangements; and a willingness to trust strangers, from politicians offering new policies to potential business partners. These may not seem original insights, but Mr Henrich's work is distinguished by the weight he places on the extended family as an obstacle to healthy individualism, and on religious norms as the determinant of family obligations. He reinforces this theme with a welter of polling data and sweeping historical arguments, mostly about medieval Europe.

As an example of kin loyalty at odds with modern thinking, Mr Henrich records the experience of democracy-builders in Afghanistan: rural folk could not grasp the idea that they might vote for somebody who was not

part of their family. Just as foreign to such outlooks, he says, is the idea that crimes are treated equally regardless of the relationships involved. In medieval China, killing within the family was treated differently from killing a stranger; killing your father was a worse crime than killing a child.

In many accounts of modern history, it was Europe's Protestant Reformation that catalysed a more individualist, law-based mentality. Mr Henrich's own emphasis is on the Catholic world from about 1000 onwards. He thinks that, by banning kin-marriage, the Roman church ushered in a more fluid society where people had to look farther afield for spouses.

Here he is not quite convincing, despite the extensive studies he adduces to argue that modern mentalities, even now, are correlated with regions of historic Catholic influence. It seems more likely that the medieval church was negotiating with, rather than moulding, a social reality which was evolving fast as cities emerged. Nor does a ban on marrying cousins imply free marital choice. It can be part of an elaborate system of communally arranged unions.

Mr Henrich's broad point about the values that underpin liberal democracy is stronger, with one big qualification. Hundreds of millions of people live neither in atomistic WEIRD-land nor in kin-obsessed pre-modern societies, but in an interesting limbo, sometimes dynamically and sometimes tragically. Think, say, of a family from a poor, remote part of south-eastern Europe, whose younger members are working and raising children in assorted European cities, while their elders keep the home fires burning in the village. An extraordinary range of roles and attitudes co-exist in three generations.

Or take the South Asian communities in some northern English towns, where the mores of rural Kashmir can persist even in the fourth generation

of diaspora life. Tradition-bound as they are, such communities are not untouched by modern British culture. Younger generations grow up somewhere between Mr Henrich's WEIRDness and the harsh security of a regulated rural clan. Some have fun negotiating this terrain, some swing sharply towards either individualism or conformity; a handful react to the confusion by embracing extremism. In any case, WEIRDness need not be an either-or category, whether in medieval Europe or the 21st century. ■



西方精神

价值判断

约瑟夫·亨里奇对WEIRD社会的研究【《世界上最怪的人》书评】

建立民主政体需要的不仅仅是一部像样的宪法，任何曾努力带领一个国家摆脱无政府状态或暴政的人都可以证明这一点。建立健康的市场经济也不只需要简洁清晰的商业法律。要实现任一都需要社会广泛接受某些价值观，但这些价值观并不容易定义。

哈佛大学的人类进化生物学教授约瑟夫·亨里奇（Joseph Henrich）创造了一个戏谑的术语来描述规则与价值观的结合产生了良性结果的社会：WEIRD，由“西方”、“受过教育”、“工业化”、“富裕”、“民主”这几个英文单词的首字母组成。这个意为“怪异”的词正好表明了他的观点——这些社会特性和相应的思维方式是人类历史上的例外，而不是常态。

他写道，支撑着WEIRD的价值观包括：坚信法治，即便可能于个人不利；对科学知识或社会组织方面的实验持开放态度；愿意信任陌生人，无论是提议新政策的政客还是潜在的商业伙伴。这些见解看起来并不新颖，但亨里奇的研究成果有其特别之处：他强调大家族是健康的个人主义的绊脚石，而宗教规范是家族义务的决定因素。他通过大量的调查数据和主要关于中世纪欧洲的笼统历史论述来强化这一主题。

亨里奇以阿富汗的民主建设者的经历为例，说明亲缘忠诚与现代思维相左：那里的乡下人无法理解投票选举的对象可以是自己家族以外的人。他说，同样让重视亲缘的人感到陌生的理念还有对犯罪行为的处置应一视同仁，无论加害者与受害方是什么关系。在中古中国，对杀害亲人与杀害陌生人的处置不同；相比杀子，弑父罪加一等。

许多有关现代历史的论述认为，是欧洲的宗教改革促进了更加个人主义、以法律为基础的思维。亨里奇则将重点放在了大约公元1000年之后的天主教世界。他认为，通过禁止近亲婚配，罗马教会开启了一个更具流动性的

社会，因为人们不得不放眼更远处寻找配偶。

在这里他不太有说服力，尽管他引用了大量研究，论证即便到了今天现代思维与历史上受天主教影响的地区仍有关联。看起来似乎更有可能的是，中世纪教会是在向随着城市的出现而迅速演变的社会现实妥协，而非塑造了这种社会现实。禁止表亲联姻也并不意味着自由通婚。这种禁令可能是社群安排联姻的复杂系统的一部分。

亨里奇有关支撑自由民主制的价值观的宽泛观点更站得住脚些，但被一种情形极大削弱。数以亿计的人既非生活在原子式的WEIRD土地上，也非生活在只看亲缘关系的前现代社会中，而是处于一种有趣的不确定状态，有时充满活力，有时悲情无奈。例如，想象东南欧偏远贫困地区的一个家庭，年轻人在欧洲各地的城市工作、抚育孩子，老人留在村子里守着家。迥异的角色和态度在三代人身上并存。

或者看看英国北部某些城镇的南亚社区，那里的克什米尔农村风俗甚至在第四代移民身上仍在延续。尽管恪守传统，这些社区并不是丝毫不受现代英国文化的影响。年轻一辈成长的环境处于亨里奇所说的WEIRD和农村家族规条的严格保护中间的某处。有人享受在这个复杂地域“探险”的乐趣，有人明显滑向个人主义或是服从规矩，也有少数人面对价值体系的混乱走向了极端主义。不管怎样，WEIRD特质都不必是非此即彼的取舍，无论是在中世纪欧洲还是在21世纪。 ■



America's new president

The economy Biden inherits

The incoming administration faces two extraordinary economic challenges

AMERICA'S VOTERS did not elect Joe Biden because they thought he would be the best steward of the economy. The economy may well define his presidency nonetheless. Mr Biden will take office in January amid a crisis brought about by the pandemic, which is capable of causing immensely more economic harm before vaccination is widespread. He will also inherit a business landscape in the throes of a once-in-a-generation shift, as technology becomes more embedded in everyday life and in more industries—a shift that has been simultaneously hastened and overshadowed by the disease. Whether Mr Biden succeeds or fails depends on how he manages these twin sources of change.

The good news is that GDP has rebounded impressively from its collapse in the spring. The unemployment rate has dropped much faster than most forecasters expected, from 14.7% in April to 6.9% in October. Were private-sector employment to keep growing at the pace of September and October it would return to its pre-pandemic level in less than a year. On most forecasts America's economy will shrink by less than any other big rich country's in 2020—the euro zone will take almost twice the hit, for example. So far there is little sign of the economic scarring that was feared at the onset of the crisis.

Unfortunately this rebound is threatened by the winter wave of the virus. The logistics of rolling out a vaccine are daunting and at first only emergency workers and the most vulnerable will receive it. The spread of the disease will worsen before a mass inoculation can take place. Already more Americans are in hospital with covid-19 than at the peak of the outbreak in the spring, though many fewer are dying. Some parts of the

country could soon face more restrictions and lockdowns. Others might experiment with letting the virus rip—an approach which could still bring about a sharp drop in consumer spending if people choose to stay at home in order to stay safe.

If the virus again puts the economy to the sword, it might not benefit from the life support it got in March in the form of lavish unemployment insurance and emergency loans for small businesses. Republicans in the Senate will probably support a limited second round of fiscal stimulus, but are in no mood for another blowout. A debate is raging about whether the Federal Reserve should extend its emergency lending into the new year. Job cuts by state and local governments, whose budgets have been hit by the pandemic, are already weighing down the labour market. They need a bailout that Republicans do not want to give. Mr Biden's first challenge will be to persuade Congress to keep the purse strings loose until the vaccine has brought about a full reopening.

At the same time the new president will need to grapple with the post-vaccine economy, which will look different from the one that entered the pandemic. The crisis has hastened the digitisation that was already poised to define business and investing in the 2020s. That trend will not fully reverse, even after the pandemic has subsided. Investors are still struggling to make sense of an economy in which intangible capital replaces the bricks-and-mortar kind, and in which network effects make incumbents more dominant and profits more enduring.

As technology permeates business, the nature of investment is changing. After the global financial crisis of 2007-09, the share of private non-residential investment flowing to intellectual property hit 30%. Soon it may breach the 40% threshold. In this world, Walmart must become an e-commerce giant, Ford must compete with Tesla to make electric cars, and computers must allocate capital. Even McDonald's has been working on its

digital strategy. The tech revolution will change the economy as much as the globalisation wave that defined Bill Clinton's presidency in the 1990s. As it reshapes the labour market—blue- and white-collar jobs alike—it could tear at the social fabric, much as the automation of manufacturing jobs did.

America's epidemic could be fading by the end of 2021. The tech surge will outlive Mr Biden's presidency. Yet the same principle should guide him on both: that government must not resist economic change, but should instead help people adapt to it. One reason America's economy is outperforming Europe's is that its stimulus has done more to prop up household incomes than it has to preserve redundant jobs. Similarly, governments that respond to technological change by remaking safety-nets and rewriting social contracts for the new era will do better than those which seek to preserve obsolete models of capitalism and government.

There are thus reasons to worry that Mr Biden's platform has a protectionist streak, a nostalgia for manufacturing jobs and an impulse to load firms with worthy social goals. One of his new-economy policies already looks like a flop: he wants to extend nationwide the regulations for gig-economy work that California voters rejected earlier this month. To succeed, Mr Biden will need to show competent crisis management. But he also needs to recognise the deeper changes taking place in the economy, and to help Americans profit from them. That is the way to raise living standards—and, as it happens, to succeed as president. ■



【首文】美国新任总统

拜登接手的经济

新一届政府面临两大非同寻常的经济挑战

拜登当选总统并不是因为选民认为他会是美国经济最好的大管家。但经济还是很有可能决定他总统任期的成败。明年1月，拜登将在新冠疫情引发的危机中走马上任。在广泛接种疫苗之前，这场疫情造成的经济危害还可能极大增长。随着科技日益嵌入日常生活和更多行业，拜登还将接手一个二三十年一遇的艰难商业变局——新冠肺炎加速了这一变局，同时也给它蒙上了阴影。拜登执政的成败取决于他如何应对这两大变化源头。

好消息是GDP已经从今年春季的暴跌中强劲反弹。失业率从4月的14.7%降至10月的6.9%，降速大大超出多数预测者的预期。如果私营部门的就业继续保持9月和10月的增速，不到一年就能回到疫情前的水平。根据大多数预测，2020年美国经济的萎缩幅度将小于所有其他富裕大国——比如，欧元区遭受的冲击差不多会是美国的两倍。到目前为止，没什么迹象显示会出现疫情之初人们所担心的那种经济创伤。

不幸的是，经济反弹面临冬季又一波疫情的威胁。分发疫苗的组织工作非常艰巨，一开始只会供应给急救人员和最易感染的人群。而在能大规模接种之前，病毒的传播还会加剧。目前美国住院治疗的新冠患者已经超过了春季疫情爆发高峰期的人数，尽管死亡人数少了很多。美国部分地区可能很快会面临更严格的限制和封锁。其他地区或许会尝试对疫情不加管控，但这种策略仍可能导致消费支出骤降，如果人们为安全起见而选择闭门不出的话。

美国在3月推出了慷慨的失业保险和小企业紧急贷款，向经济输血。如果病毒再次把经济推向绝境，它可能不会再得到这样的救援。参议院的共和党人可能会支持有限的第二轮财政刺激计划，但无意再像第一轮那样出手阔绰。一场关于美联储是否应该将紧急贷款延长到明年的辩论正在激烈进行中。因为预算受到疫情的严重影响，各州和地方政府纷纷裁员，这已经

让劳动力市场不堪重负。它们需要紧急财政援助，而共和党人却不想提供。拜登面临的第一个挑战将是说服国会继续松开钱袋子，直到疫苗让经济全面重启。

与此同时，拜登将需要设法应对后疫苗时代的经济，它的面貌将不同于疫情前的经济。数字化以其势头看原本就会成为2020年代的商业和投资活动的决定性力量，新冠危机加快了它的进程。即使疫情消退，这一趋势也不会完全逆转。投资者仍在努力理解这样一种经济形态：无形资产取代实体资产；网络效应让现有企业更具主导优势、利润更持久。

随着科技渗透到商业领域，投资的特点正在变化。2007至2009年的全球金融危机之后，高达30%的私人非住宅投资流向了知识产权，很快可能还会突破40%的临界值。在这样一个世界里，沃尔玛必须成为电子商务巨头，福特必须与特斯拉竞争生产电动汽车，计算机必须配置资本。就连麦当劳也一直忙着制订数字战略。这场科技革命给经济带来的改变将不亚于上世纪90年代成为克林顿执政期关键特征的全球化浪潮的影响。在重塑包括蓝领和白领在内的劳动力市场的同时，它还可能撕裂社会结构，就像当年的制造业工作自动化那样。

美国的疫情可能会在2021年底前消退。科技浪潮将持续到拜登的总统任期之后。但在应对这两大挑战时，他应该遵循同一条原则：政府切不可抵制经济变革，而应帮助人们调整适应它。美国目前的经济表现之所以优于欧洲，一个原因是相比于保留过剩的工作岗位，美国的经济刺激计划更着力于贴补家庭收入。同样地，在面对科技变革时，能为新时代重建社会安全网并改写社会契约的政府将比那些试图保留过时的资本主义和政府模式的政府做得更好。

因此，我们有理由担心拜登的执政纲领中存在一抹贸易保护主义色彩、对制造业岗位的怀旧之情，以及让企业背负崇高社会目标的冲动。他其中一项新经济政策看起来已经失败了：他希望在全国推广的对零工经济的监管在本月稍早时已经被加州选民否决。要获得成功，拜登需要展现出危机处理能力，但他也需要认识到经济正在发生更深层次的变化，并帮助美国人

民从中得益。这是提高生活水平的途径，也恰恰是他在总统任期上取得成功的途径。■



Vaccines

Suddenly, hope

Scientists have managed to create a vaccine for covid-19. Getting enough people vaccinated will be even harder

NINE LONG years elapsed between the isolation of the measles virus in 1954 and the licensing of a vaccine. The world waited for 20 years between early trials of a polio vaccine and the first American licence in 1955. Marvel, then, at how the world's scientists are on course to produce a working vaccine against SARS-CoV-2, the virus that causes covid-19, within a single year.

And not just any vaccine. The early data from a final-stage trial unveiled last week by Pfizer and BioNTech, two pharma companies, suggests that vaccination cuts your chances of suffering symptoms by more than 90%. That is almost as good as for measles and better than the flu jab, with an efficacy of just 40-60%. Suddenly, in a dark winter, there is hope.

Not surprisingly, Pfizer's news on November 9th roused the markets' bulls. Investors dumped shares in Clorox, Peloton and tech firms, which have all benefited from the coronavirus, and instead switched into firms like Disney, Carnival and International Consolidated Airlines Group, which will do well when the sun shines again. The OECD, a club of mainly rich countries, reckons that global growth in 2021 with an early vaccine will be 7%, two percentage points higher than without.

There is indeed much to celebrate. Pfizer's result suggests that other vaccines will work, too. Over 320 are in development, several in advanced trials. Most, like Pfizer's, focus on the spike protein with which SARS-CoV-2 gains entry to cells. If one vaccine has used this strategy to stimulate immunity, others probably can, too.

Pfizer's vaccine is also the first using a promising new technology. Many vaccines prime the immune system by introducing inert fragments of viral protein. This one gets the body to make the viral protein itself by inserting genetic instructions contained in a form of RNA. Because you can edit RNA, the vaccine can be tweaked should the spike protein mutate, as it may have recently in mink. This platform can be used with other viruses and other diseases, possibly including cancer, BioNTech's original focus.

So celebrate how far biology has come and how fruitfully it can manipulate biochemical machinery for the good of humanity (there will be time later to worry about how that power might also be abused). And celebrate the potency of science as a global endeavour. Drawing on contributions from across the world, a small German firm founded by first-generation Turkish immigrants has successfully worked with an American multinational company headed by a Greek chief executive.

Yet despite the good news, two big questions stand out, about the characteristics of the vaccine and how fast it can be distributed. These are early results, based on 94 symptomatic cases of covid-19 from among the 44,000 volunteers. Further answers must wait until the trial has gathered more data. It is, therefore, not clear whether the vaccine stops severe cases or mild ones, or whether it protects the elderly, whose immune systems are weaker. Nor is it known whether inoculated people can still cause potentially fatal infections in those yet to receive jabs. And it is too soon to be sure how long the beneficial effects will last.

Clarity will take time. In the next few weeks the trial should be declared safe, though further monitoring of the vaccine will be needed. The companies predict that immunity will last for at least a year. The 90%-plus efficacy is so high that this vaccine may offer at least some protection to all age groups.

While the world waits for data, it will have to grapple with distribution. Vaccine will be in short supply for most of next year. Although RNA jabs may prove easier to make at scale than those based on proteins, Pfizer's requires two doses. The company has said that it will be able to produce up to 50m doses in 2020 and 1.3bn next year. That sounds a lot, but America alone has over 20m first responders, medical staff, care-home workers and active-duty troops. Perhaps a fifth of the world's 7.8bn people, including two-thirds of those over 70, risk severe covid-19. Nobody has ever tried to vaccinate an entire planet at once. As the effort mounts, syringes, medical glass and staff could run short.

Worse, Pfizer's shots need to be stored at temperatures of -70°C or even colder, far beyond the scope of your local chemist. The company is building an ultra-cold chain, but the logistics will still be hard. The vaccine comes in batches of at least 975 doses, so you need to assemble that many people for their first shot, and the same crowd again 21 days later for a booster. Nobody knows how many doses will be wasted.

So long as there is too little vaccine to go around, priorities must be set by governments. A lot depends on them getting it right, within countries and between them. Modelling suggests that if 50 rich countries were to administer 2bn doses of a vaccine that is 80% effective, they would prevent a third of deaths globally; if the vaccine were supplied according to rich and poor countries' population, that share would almost double. The details will depend on the vaccine. Poor countries may find ultra-cold chains too costly.

The domestic answer to these problems is national committees to allocate vaccine optimally. The global answer is COVAX, an initiative to encourage countries' equal access to supplies. Ultimately, though, the solution will be continued work on more vaccines. Some might survive in commercial refrigerators, others will work better on the elderly, still others might

confer longer protection, require a single shot, or stop infections as well as symptoms. All those that work will help increase supply.

Only when there is enough to go around will anti-vaxxers become an obstacle. Early reports suggest the jab causes fevers and aches, which may also put some people off. The good news is that an efficacy of 90% makes vaccination more attractive.

| *The tunnel ahead*

The next few months will be hard. Global recorded death rates have surged past their April peak. Governments will struggle with the logistics of vaccination. America is rich and it has world-class medicine. But it risks falling short because the virus is raging there and because the transition between administrations could lead to needless chaos and delays.

Squandering lives when a vaccine is at hand would be especially cruel.

Science has done its bit to see off the virus. Now comes the test for society.





【首文】疫苗

曙光乍现

科学家已经设法研制出了新冠疫苗。让人们充分接种是更大的挑战

从1954年分离出麻疹病毒毒株，到一种麻疹疫苗获批，足足花了九年。从小儿麻痹症疫苗的早期试验，到美国首个疫苗在1955年获批，世界等待了20年。所以，惊叹吧，全球科学家眼看将在仅仅一年内就拿出有效的新冠病毒疫苗了。

而且这不是什么寻常的疫苗。两家制药公司美国辉瑞（Pfizer）和德国BioNTech上周公布的三期临床试验的初步数据表明，接种疫苗可令出现症状的几率降低90%以上。这样的预防效果几乎和麻疹疫苗差不多，优于流感疫苗的40%至60%。突然之间，黑暗的冬夜里显现了曙光。

毫不意外，11月9日辉瑞发布的消息激发股市走强。投资者抛售得益于疫情的高乐氏（Clorox）、帕洛顿（Peloton）及高科技公司的股票，转而买入迪士尼、嘉年华邮轮（Carnival）及国际联合航空集团（International Consolidated Airlines Group）这类待到雨过天晴时将表现出色的股票。成员主要为富裕国家的经合组织（OECD）估计，在首批疫苗投用的情况下，2021年的全球增长率将为7%，比没有疫苗的情况高两个百分点。

这确实很值得庆贺。辉瑞的结果意味着其他疫苗也会奏效。全球正在研发的疫苗超过320种，其中多个已处于后期试验阶段。大多数都和辉瑞研制的疫苗一样，着眼于新冠病毒入侵宿主细胞所依赖的刺突蛋白。如果一种疫苗能通过这种策略激发免疫力，其他疫苗很可能也可以。

辉瑞的疫苗也是首个运用到一种前景大好的新技术的疫苗。许多疫苗通过向体内引入病毒蛋白的惰性裂解片段来激发免疫系统。而辉瑞的这款疫苗则是把含遗传指令的RNA注入体内，让人体自行生成病毒蛋白。因为RNA是可编辑的，所以刺突蛋白假如发生了变异——最近在养殖水貂中可能就出现了变异——也能对疫苗作相应微调。该技术平台可用于其他病毒和疾

病，可能包括癌症，这也是BioNTech本来的研发重点。

生物学取得了长足发展，能够运用生物化学机制大大造福人类，这值得庆祝（这种力量也可能被滥用，暂且把担忧放在后头）。全球联合科研攻坚的成效也让人欢欣鼓舞。通过吸收世界各地的科研成果，一家由第一代土耳其移民创立的德国小公司和一家由希腊人担任首席执行官的美国跨国公司合作成功。

不过，在这个好消息背后仍有两大问题——疫苗的特性和普及速度。目前的说法是基于早期结果：44,000名志愿者中有94人出现感染新冠病毒的症状。但要获得进一步的答案，必须等到试验收集到更多数据。因此，尚不清楚该疫苗是可以预防重症还是轻症感染，能否保护免疫系统较弱的老年人，也不知道接种者是否仍会在未接种人群中造成可能致命的感染。疫苗的预防效果能维持多久暂时也不能确定。

要搞清楚这些问题需要时间。未来几周应该会宣布疫苗试验安全，尽管仍需进一步监测。两家制药公司预测免疫力至少可维持一年。有效性高达90%以上意味着该疫苗可为所有年龄段的人群至少提供一定程度上的保护。

在等待数据的同时，全球还必须应对疫苗分发的问题。明年大部分时间里疫苗都将供不应求。尽管RNA疫苗可能被证实比基于蛋白质的疫苗更易批量制造，但辉瑞的疫苗需要接种两剂。该公司表示能在2020年生产最多5000万剂疫苗，到2021年生产13亿剂。这听来很多，可单单在美国，急救人员、医务人员、养老院工作人员和现役军人就超过2000万人。全球78亿人口中可能有五分之一（包括70岁以上人群的三分之二）有感染新冠重症的风险。一下子给整个地球的人接种疫苗是前所未有的尝试。随着接种量增加，注射器、医用玻璃和相关工作人员都可能出现短缺。

更糟糕的是，辉瑞的疫苗需要在零下70°C甚至更低的温度中存放，远超出各地普通药房的存储能力。该公司正在打造一条超低温冷链，但物流仍会是个大挑战。运输一批新冠疫苗至少有975剂，所以需要召集这么多人打

第一针，21天后再次召集同一群人打补强针。谁也不知道有多少疫苗会在这个过程中浪费掉。

只要疫苗供应不足，政府就必须定下接种的优先次序。国家内部和国家之间都要处理好这方面的轻重缓急，这事关重大。模型显示，如果50个富裕国家能给国民接种20亿剂有效率为80%的疫苗，全球新冠死亡数字就会减少三分之一。如果疫苗是按富国和穷国的人口供应，该比例会翻近一倍。具体情况将取决于疫苗本身。对穷国而言，超低温冷链的成本可能太高了。

在一国内部，解决这些问题的办法是成立国家级委员会，对疫苗做优化分配。在全球，应对方案是旨在促进各国平等获取疫苗的“新冠肺炎疫苗实施计划”（COVAX）。但最终的答案仍是继续研制更多疫苗，有些可以用商用冰箱存储，有些更适用于老年人，还有一些能提供更长期的免疫保护，只需注射一次，或者既防症状又防感染。所有起效的疫苗都将有助于增加供应。

等到有足够的疫苗供应时，反接种派才会成为阻力。早期试验报告表明接种这款疫苗会引起发烧和疼痛，这也可能让一些人心生抗拒。好消息是，高达90%的预防率会让接种疫苗更有吸引力。

| 前方隧道

未来几个月会很艰难。全球报告的新冠患者死亡率已超过4月时的峰值。各国政府将迎战疫苗接种的物流问题。美国财力雄厚，医学水平世界一流。但由于那里疫情肆虐，以及政府交接可能导致不必要的混乱和拖延，有可能辜负大家的期待。有疫苗可用还让人白白丧命只会显得特别残酷。科学界已经尽其所能来遏止新冠病毒，现在是考验社会的时候了。■



Financial markets

Fixing the plumbing

A well-functioning Treasury market is crucial—whatever is in the White House. Time to fix how it works

THIS HAS been an extraordinary year for American government debt. The Treasury market is usually the world's most liquid bond market and a haven in stormy times. But in March it seized up as panic about the pandemic led to fire sales and failed trades. The Fed fixed the problem by buying, in two months, nearly as many Treasuries as it did during five years of quantitative easing after the global financial crisis. The market is now being drenched with new issuance as the federal government spends like mad. Since the start of April it has raised a net \$3.3trn to fund its stimulus programmes, expanding the outstanding stock of bonds by 19%. Over the past week bond yields have seesawed as investors have weighed and reweighed the likelihood of more stimulus after the election.

An even more extraordinary decade lies ahead. Regardless of whether a big stimulus is passed in 2021, the budget deficit will probably stay above 8% of GDP. An ageing population will continue to lift health-care spending. And with the Federal Reserve unable to cut rates much more, bigger deficits might be necessary to stimulate the economy during future downturns. A supersized bond market will amplify both the probability of more market stress and its consequences. Randal Quarles, the vice-chairman of the Fed, recently warned that the “sheer volume” of issuance means the market's plumbing may come under strain. That could disrupt the government's ability to borrow and cause tremors across the world's financial system.

There are two fault lines. When Uncle Sam issues debt a group of middlemen known as “primary dealers”—mostly banks—are obliged to buy it up at “reasonably competitive” prices. Primary dealers also act as

intermediaries for investors who wish to trade with one another. In a crunch Treasuries can pile up on dealers' balance-sheets, causing them to swell and pushing the banks closer to breaching the capital requirements set by regulators. That makes it harder for them to act as intermediaries, and investors do not like trading without a big institution sitting in the middle. In the spring, as investors rushed to unwind their bets, primary dealers were overwhelmed.

The second vulnerability is that the Treasury market is symbiotically connected with another crucial market: the one for "repo" lending, whereby banks and other financial firms borrow from one another by temporarily exchanging Treasuries for cash. Because primary dealers typically use repo transactions to fund their purchases of Treasuries, the two markets are closely linked. The repo interest rate is important to the economy (more so than the "federal funds" rate that the Fed officially targets) and anchors borrowing rates for businesses and households. But when Treasury issuance or the Fed's operations suck cash out of the banking system, the repo rate can spike unexpectedly, catching policymakers off-guard. This happened in late 2019.

It would be wise to mend the pipes before the next torrent of issuance gushes down them. Some quick fixes are obvious. A temporary exemption of cash and Treasuries from banks' leverage ratios should be made permanent. Banks should not have to hold capital against assets which are all but risk-free. And the number of primary dealers could also be expanded, so that it matters less if any one of them gets into trouble.

But it would be better still to implement a deeper overhaul. The primary-dealer system is needlessly complex and would never be designed from scratch today. It should be phased out in favour of a central clearing house for Treasury trades which would let smaller firms deal with each other without an intermediary clogging up the market. More debt issuance could

take place without middlemen, too.

The Fed must also get a better grip on rates in the repo market, which influences the entire economy. Currently it puts a floor under repo rates but, in normal times, does not cap them. The answer is a “standing repo facility”, through which it would lend at its target interest rate to any counterparty that can provide short-term Treasuries as collateral. These Fed loans would pose little risk to the taxpayer. And with a firmer grip on rates the Fed would have less need to buy government bonds in a panic, a tactic which over time is destined to cause a political stink because it looks as if the government is being financed by the printing presses.

Dodgy financial plumbing is tricky to fix but it has the capacity to cause an almighty mess. It determines how well policy is being transmitted to the economy as a whole. As the pandemic leads to an epic amount of government borrowing and blurs the boundary between fiscal policy and the Fed, it is time for reforms to make the pipes safer. ■



【首文】金融市场

修管道

无论谁入主白宫，运转良好的国债市场都至关重要。是时候修整一番了

今年对美国政府债务来说是非同寻常的一年。一般来说，美国国债市场是世界上流动性最强的债券市场，也是动荡时期的避风港。但今年3月，疫情引发的恐慌导致了低价抛售和交易失败，让这个市场突然失灵。为了化解危机，美联储大举买入国债，两个月的购买量就接近于全球金融危机后的五年量化宽松期间的总和。随着联邦政府疯狂扩大支出，市场现在充斥着大量新发行的债券。自4月初以来，美国政府已经为经济刺激计划筹集了3.3万亿美元的净融资，使未偿付债券存量增加了19%。过去一周里，随着投资者再三权衡大选后是否可能出台更多刺激措施，债券收益率也起伏不定。

接下来的十年会更不寻常。无论2021年会不会通过大规模经济刺激方案，预算赤字都可能保持在超过GDP的8%。随着人口老龄化，医疗支出也会继续膨胀。而美联储已没有大幅降息的空间，在未来的经济低迷期可能还是需要通过扩大赤字来刺激经济。一个超大规模的债券市场将放大市场承压增大的概率及后果。美联储副主席兰德尔·夸尔斯（Randal Quarles）最近警告称，“巨量”国债可能会让这个市场的流通管道不堪重负。这可能会破坏美国政府的举债能力，并在全球金融体系引发震动。

其中存在两个薄弱环节。美国政府发行债券时，一批被称为“一级交易商”的中间商（多为银行）有义务以“具有一定竞争力的”价格大量买进。投资者互相交易时，这些一级交易商也充当中间商的角色。发生危机时，美国国债会在这些交易商的资产负债表上积压起来，使其资产负债表膨胀，导致银行濒临突破监管机构设定的资本金要求。这样一来它们便难以继续充当中间商的角色，而一旦缺少大型机构居中，投资者彼此交易的意愿也会打折扣。今年春季投资者纷纷急于平仓时，一级交易商就不堪重负了。

第二个弱点是国债市场与另一个关键市场的共生关系：“回购”借贷市场。

在这个市场上，银行和其他金融公司彼此之间用持有的国债临时换取现金，也就是相互借钱。由于一级交易商通常都利用回购交易来为购债筹措资金，因此这两个市场密不可分。回购利率对经济非常重要（甚至比美联储官方设定的“联邦基金”利率更重要），而且是企业和家庭贷款利率的基准。但当国债发行或美联储的操作从银行系统吸走资金时，回购利率可能意外飙升，令政策制定者措手不及。2019年末就发生过这种情况。

在下一轮债券发行的洪流汹涌而至之前修缮管道是明智之举。眼下有一些明显能立竿见影的做法。目前允许银行在计算杠杆率时将现金和国债剔除在外，这项临时性的规定应该永久固定下来。银行不应该为几乎零风险的资产预留资本金。此外，一级交易商的数量也可以扩大，这样万一哪一家陷入了麻烦，问题也不会那么严重。

但是，来一场更彻底的大修会更好。一级交易商制度的复杂度没有必要——如果今天重新设计的话绝不会如此。它应该被逐步淘汰，让位给一个国债中央清算所，让较小的公司可以彼此交易而没有中间商阻塞市场。此外，也可以不经过中间商直接发行更多债券。

美联储也必须更有力地控制影响整个经济的回购市场利率。目前，美联储为回购利率设定了下限，但在正常时期并不设上限。这个问题的对策是“常设回购便利机制”，以其目标利率向任何能够提供短期国债抵押的交易对手提供贷款。美联储这种放贷并不会给纳税人带来什么风险。而且，在更有力地控制住利率的情况下，它在市场发生恐慌时也就不那么需要买入政府债券了。长期而言，这种策略注定要引发政治上的争议，因为看起来政府好像完全在靠印钞机来钱。

运转不良的金融管道不易修复，却能造成巨大的混乱。它决定了政策传导到整体经济的顺畅程度。这次疫情促使政府借下巨量债务，也模糊了财政政策与美联储之间的界限。是时候实施改革把管道变得更安全了。■



Buttonwood

Our currency, your problem

Why dollar assets are still riding high—and why that matters for everywhere else

CAN YOU identify what or whom the following describes: is widely disliked around the world; might have been ditched by some supporters earlier had convincing alternatives existed; has had a difficult six months; and refuses to go quietly? Here's another clue: this is not a column about politics. The answer is the dollar. It is the most unloved of major currencies, apart from all the others. And, oddly, it has been given a fillip by a messy election result at home.

Or perhaps that is not so odd. The dollar's resilience has been one of the more monotonous motifs in financial markets in recent years. Dollar strength is twinned with another hardy theme—the growing heft of America's companies, notably its tech giants, in global equity markets. The dollar matters for America, but it matters for everywhere else, too. A weaker dollar would trigger a period of catch-up by the rest of the world's economies and asset markets. Such a prospect is seemingly delayed.

A reason for dollar resilience is growing doubts over fiscal stimulus in America. The election was supposed to be the start of a new era of fiscal largesse. Agreeing on any kind of policy now looks hard. If Joe Biden enters the Oval Office in January he is likely to face a divided Congress. But dollar strength is not solely down to politics. It is as much about the economic consequences of a resurgent coronavirus as it is about dashed hopes of a blue-wave election.

Begin with the blue wave that didn't crest. Before the election, an idea had taken hold, fuelled by pollsters and election forecasters, that a clean sweep of the White House and both houses of Congress by the Democratic Party

was highly likely. The upshot would be a weaker dollar.

In 2016 a similar prospect of fiscal easing drove the dollar up, not down. This needs some explaining. The difference is that four years ago, the Federal Reserve was expected to offset the stimulative effect of tax cuts by raising interest rates in order to contain inflation—thus supporting the dollar. But with the economy now weak, the Fed has committed itself to easy money. A fiscal-stimulus package would be an unimpeded spur to aggregate demand, leading to more imports, a wider trade deficit and a weaker dollar. And a weaker dollar would in turn help the rest of the world, partly because of its role as a borrowing currency beyond America's shores. A lot of emerging-market companies and governments have dollar debts, so a weaker greenback acts as an indirect stimulus to global growth.

Instead, the dollar has perked up a bit. That is because the dollar is special in another way. Dollar assets, notably shares, are more prized when the outlook seems less certain. Holders of dollars cling on to them for longer, rather than swap them for other currencies. This goes for wealthy savers in emerging economies, or Chinese or South Korean exporters, say, who have earned dollars on sales.

It also goes for institutional investors at home who might have thought of cashing in some of their expensive-looking American tech stocks for a wager on cheap-looking cyclical stocks in Europe or Asia. The diminished prospect of fiscal stimulus is one reason why this "reflation trade" is less alluring. The resurgence of coronavirus infections is another. Much of Europe is now in soft lockdown. Its economy is losing steam. The appeal of cyclical stocks is similarly ebbing. Investors have instead piled back into tech firms, which benefit from the stay-at-home economy.

If there is one thing as hardy as the dollar itself, it is forecasts that its resilience cannot last. What might hasten the dollar's fall now? Even

without a friendly Senate to back his plans for increased federal spending, a President Biden would probably have a less bellicose and arbitrary trade policy than a re-elected President Trump. Good news on a vaccine might rekindle American investors' appetite for buying cheap assets abroad.

Further out, the dollar still seems likely to weaken. Whatever the configuration of American politics, fiscal stimulus will not stay off the agenda for ever. Populism is hardly in retreat. Bond yields are incredibly low. In the circumstances it would be unwise to think that politicians will forgo the temptations of deficit-financed spending or tax cuts for too long. And for the past half-decade the greenback has drawn strength from the fact that short-term interest rates in America were higher than in western Europe and Japan. One of the few things that everyone can agree on is that this advantage is largely gone. ■



梧桐

我们的货币，你们的麻烦

为什么美元资产仍居高不下，以及为什么这对其他地方也很重要

看你能否猜出以下内容所描述的对象：在全世界不受多数人待见；如果有更好的选择，可能一早就被一些支持者抛弃了；经历了艰难的六个月；拒绝安静地让位。还有一个提示：我们这不是个政治专栏。答案是美元。除去所有非主要货币，它是主要货币中最不受喜爱的。而且奇怪的是，美国大选结果的纷扰却给它带来了利好刺激。

可能也没那么奇怪。近些年，美元坚挺已成了金融市场上持久到比较乏味的主题之一。美元强势与另一个同样持久的主题紧密相连：美国公司尤其是美国科技巨头在全球股票市场的影响力越来越大。美元对美国很重要，但对所有其他地方也很重要。美元疲软会触发一段全球其他经济体和资产市场上行追赶的时期。目前看来这样一个前景似乎延迟了。

美元坚挺的一个原因是人们对美国的财政刺激计划越发持怀疑态度。大选原本应该开启一个慷慨财政政策的新时期。现在看起来要就任何政策达成一致都很困难。如果拜登能在1月进入椭圆形办公室，他很可能会面临一个分裂的国会。但是美元的强势并不仅仅是政治因素造成的。相比民主党在选举中掀起“蓝色浪潮”的希望破灭，新冠病毒再次爆发的经济后果带来的影响一样大。

从没能掀起的蓝色浪潮说起。大选前，在民调和选情预报机构的推动下，人们开始相信民主党很有可能在总统和国会两院选举中同时大获全胜。如此的结果将是美元走弱。

类似的对财政宽松的预期在2016年推动了美元升值而非贬值。这需要解释一下。两者的不同之处是四年前市场预期美联储会加息来抵消减税的刺激作用，从而抑制通胀，这样就会支撑美元。但由于目前经济疲弱，美联储已承诺实施宽松的货币政策。财政刺激方案将不受阻碍地刺激总需求，导

致进口增加，贸易赤字扩大，美元走弱。而美元走弱反过来又会帮到世界其他地区，原因之一是美元是美国以外的贷款计价货币。许多新兴市场的公司和政府都背负着美元债务，因此美元走弱会间接刺激全球增长。

但美元实际上却略微升值了。那是因为美元在另一个方面的特殊性。当前前景看起来不太确定时，人们会更看重美元资产，尤其是股票。手里有美元的人会坚持持有，而不会将它们换成其他货币。新兴经济体的富裕储蓄者同样如此，那些通过出口贸易赚到了美元的出口商（比如中国或韩国的）也一样。

美国的一些机构投资者也是如此，它们本来已经在考虑将手中一些看起来价格较高的美国科技股兑现，去押注欧洲或亚洲看起来廉价的周期性股票。财政刺激的前景减弱是这种“再通胀交易”吸引力降低的原因之一。另一个原因是新一波新冠疫情。欧洲大部分地区现在进入软封锁状态，经济正在失去动力。周期性股票的吸引力也在减弱。投资者又转身涌向了从居家经济中受益的科技公司。

如果说还有什么和美元本身一样坚挺，那就是“美元韧性不会持久”这一预测。那么眼下有什么因素可能加速美元下跌呢？拜登成为总统后，即使没有一个友好的参议院支持他增加联邦支出的计划，他的贸易政策也很可能不会像特朗普连任的情况下那么好斗和武断。有关疫苗的好消息可能会重新激起美国投资者购买海外廉价资产的兴趣。

更长远来看，美元似乎仍有可能走弱。无论美国政局如何，财政刺激措施都不会永远脱离议程。几乎看不到民粹主义退潮的迹象。债券的收益率非常低。在这种情况下，如果认为政客能长时间抵制赤字支出或减税的诱惑是不明智的。过去五年里美元坚挺是因为美国的短期利率高于西欧和日本。人们难得能达成一致意见的一点就是这种优势已基本消失。■



Chaguan

Chicken and egg

To see why China may struggle to achieve high-tech self-reliance, visit an industrial chicken farm

IT TAKES AN effort—a small hardening of the heart—to see day-old Jinghai Poultry chicks for what they are. These, for all their plaintive cheeping and soft, fuzzy plumage, are tiny, high-performance meat factories. The product of decades of genetic research in American and European laboratories, they hatch in China thanks to global supply chains, involving the air-freighting of eggs and chicks between secure breeding sites on five continents.

Those chains are more fragile than once supposed. Animal diseases, the US-China trade war and covid-19 have all disrupted, or threatened to disrupt, industrial chicken supplies. That makes those chicks a window onto something interesting: China's increasingly complicated relationship with high-tech globalisation, a force that has made the country more prosperous, but also reliant on the outside world in ways that trouble Communist Party bosses.

The unsentimental logic of high-performance poultry-rearing is easy to grasp. Standing this week in the loading bay of a factory farm in the coastal province of Jiangsu, Chaguan heard Jinghai executives explain how “white-feather meat chickens”, as they are known in China, grow to 2.5kg in 40 days. Homegrown varieties of “yellow-feather chicken”, descended from backyard fowl, take twice as long to mature and will only ever weigh half as much. Clients collect cardboard trays holding 102 chicks, peeking through slats in the sides. Four trays can generate a tonne of chicken.

Nor is China's interest in cheap protein mysterious. Half a century ago meat was a rare luxury. Now, many see it as a daily necessity. In the meantime,

the country's supplies of farmland and clean water have not grown. Agriculture remains blighted by food-safety scandals, the rampant use of fake or illegal animal medicines, and disease outbreaks. Small surprise, then, that Chinese leaders give frequent speeches about food security. A puzzle lurks, though. Leaders also call for self-reliance in key technologies. And in the case of broiler chickens, those two ambitions—rearing meat efficiently and avoiding dependence on imports—are in tension.

The chicks cheeping at Chaguan are the fifth-generation descendants of pedigree birds whose bloodlines represent 80 years of selection for such traits as efficient food-to-meat conversion, rapid growth, strong leg bones and disease resistance. After waves of consolidation, the industry is dominated by two firms, Aviagen (based in Alabama and owned by the EW Group of Germany) and Cobb (owned by Tyson, an American poultry giant).

The most valuable pedigree birds never leave maximum-security farms in America and Britain: a single pedigree hen may generate 4m direct descendants. Their second-generation offspring are flown to breeding sites dispersed between such places as Brazil, Britain and New Zealand, in part to hedge against supply shocks when avian influenzas and other diseases close borders. Day-old third-generation chicks are air-freighted to local partners such as Jinghai, which spend six months growing them and breeding them in climate-controlled, artificially lit indoor facilities. In all, China imports 1.6m third-generation white-feather chicks a year.

Jinghai hatches 8m fourth-generation, “parent stock” chickens annually. The company sells some to other agri-businesses. It breeds from the rest to produce fifth-generation chicks like those cheeping at Chaguan. These are “meat chickens”, consumed in fast-food outlets, schools and factory canteens, or as chicken parts sold in supermarkets. Yellow-feather chickens, deemed tastier by Chinese cooks, account for most whole birds sold in markets.

Chinese breeders have long tried to create local varieties with bloodlines available in-country. Breeding from imported third- or fourth-generation chickens is a bad solution: their genes are less desirable than those of their elite grandparents, making them a poor starting-point for a new variety. In September the State Council, China's cabinet, issued a paper on livestock-rearing that set self-sufficiency in poultry as a goal, calling meat-chicken breeding a priority. Big foreign firms have resisted appeals from officials to send second-generation stock to China. A poultry firm with 10% of the domestic market, Fujian Sunner, says it has bred all-Chinese broilers: their performance is a source of some debate.

Dependence on foreign bloodlines does carry risks. For several months recently New Zealand was one of the only countries able to send third-generation chicks to China, after other exporters suffered bird-flu outbreaks. Li Jinghui, president of the China Broiler Alliance, an industry association, calls conditions ripe for China's "brilliant" scientists to develop local birds. Mr Li adds that Chinese diners do not share the West's love of breast meat and think chicken feet a delicacy, so that Chinese-bred broilers might have bigger thighs and feet. But Mr Li suggests that the government's aim is diversifying meat supplies, rather than literal self-sufficiency. Let Chinese and foreign chicken breeds compete like Huawei and Apple smartphones, he urges: market forces should decide the result.

| *Don't even ask about animal rights*

Wang Hongsheng, a boss at Jinghai, admits to fretting about interruptions to chick supplies, even wondering if President Donald Trump might curb American exports. But to develop a domestic breed from scratch would take years, and if it does not meet market needs, a firm could spend a fortune "without much to show for it".

High-tech chickens are not as sleek as high-speed trains or as clever as quantum computers. Still, they are a case study of why self-reliance is hard.

China's poultry market has room to grow: Westerners each eat far more chicken than Chinese do. But without a stronger animal-health system and environmental controls, biotechnology alone cannot help China to develop world-class agriculture. Moreover, a long-standing Chinese strategy—bullying foreign firms to hand over intellectual property—is counter-productive now. Western trust in China is low, and official talk of self-sufficiency is one cause. The politics of globalisation get tricky when one side feels it is being readied for the pot. ■



茶馆

鸡和蛋

要了解中国为何可能难以在高科技领域实现自给自足，可以去一个工业化养鸡场走走

你得努把力——硬下点心肠——才能去看京海禽业养殖场里初生的小鸡仔。这些叽叽哀鸣、软乎乎、毛茸茸的小家伙们却是高效的微型肉厂。它们是美国和欧洲的实验室几十年遗传学研究的产物。因为有全球供应链在五大洲的安全育种点之间空运鸡蛋和小鸡，它们才能在中国孵化。

这些供应链比之前想象的更脆弱。动物疫病、中美贸易战和新冠病毒都已经扰乱或可能扰乱工业化的鸡肉供应。因此，透过这些小鸡可以观察到一个有趣的现象：中国与高科技全球化之间日益复杂的关系。这种高科技全球化让中国更加繁荣，但也让它依赖于外部世界，而这困扰着共产党的领导们。

高效家禽养殖的冰冷逻辑很容易理解。最近在沿海省份江苏一家养殖场的装货区，本专栏记者听京海禽业的高管解释了这些在中国被称为“白羽肉鸡”的小鸡是如何在40天内长到2.5公斤的。本土的“黄羽鸡”源自人们在自家后院喂养的“走地鸡”，它们的生长期长一倍，长成后也只有白羽鸡的一半重。客户们来取走装着102只小鸡的硬纸板托盘，透过两边板条的缝隙可以看到里头的小鸡。四托盘小鸡能产一吨鸡肉。

中国对价格低廉的蛋白质的兴趣也不难理解。半个世纪前肉是难得的奢侈品。现在许多人把吃肉视为日常必需。与此同时，中国的农场和洁净水供应并没有增加。农业仍然受食品安全丑闻、假劣或非法兽药泛滥，以及疫病的影响。因此，中国领导人经常就粮食安全问题发表讲话也不足为奇。不过这里潜藏着一个难题。领导们还呼吁在关键技术上自给自足。而在肉鸡的问题上，高效饲养肉禽和避免依赖进口这两大雄心是有冲突的。

这些冲着记者叽叽叫的小鸡是纯种鸡的第五代后代，纯种鸡的血统代表了80年来人们对高饲料转换率、快速生长、强健的腿骨和抗病能力等特性的

选择。经过一波又一波的整合，这一行业目前由两家公司主导：安伟捷（Aviagen，总部位于阿拉巴马州，为德国EW集团所有）和科宝（Cobb，美国禽业巨头泰森[Tyson]旗下公司）。

最珍贵的纯种鸡从未离开过位于美国和英国防备森严的养殖场：一只纯种母鸡也许能产出四百万只直系后代。它们的第二代后代被空运到分散在巴西、英国和新西兰等地的育种点，一定程度上是为防范禽流感等疫病导致边境关闭时对供应的冲击。刚出生一天的第三代雏鸡被空运到京海等地方合作伙伴那里，京海将花六个月的时间在控温控湿、人工照明的室内养殖场中培育它们。中国每年总共进口160万只第三代白羽鸡。

京海每年孵化800万只四代鸡，即父母代种鸡。它将其中一些卖给其他农业企业，再从剩下的四代鸡中繁殖出第五代小鸡，也就是冲着记者叽叽叫的那些。这些就是肉鸡，在快餐店、学校和工厂食堂被食用，或是在超市分割出售。中国厨师认为黄羽鸡更美味，市场上出售的整鸡中黄羽鸡占大多数。

长期以来，中国育种专家一直想用可在国内获得的种系培育出本土鸡种。从进口的第三代或第四代鸡中繁殖不是个好办法：它们的基因不像祖辈精英的基因那么理想，用它们繁殖新品种就输在了起跑线上。今年9月，中国国务院发布了一份关于畜牧业的文件，以家禽自给为目标，重点开展肉鸡育种攻关。外国大公司拒绝了中国政府官员的恳求，不愿向中国提供第二代种鸡。占有10%国内市场份额的禽业公司福建圣农称，他们已经培育出了首个纯中国血统的肉鸡品种：它们的性能引发了一些争议。

依赖外国鸡种确实有风险。最近几个月，其他出口国遭遇禽流感爆发，新西兰是仅剩的能够向中国出口第三代雏鸡的国家之一。行业协会中国白羽肉鸡联盟的总裁李景辉认为，中国“优秀的”科学家培育本土肉鸡新品种的条件已经成熟。李景辉补充说，中国人不像西方人那样爱吃鸡胸肉，并且觉得鸡爪是种美味，所以中国培育的肉鸡或许可以有更大的鸡腿和鸡爪。但他表示，政府的目标是让肉类供应多样化，而不是一味地自给自足。他呼吁让中国和国外的鸡种像华为和苹果的智能手机那样竞争，结果应当由

市场力量决定。

| 动物权利问都别问

京海的总经理王宏胜承认担心种鸡供应中断，甚至担心特朗普是否会限制美国的出口。但是，从头开始培育一个本土品种需要多年时间，而且如果不能满足市场需求，企业可能会花了一大笔钱却打了水漂。

高科技鸡不像高铁那样光鲜亮丽，也不像量子计算机那样智能。尽管如此，这仍然是一个研究自力更生何以困难的案例。中国的家禽市场还有增长空间：西方人均摄入的鸡肉远比中国人多。但是，如果没有更强大的动物健康系统和环境控制，单靠生物技术无法帮助中国发展出世界级的农业。此外，中国长期以来强迫外国公司交出知识产权的策略现在适得其反。西方对中国的信任度很低，而官方自给自足的说法是原因之一。当一方觉得自己成了被宰杀的鸡时，全球化的政治局势就变得棘手起来。 ■



The Economist film

Public Debt - How much is too much?

The covid-19 pandemic is set to increase public debt to levels last seen after the second world war. But is rising public debt a cause for concern? New economic thinking suggests perhaps not, at least for now.



经济学人视频

公共债务 - 多高算“过高”？

新冠大流行将使全球公共债务增加到相当于二战后的超高水平。公共债务不断上升值得担忧吗？新的经济思想表明，至少目前可能并不需要。



Schumpeter

Jeff Bezos's final frontier

Where is Amazon's boss headed next?

IT HAS THE largest windows in space. Six reclining seats. And blue edges that passengers can grab hold of as they float weightlessly more than 100km (62 miles) above Earth. If that is not rarefied enough, imagine if one of the fellow passengers were Jeff Bezos, gazing down onto a planet that is spanned by his digital conglomerate, Amazon, and of which he is the richest inhabitant. When the time comes for Mr Bezos's private venture, Blue Origin, to send paying tourists into space, its proprietor will almost certainly be among them. "I suspect that he will be—and is, indeed, eager to be—one of the first private citizens to blast himself into space," writes Walter Isaacson, a biographer, in an introduction to the collected writings of Mr Bezos. Already you shudder to think of Mr Bezos's peals of laughter ringing through the heavens.

It is easy to assume that for the 56-year-old man who has (and sells) everything, space tourism is the ultimate vanity project. He launches rockets from his ranch in West Texas. He has a rippling physique. His bald head resembles that of his idol, Captain Jean-Luc Picard in "Star Trek". He is fulfilling a childhood dream. In 1982 he told his schoolmates: "Space, the final frontier, meet me there!"

Yet dismissing his space quest as a combination of mid-life crisis and money to burn would be underestimating the missionary zeal that drives Mr Bezos, and which "Invent & Wander", a collection of 23 years of letters to Amazon shareholders and other musings, illustrates. His work on Earth is not yet done. Covid-19 has brought him back squarely to Amazon's helm. But the book, which is mostly backward-looking, leaves a tantalising hint that you need to peer into the stratosphere to see what comes next. What

that means for the future of Amazon is left frustratingly vague.

On the surface, his twin obsessions are a puzzle. It is difficult to imagine more different ventures than retailing and rocketry. Revolutionary as both firms are, there are few more hard-headed ones than Amazon, and few more dreamy-sounding concepts than space colonisation. Amazon is a utilitarian monument to the consumer, worth \$1.6trn. It promises relentlessly lower prices, speedier delivery and greater variety—as well as faster cloud computing power in the case of Amazon Web Services (AWS). Blue Origin's vision, funded by the sale of Mr Bezos's Amazon stock, is Utopian. It is “to enable a future where millions of people are living and working in space to benefit Earth”. It hopes to achieve this by making launch vehicles that can land and be fully reusable. New Shepard, its suborbital spacecraft, has completed more than a dozen flights. Yet it is years behind schedule for flying tourists to space. For now, Blue Origin's main customer is the government.

The two companies operate with different degrees of transparency and velocity, too. Amazon has been a public company since it was three years old. Its founding motto was “get big fast” and its obsessive quest to innovate includes a willingness to fail. Blue Origin was kept secret for years after its birth in 2000. It calls itself a tortoise not a hare. Its motto is *Gradatim Ferociter*, or “Step by step, ferociously”. As Mr Bezos has said, “If you're building a flying vehicle, you cannot cut any corners.”

Or take their approach to rivals. Amazon, which dominates e-commerce and the cloud, treats them with the haughtiness of a trailblazer. Mr Bezos tells employees to be terrified of customers, not competitors. Blue Origin is a laggard. It is trying to catch up with SpaceX, the rocketry business of Elon Musk, another space-mad plutocrat. Other rivals include Virgin Galactic, the listed venture of Richard Branson, a British tycoon. Aerospace stalwarts such as Lockheed Martin and Northrop Grumman are both collaborators

and competitors. Boeing is a mighty incumbent.

Yet at Amazon, Mr Bezos has proved he can run businesses as diverse as one famous for brown boxes, and another for cloud computing. As he wrote in 2015, Amazon and AWS may look different, but they share similar underlying principles on which they act. The same may be true of Amazon and Blue Origin.

| *Stairway to heaven*

Their visions are communicated by a simple narrative. Amazon's is a focus on customer satisfaction, behind which employees, suppliers and shareholders fall into line. Blue Origin's core belief is that reusable rockets will lower costs so that access to space is made possible for many. These mantras are endlessly repeated.

Second, the two businesses share breathtaking ambition. From the Kindle and AWS to Echo smart speakers and Alexa, their soothing machine-learned voice, Amazon has frequently given customers more than they ever thought they needed. With Blue Origin, Mr Bezos hopes that he can unleash entrepreneurial activity allowing others to follow his "road to space" and create a new era for business along the way.

Most important, both firms are imbued with Mr Bezos's devotion to the long term. In his missives about Amazon, he repeatedly reaffirms his intention to invest to win market leadership in a variety of industries, rather than prioritising short-term profits. Blue Origin's horizons are measured in decades, if not centuries. Both benefit from Mr Bezos's knack for burying himself in the day-to-day detail, without losing sight of the big picture.

What his fixation with the heavens says about Mr Bezos's future at Amazon remains a vexing question. The book does not hint at controversies such as

the online empire's treatment of third-party sellers, the hollowing out of high streets, or its quashing of unionisation efforts. It repeats the cliché that it is "day one" for Amazon, even though it seems late in the day as competitors in e-commerce and the cloud up their game and political heat rises. It gives no sense of whether AWS, its most profitable division, should be spun off, or of when Mr Bezos may step down. But it makes clear that Blue Origin, as Mr Bezos put it last year, is "the most important work I'm doing". One day it may take him not just into orbit but away from the mother ship. ■



熊彼特

贝佐斯的终极前沿

亚马逊老板的下一站在哪里？

它拥有太空中最大的窗户。六张躺椅。还有蓝色的边框——乘客在距地表100多公里的高空失重漂浮时可以抓住它们。如果这些还不够高大上，想象一下同行乘客之一是杰夫·贝佐斯，他正俯瞰着他的数字帝国亚马逊盘踞的那颗星球，而他是那里的首富。当这一天来临——贝佐斯的私有企业蓝色起源（Blue Origin）把付费游客送上太空——几乎可以肯定它的老板也会是其中一员。“我觉得他会成为——而且是很渴望成为——第一批把自己送入太空的普通民众之一。”传记作家沃尔特·艾萨克森（Walter Isaacson）在贝佐斯文集的前言中写道。想到贝佐斯的哈哈大笑声响彻天空，你都瑟瑟发抖了吧。

你很容易会想，对一个拥有（并销售）一切的56岁男人来说，太空旅游是一个终极面子工程。他从自己位于西得克萨斯的牧场发射火箭。他的肌肉线条分明。他的光头和自己的偶像酷似——《星际迷航》（Star Trek）中的舰长让-卢克·皮卡德（Jean-Luc Picard）。他正在实现儿时的梦想。1982年，他曾对同学说：“太空，终极边界，我们那里见！”

然而，如果认为贝佐斯对太空的追求不过是源于中年危机加上花不完的钱，那就低估了他那传教士般的热忱。《创造与漫步》（Invent & Wander）收录了他23年来的致股东信及其他思想点滴，展示了这种作为他内驱力的热忱。他在地球上的工作尚未完成。新冠肺炎直接把他送回了亚马逊的方向盘前。但这本主要回顾过去的书留下了一个诱人的线索——要知道接下来会发生什么，需要放眼太空。但想知道这对亚马逊的未来意味着什么，却又有如雾里看花，令人沮丧。

乍一看，他同时痴迷两件事令人费解。很难想象还有比零售和火箭制造更风马牛不相及的企业。尽管这两家公司都是革命性的，但很少有公司比亚马逊更务实，也很少有什么概念比太空殖民听上去更梦幻。对消费者来

说，市值1.6万亿美元的亚马逊是实用主义的典范。它不仅承诺会一直让亚马逊的商品价格更低、送货更快、品种更全，还承诺会不断提高亚马逊网络服务（AWS）的云计算能力。而蓝色起源的愿景却是乌托邦式的，它的资金来自贝佐斯出售的亚马逊股票。它想让“数百万人未来能够在太空生活和工作，以造福地球”。它希望通过制造可返回且可完全重复使用的运载火箭来实现这个目标。它的亚轨道飞船新谢泼德号（New Shepard）已经完成了十几次飞行。但它的载人太空旅游项目已经比原计划晚了好几年。蓝色起源目前的主要客户是美国政府。

两家公司运营的透明度和速度也不同。亚马逊在成立的第三年上市。它创立之初的座右铭是“快速扩张”（get big fast），它对创新的执着追求包括不惧失败。而蓝色起源在2000年成立后的好几年中都处于保密状态。它自称是乌龟而不是兔子。它的座右铭是Gradatim Ferociter，这个拉丁语意为“步步为营，勇往直前”。正如贝佐斯所言，“如果你是在造一架飞行器，就走不得任何捷径。”

再看它们对待竞争对手的方式。主导电子商务和云计算领域的亚马逊以开拓者自居，傲视对手。贝佐斯告诉员工要畏惧客户而非竞争对手。而蓝色起源落后于人。它正在努力追赶另一位富豪太空迷伊隆·马斯克的火箭公司SpaceX。英国大亨理查德·布兰森（Richard Branson）的上市公司维珍银河（Virgin Galactic）也是对手。洛克希德·马丁（Lockheed Martin）和诺斯罗普·格鲁曼（Northrop Grumman）等老牌航天公司既是它的合作伙伴，也是竞争对手。波音是另一家强大的成熟企业。

不过，在亚马逊，贝佐斯已经证明自己有能力管理两个截然不同的企业——一个以纸板箱闻名，另一个以云计算著称。正如他在2015年写道的，亚马逊和AWS看起来可能不同，但它们遵循相似的基本运作原理。蓝色起源和亚马逊可能也是这样。

| 天梯

首先，两家公司的愿景都以一套简单的叙事来传达。亚马逊的愿景是关注客户满意度，这一点得到了员工、供应商和股东的一致认同。蓝色起源的

核心信念是可重复使用的火箭会降低成本，这样很多人就有机会进入太空。这些说法被不厌其烦地重复。

其次，两家公司都有惊人的雄心壮志。亚马逊为顾客提供的新物品常常拓宽了他们对于自己需要什么的认识，比如Kindle、AWS、Echo智能音箱，以及由机器学习驱动、声音柔和的语音助手Alexa。在蓝色起源这一边，贝佐斯希望掀起创业潮，带动其他人追随他的“太空之路”，在此过程中开创一个商业新时代。

最重要的是，两家公司都灌注了贝佐斯致力于长期发展的理念。在亚马逊的致股东信中，他一再重申自己想要通过投资在多个行业赢得市场领导地位，而不是优先考虑短期利润。而蓝色起源即便不是放眼几百年，至少也是几十年。两者都受益于贝佐斯既能全力以赴地捡芝麻，又不会丢了西瓜的本事。

贝佐斯的太空情结对他在亚马逊的未来意味着什么？这仍是个挥之不去的问题。这本书未提及一些争议性事件，比如这个电商帝国如何对待第三方卖家、致使商业街空心化，以及阻挠员工组建工会等。它重复了“对亚马逊而言每天都是第一天”这样的陈词滥调，尽管天色似乎已经不早了——亚马逊在电子商务和云计算领域的对手提高了竞争力，同时它自己也面临更大的政治压力。从这本书也看不出亚马逊最赚钱的部门AWS是否应该被拆分，或者贝佐斯何时会退位。但它明确了一件事，即正如贝佐斯去年所说的，蓝色起源是“我当前最重要的工作”。总有一天，蓝色起源不仅会把贝佐斯送入轨道，也会把他带离亚马逊这艘母舰。■



Cross-border lending

Making inroads

The overseas activities of Chinese banks shift up a gear

CHINA'S BANKING system, with \$35trn in assets, is the world's largest. Its four biggest lenders, measured by assets, head the global league table. Yet Western banks rarely come up against Chinese peers in foreign climes. That has fed the stereotype that China's banks are either uninterested in global business or, staffed by staid bureaucrats and stuffed with bad loans, are uncompetitive abroad. A new study suggests that this portrait is wide of the mark.

In fact the global footprint of China's banks has grown to rival that of Western lenders. In June this year its deposit-takers, including some of its policy banks, accounted for 7% of total cross-border lending flows, up from 5% in 2015, and lent to 196 out of 216 countries. A recent paper by Catherine Koch and Swapan-Kumar Pradhan of the Bank for International Settlements (BIS) and Eugenio Cerutti of the IMF explains why the rich world hasn't noticed: China's banks reign in poorer markets that Western lenders either never entered or are now abandoning.

Chinese banks provide 26% of all cross-border loans to developing countries today, most of them in dollars (see chart). That is up from a fifth in 2016, and has risen since the pandemic. (Ms Koch points out that the BIS's figures cover only countries that report to it, and suspects that the true share could be higher.) China's share is still lower than that of European banks, which, though retrenching, account for 34% of cross-border lending to poor countries. In half of these places, though, its banks are now the largest cross-border lenders.

Banks from emerging economies are typically reluctant to lend far away

from home, perhaps because their own markets are still growing and the creditworthiness of far-flung borrowers is harder to assess. By looking at loans made by banks from their home base, as well as by their foreign subsidiaries, the researchers show that Chinese lenders are not so put off. In that sense they resemble banks from Europe and America, says Mr Cerutti, even though they are typically state-owned and their overseas expansion is much more recent.

In another respect, however, China's banks stand out. Cross-border loans tend to be correlated with trade and investment flows, which give lenders more information about foreign borrowers. The link between lending by China's banks and bilateral trade is especially strong. But lending bears little relation to investment flows. The authors suspect that this reflects China's capital controls, and the fact that its portfolio investments target rich markets.

What does all this mean for borrowers? The rise of China's banks brings both risk and reward. One concern has been that the lending has added to some poor countries' debt woes. In some places China's banks are now important enough that, if a shock causes them to pull back, then a local credit crunch could ensue. But China could be a source of needed capital too. Strong inflows into the country this year mean that its banks are flush with dollars. If recent form is a guide, a chunk will be recycled into developing countries. ■



跨境贷款

开疆拓土

中资银行加速海外扩张

中国的银行体系拥有35万亿美元资产，规模为世界最大。以资产衡量，中国的四大行在全球排名最前。然而，西方银行却很少在国外遭遇中国同类的挑战。这加深了一种刻板印象，即中资银行要么对全球业务不感兴趣，要么就是充斥古板的官僚和坏账而在海外缺乏竞争力。一项新研究表明，这样的描画错得离谱。

事实上，中资银行的全球足迹已扩展到可与西方银行相匹敌。今年6月，包括一些政策性银行在内的中国存款机构贡献了跨境贷款总额的7%，高于2015年的5%，向216个国家和地区中的196个放贷。国际清算银行（BIS）的凯瑟琳·科赫（Catherine Koch）和斯瓦潘-库马尔·普拉丹（Swapan-Kumar Pradhan）以及国际货币基金组织（IMF）的尤金尼奥·塞鲁蒂（Eugenio Cerutti）近期发表了一篇论文，解释了富裕国家为何没注意到这种扩张：中资银行掌控了那些西方银行从未进入或正在放弃的较贫穷的市场。

在提供给发展中国家的所有跨境贷款中，中资银行如今占26%，其中大部分是美元贷款（见图表）。这相比2016年时五分之一的占比已经提升，而且自疫情发生以来继续攀升。（科赫指出国际清算银行的数据仅涵盖向其报告的国家，他怀疑真实份额可能更高。）中资银行的份额仍低于欧洲的银行，尽管后者正在缩减这部分放贷，但仍占面向穷国的跨境贷款的34%。不过，中资银行在其中一半地区都是最大的跨境贷方。

新兴经济体的银行通常不愿给距离本国很远的地区放贷，这或许是因为它们自己的市场仍在发展，以及偏远地区借款人的信用更难评估。研究人员查看了各家银行大本营以及它们国外子公司的放贷情况，结果显示中资银行倒没怎么退却。塞鲁蒂表示，从这个意义上说它们和欧美的银行相似，尽管它们通常为国有，海外扩张也晚得多。

但在另一个方面，中资银行很不一样。跨境贷款往往与贸易和投资流动相关，银行可从这些渠道获得更多关于外国借款人的信息。中资银行的放贷与双边贸易的联系尤其紧密，但与投资流动没什么关联。几位作者怀疑这反映了中国的资本管制，以及它的组合投资瞄准的是富裕市场。

这一切对借款人意味着什么？中资银行的崛起带来了风险，也带来了回报。一个担忧是这些贷款加剧了一些穷国的债务困境。中资银行如今在一些地方作用重大，如果一场冲击导致它们回撤，可能引发局部的信贷紧缩。但中国也可能成为所需资本的来源。今年大量资金流入中国，这意味着其银行美元充裕。如果近期的情况可作为一种参考，那么其中的一大块又会被收集利用，流向发展中国家。■



Video games

The games are only just beginning

A battle royale between the new PlayStation and Xbox consoles is kicking off. But gaming's prospects—and millions of new users—depend on streaming

THERE IS NOTHING quite like a captive audience. When Sony, a Japanese electronics giant, reported its latest set of quarterly results on October 28th, the star performer was the firm's video-gaming division, which makes the PlayStation line of consoles. Had it been a normal year, revenues would probably have been down, because Sony's current model—the PlayStation 4—is coming to the end of its life.

But in a year marked by lockdowns and working from home, gaming revenue instead grew by 11.5% year-on-year (and operating profits by 61%) as housebound consumers reached for their controllers. Sony is not alone. Microsoft, its gaming arch-rival, released its own results the day before. Its Xbox One console is similarly superannuated, yet revenues jumped by 30%. The good times have been repeated across the industry (see chart).

Most forecasters expected covid-19 to boost the video-gaming business. The pandemic has given a fillip to other forms of indoor entertainment, from board games to video-streaming to books. But the scale of the surge has caught industry-watchers by surprise. Tony Habschmidt, head of consulting at Newzoo, a games-industry analytics firm, says that when the pandemic began, his company predicted a boost of around \$2bn to industry revenues on top of its existing forecasts. The latest figures, he says, suggest the real figure has been nearer \$17bn. Newzoo now reckons industry revenues will reach \$175bn this year, a rise of 20%. Even for an industry that had been growing by 9% annually, 2020 has been a barnstorming year.

It is not over yet. Amid a blitz of adverts, trailers and PR, Sony and

Microsoft are replacing their existing consoles with new, more powerful machines. On November 10th Microsoft released the Xbox Series X. Sony responded two days later with the PlayStation 5. With a locked-down Christmas looming in many parts of the world, demand for both will be high. If industry rumours about pre-orders are correct, some consumers may have to go without.

At the same time, both firms will be keeping their eyes on several big new competitors. Amazon, Facebook and Google all think the time is right to try their luck in the gaming business. Over the past decade streaming has revolutionised music, television and films. The tech giants think cloud computing, fast broadband and 5G mobile networks mean the time is right to try the same thing with video games.

Start with the consoles themselves. Sony won the previous round of the console wars, selling over 100m PlayStation 4s and more than 1bn games. Microsoft does not provide official figures, but most analysts reckon that sales of the Xbox One (confusingly, the Xbox's third iteration) were only half as high. Most expect Sony to outsell its rival this time, too. Piers Harding-Rolls at Ampere Analysis, a media-analysis firm, thinks 5m new PlayStations will be sold in the run-up to Christmas, compared with 3.9m Xboxes.

One reason is brand loyalty. "There's very much a cult following when it comes to consoles," says Michael Pachter, an analyst at Wedbush Securities. "PlayStation owners will mostly buy another PlayStation, and Xbox owners will get a new Xbox." Another is Sony's strategy, which focuses on existing gamers. Analysts think the firm is selling the machines at a loss—a common tactic for console-makers. Sony's marketing has emphasised exclusive, big-budget games that are aimed at committed gamers and are not available elsewhere.

Sony's executives will be hoping the analysts' projections are right, because the PlayStation 5 is vital to its future. The firm's gaming division is now its largest. Its recent success has cushioned the impact of problems elsewhere, such as in its imaging division, which has suffered from the troubles of Huawei, a Chinese tech giant that is one of its big customers.

Microsoft, for its part, professes itself unworried about precisely how many new Xboxes it sells. It is just as focused on expanding the market as on trying to win over existing gamers. More than 3bn people own smartphones, and mobile games—smaller and more casual than console titles—are the most popular sort of app. Phil Spencer, who runs Microsoft's Xbox division, estimates that only around 200m households worldwide are willing—or able—to splash out on an expensive piece of gaming hardware like a console.

Microsoft is therefore trying to lower the barriers to adoption. It will offer hire-purchase deals for its new Xbox. It is heavily promoting "Game Pass", a subscription service that offers access to an online library of hundreds of games for up to \$15 per month (a quarter of the upfront cost of a typical high-end console game).

| *Cloud strife*

The centrepiece of this strategy is a service called xCloud, which aims to remove the need to own a dedicated console at all, by running games in distant data-centres and streaming the results to smartphones, internet-connected TVs, or any screen that can be hooked up to the internet and a game controller.

In rich countries, streaming could let gamers play anywhere, not just at home—doing for games what Spotify and Netflix have done for music and films. In poorer countries, where smartphones are common and data plans are cheap, it could bring console gaming within the reach of millions of

new players. “There are 1.2bn people in Africa and the average age is 20,” says Mr Spencer. “Many of them follow our games—they know the characters, the stories, even the release dates. They just lack devices on which to play them”.

Game-streaming is not a new idea. Previous attempts have been plagued by technical problems (streaming a game, which must react instantly to a player’s actions, is far harder than streaming a film or song to a passive viewer). And Microsoft is not the only firm that thinks the time is now ripe. Sony offers its own version, called “PSNow” (though it is limited to older games), as does Nvidia, a gaming-focused chipmaker, and several other firms. Other tech giants with little experience of video-gaming are also piling in. Google launched “Stadia” in 2019. Amazon announced its “Luna” service in September. On October 26th Facebook threw its hat into the ring with its own “Facebook Gaming” service.

Game-streaming sounds attractive on paper, but few expect it to transform the industry overnight. “I would describe the market as embryonic,” says Mr Harding-Rolls. Still, there is huge interest: Ampere tracks 60 firms whose offerings are either in public testing or available for use. And if streaming does take off, it is likely to prove just as disruptive as it has been in other media. “If you can make streaming work, you could grow the gaming market tenfold,” reckons Mr Pachter. The video-streaming wars have seen deep-pocketed tech giants and media companies spend billions on content. Similar jockeying may be under way in games. On September 21st Microsoft bought ZeniMax Media, which makes the best-selling “Fallout” and “Elder Scrolls” series of games, for \$7.5bn.

It is too early to pick out winners and losers, but most analysts think Microsoft is well positioned. Its Azure cloud business is the world’s second-biggest, giving it a reach that many competitors lack. Last year Sony, which lacks cloud infrastructure of its own, said it was exploring the option of

using Azure to power its own gaming services. And unlike Google or Amazon, its only real cloud rivals, Microsoft has decades of experience in the games business.

But its competitors have strong points, too. Amazon has 150m subscribers to its Prime service, which already includes streamed video and music. Google could leverage YouTube, where gaming videos are popular. Facebook plans to pitch its service at people who already play simpler, browser-based games on its existing platform, which boasts over 2bn users a month. And Sony's success with the PlayStation has proved that size is not everything. There is all to play for. ■



电子游戏

游戏才刚刚开始

新款PlayStation和Xbox之间的“大逃杀”已经开局。但游戏产业的前景以及能否吸引数百万新用户取决于流媒体

拥有一批“死忠粉”是再好不过的。10月28日，日本电子巨头索尼公布了最新季度业绩，旗下表现最好的是生产PlayStation系列游戏主机的电子游戏部门。换作是平常年头，收入可能会下降，因为索尼当前一代的游戏主机PlayStation 4已进入它生命周期的尾声。

但在一个到处封锁、居家办公的年头里，困守家中的消费者打游戏寻乐，游戏收入反而同比增长了11.5%（营业利润上升了61%）。不止索尼如此。它在游戏领域的老对手微软在前一天发布了业绩。微软的Xbox One游戏主机同样是快要淘汰的老款，但收入却跃升了30%。整个行业都上演了这种繁荣景象（见图表）。

大多数预测者之前都认为新冠疫情会助推电子游戏业务增长。疫情已经刺激了桌游、视频流媒体以及图书等其他形式的室内娱乐的增长。但游戏业的增长幅度之大还是让行业观察人士感到惊讶。游戏行业分析公司Newzoo的咨询主管托尼·贺博施密特（Tony Habschmidt）表示，其公司在疫情初期预测，行业收入会在之前预测数字的基础上增加约20亿美元。他说，最新数据表明，实际数字已接近170亿美元。Newzoo现在估计今年行业收入将达1750亿美元，增长20%。即使在年增速已达9%的电子游戏业，2020年也堪称爆发增长的一年。

不止于此。索尼和微软正推出性能更强大的新产品替换现有老款。在一轮广告、预告片和公关轰炸后，微软于11月10日发布了Xbox Series X，索尼在今天以PlayStation 5迎战。今年圣诞期间世界很多地方可能都处于封城状态，对这两款游戏主机的需求会很高。如果有关预售情况的业界传闻是真的，那么部分消费者也许还抢不到货。

与此同时，这两家公司会继续紧盯几大新对手。亚马逊、Facebook和谷歌都认为现在是时候进入游戏业一试身手了。过去十年，流媒体彻底改变了音乐、电视和电影产业。这些科技巨头认为，云计算、高速宽带和5G移动网络意味着现在到了彻底改变电子游戏业的好时机。

先看游戏主机。在上一轮主机大战中，索尼是赢家，售出超过一亿台PlayStation 4和十亿多套游戏。微软没有公开官方数据，但大多数分析师估计Xbox One（名字易混淆，实际是Xbox的第三代产品）的销量仅为前者一半。多数人预计这次的销量赢家还是索尼。媒体分析公司安培分析（Ampere Analysis）的皮尔斯·哈丁-罗尔斯（Piers Harding-Rolls）认为，圣诞节前新款PlayStation的销量会达到500万台，而Xbox估计会售出390万台。

一个原因是品牌忠诚度。“游戏主机可说有大批狂热粉丝，”维德布什证券（Wedbush Securities）的分析师迈克尔·帕切特（Michael Pachter）说，“玩PlayStation的大多会再买一台PlayStation，玩Xbox的再买新的Xbox。”另一个原因是索尼的策略专注于现有玩家。分析人士认为索尼在亏本出售游戏主机——这是游戏主机制造商的普遍策略。索尼的营销重点是瞄准死忠玩家的、在别处玩不到的独家大制作游戏。

索尼的高管会希望这些分析师预测准确，因为PlayStation 5对公司前景至关重要。游戏部门现在是索尼旗下最大的业务部门，它近期的辉煌业绩缓冲了其他部门遭遇的冲击，比如索尼的影像部门因为华为的麻烦而受损——这家中国科技巨头是索尼的大客户之一。

微软自称不担心新款Xbox到底能卖出多少。它既努力争夺现有玩家，也注重扩展市场。全球超过30亿人拥有智能手机，手机上最受欢迎的应用是游戏，而手机游戏比主机游戏更轻巧、休闲。微软Xbox部门的负责人菲尔·斯宾塞（Phil Spencer）估计，全世界只有约两亿家庭愿意或有能力花大价钱购置游戏主机这样的昂贵游戏硬件。

因此，微软正在努力降低玩游戏的门槛。它将为新款Xbox提供分期付款购

买计划。它正大力推广订阅服务“游戏通行证”（Game Pass），每月最高支付15美元（相当于一款高端主机游戏一般售价的四分之一）就能在线访问有数百款游戏的资源库。

| 云争斗

该策略的核心是名为xCloud的服务，目标是在远程数据中心运行游戏并把结果通过流媒体传输到智能手机、互联网电视或任何可连接互联网和游戏控制器的屏幕上，从而免除购置专门的游戏主机的需要。

在富裕国家，流媒体可以让玩家在任何地方玩游戏，而不只在家里，就像Spotify和奈飞（Netflix）在音乐和电影上做到的那样。在智能手机普及且流量套餐价格便宜的较贫穷国家，流媒体也许能为主机游戏发展出数百万新玩家。“非洲有12亿人口，平均年龄20岁，”斯宾塞说，“他们中许多人是我们的游戏迷，知道游戏角色、故事，甚至发行日期。他们缺的只是玩这些游戏的设备。”

“游戏流”不算什么新概念。过去的尝试一直受制于技术问题（游戏流传输必须对玩家的动作立即做出反应，相比观众被动接收数据的电影或音乐流要困难得多）。认为目前时机已成熟的公司不止微软。索尼也有自己的游戏流服务，名为“PSNow”（但只提供老款游戏）。专注为游戏供应芯片的制造商英伟达（Nvidia）等几家公司也有类似的产品。其他缺乏电子游戏经验的科技巨头也纷纷涉足。谷歌在2019年推出Stadia。亚马逊在今年9月宣布推出Luna服务。Facebook在10月26日推出Facebook游戏服务，加入战圈。

游戏流在理论上很吸引人，但很少有人认为它会在一夜之间改变整个行业。“我觉得市场现在还在萌芽状态。”哈丁-罗尔斯表示。尽管如此，大家还是兴致高涨。安培分析追踪到了60家正在公开测试或已开放使用游戏流服务的公司。而如果游戏流真的普及起来，对行业的颠覆可能不亚于在其他媒体领域已经发生的。帕切特认为，“如果能用好流媒体，游戏市场可能增长到原来的十倍。”在视频流大战中，财力雄厚的科技巨头和媒体公司在内容上投掷了数十亿美元。类似的争夺也许正在游戏业上演。9月

21日，微软以75亿美元的价格收购了制作过畅销游戏系列《辐射》（Fallout）和《上古卷轴》（Elder Scrolls）的游戏开发商 ZeniMax Media。

现在要说谁输谁赢还为时过早，但大多数分析师认为微软处于有利地位。它的Azure云业务是全球第二大云服务，这是许多竞争对手不具备的覆盖度。去年，没有云基础设施的索尼表示正在研究用微软的Azure支持自己的游戏服务的可能性。谷歌或亚马逊尽管在云服务上是微软仅有的真正的竞争对手，但它们不像微软那样拥有几十年的游戏业务经验。

然而，这些竞争对手有它们自己的优势。亚马逊的Prime服务（已包含视频及音乐流媒体服务）拥有1.5亿订户。谷歌可以利用游戏视频风行的YouTube。Facebook计划向已经在它现有的平台上玩简单的网页游戏的人推销服务，该平台号称月度用户超过20亿。而索尼PlayStation的成功证明了规模并非一切。输赢未知，一切大有可玩。■



Buttonwood

Blitz-coin

Revisiting the investment case for bitcoin

EVERY TUESDAY for most of 1979-80, the Blitz wine bar in Covent Garden was host to an influential club-night. London was then a run-down city. The Blitz was a seedy spot. What made it remarkable were the Blitz Kids, the extravagantly dressed Tuesday-night regulars. A teenage Boy George worked in the cloakroom. The door policy was strict. To get in, said Steve Strange, who ran the club-night, you had to look “like a walking piece of art”. Mick Jagger was once refused entry.

This all seemed shallow and transient. The make-up, the get-ups and the evident disdain for people who were not walking pieces of art were marks of unseriousness. Yet the Blitz Kids, a mix of art students and urchins, would go on to shape popular culture, according to “Sweet Dreams: The Story of the New Romantics”, a new book by Dylan Jones. This brings us to another hangout for oddballs, fantasists and drop-outs: bitcoin. To most people it seems at best a fad, at worst a con-job. But it refuses to disappear. And its price in dollars is up by around 150% since March.

It is hard to have a sensible conversation about bitcoin. To show interest is to invite contempt from sceptics and an inbox stuffed with get-rich-quick proposals from boosters. But a nagging thought will not go away. What if these crypto-kids are on to something just as the much-derided Blitz Kids were? After all, as well as notoriety, bitcoin has ingenuity and scarcity on its side.

Start with the ingenuity. Even people who are hostile to bitcoin will concede that its technology is fiendishly clever. It is essentially a way of accounting for who has spent what. Instead of a central exchange to keep

score, and to verify payments and receipts, it uses an electronic ledger that is distributed across the entire system of bitcoin users. The system's dispersed nature means that tampering with the accounts would require gaining control over a majority of the network's computers. That is an important source of trust in bitcoin.

A big part of its appeal to users is that no one official entity—no government, bank or tech firm—is in charge. (This is also what a lot of people dislike about it.) The system is self-regulating. It is also self-limiting. Bitcoins are “mined” when a computer solves a very time-consuming maths problem. It must identify a large number encrypted in the system's code. Over time the remaining numbers become harder to find. Eventually the mine will be exhausted. Bitcoin's supply protocol is as restrictive as the Blitz's door policy. Only 21m bitcoins will ever be produced.

Millennial techies are at home with all this. The older technophobic crowd tends to be hostile. So be it. “That most people still hate bitcoin isn't a bad thing,” writes Dylan Grice of Calderwood Capital, an alternative-investment boutique, in a recent letter to clients. This is to say that it is difficult to make a lot of money buying an asset that everybody likes. And as with the Blitz, the infamy and outrage is part of the allure. Older visitors might grumble that the music played there was unremarkable or that the venue was a dump. It didn't matter. The club acted as a focal point for like-minded people. That is an underrated virtue. Thomas Schelling, a Nobel prize-winning economist and game theorist, contended that people gravitate towards focal points without formally agreeing to do so. His insight extends to asset markets. Gold bars—or bitcoins—have value if enough people tacitly agree that they do.

What precisely might that value be? An honest answer is: “Who knows?” Bitcoin has no intrinsic worth. As with gold, there is no stream of future

dividends to build a valuation around. Yet people have become comfortable with gold as an asset because it has been around for so long. Bitcoin is a newcomer, but its use is growing. So if you believe it has a future, you may want to own some, says Mr Grice. Indeed if you like gold as a hedge against a revival in inflation or some other calamity, you might consider transferring some of your gold allocation to bitcoin. It has advantages over the precious metal: it can be more easily stored and transferred, for instance. In some places, you can actually use it.

Bitcoin is a pretty tiny club. Beside it, gold looks as capacious as Wembley Stadium. The market value of all bitcoin is just 1-2% of the value of all the gold above ground. Scarcity is a trait of many things that are perceived to have value. Steve Strange, who sadly died in 2015, understood this fully. "The best move I ever made was turning Mick Jagger away at the door," he said. ■



梧桐

闪击币

重新审视比特币的投资理据

在1979到1980年的大部分时间里，考文特花园的“闪击”（Blitz）酒吧每周二都会举办轰动一时的夜店聚会。当时的伦敦破败萧条。这个酒吧也是个乌烟瘴气的地方。让它不同凡响的是一群衣着夸张的周二之夜常客，人称“闪击小孩”（Blitz Kids）。当时十几岁的乔治男孩（Boy George）在那里的衣帽间工作。那儿的入场规定十分严格。周二看场子的史蒂夫·斯特兰奇（Steve Strange）说，要想进来，你看起来得“像一件行走的艺术品”。米克·贾格尔（Mick Jagger）曾被拒之门外。

这一切看起来肤浅而短暂。浓妆艳抹、奇装异服、对那些没有行走艺术品范儿的人赤裸裸的不屑——看起来都像是闹着玩的。但是，迪伦·琼斯（Dylan Jones）在新书《甜美的梦：新浪漫主义者的故事》（Sweet Dreams: The Story of the New Romantics）中指出，由艺术生和坏孩子组成的闪击小孩之后却塑造了流行文化。讲到这里，就带出了另一个怪咖、幻想家和辍学生的聚集地：比特币。对于大多数人来说，比特币往好了说是一种时髦，往坏了说就是一场骗局。但它拒绝昙花一现。自3月以来，其美元价格已经上涨了150%左右。

很难就比特币做理智的探讨。一旦你表现出兴趣，就会招来质疑者的蔑视，而邮箱里很快会塞满支持者发来的快速致富法。但你的脑海里有个声音挥之不去。万一这些年轻的加密狂人和当年备受讽刺的闪击小孩一样，会搞出些名堂来呢？毕竟，虽然声名狼藉，比特币还具有独创性和稀缺性。

先来看独创性。即使是厌憎比特币的人也得承认它的技术极其聪明。本质上，这是一种记录谁花了多少钱的记账方法。它没有采用一个中央交易所来记账和验证收付款，而是使用了一个分布在整个比特币用户系统之中的电子分类账。这个系统的分散性意味着要想篡改账本就必须取得网络中大

部分计算机的控制权。这是比特币可信度的重要来源。

比特币对用户的吸引力很大程度上源自它不归任何一个官方实体掌管，无论是政府、银行还是科技公司。（这也是很多人不喜欢它的原因。）这个系统是自我监管的，也是自限的。要“挖到”比特币，需要用计算机解决一个非常耗时的数学问题。它必须找出一个用系统代码加密的大串数字。随着时间的推移，剩下的数字将越来越难找。最终比特币矿源会枯竭。比特币的供应规则和闪击酒吧的入场规则一样有限制性。一共只会产生出2100万枚比特币。

千禧一代的科技控对这一切甘之如饴。年长一点的“科技恐”则很反感。这没什么。精品另类投资管理公司卡尔德伍德资本（Calderwood Capital）的迪伦·格莱斯（Dylan Grice）最近在给客户的信中写道：“大多数人仍然讨厌比特币，这不是坏事。”意思就是说，去买一种人人都喜欢的资产很难赚到大钱。另外，和闪击酒吧一样，恶名和出格是其诱惑力的一部分。年长的客人可能会抱怨那里播放的音乐平平无奇，或者环境肮脏不堪。这没关系。这个夜店充当了志趣相投者的汇聚点。这是一种被低估的优点。获得诺贝尔奖的经济学家和博弈论专家托马斯·谢林（Thomas Schelling）认为，在没有正式达成过共识的情况下，人们也会向焦点汇聚。他的洞见也适用于资产市场。只要有足够多的人默认金条——或比特币——有价值，那么它就有价值。

那么它究竟价值几何？坦白的回答是：“谁知道呢？”比特币并不具备内在价值。和黄金一样，它不能持续产生未来的分红，因此无法据此来估值。但由于黄金历史悠久，人们已经习惯于把它视为一种资产。比特币是个新生事物，但它的使用正在扩大。所以如果你相信它有未来，或许可以持有一些，格莱斯说。如果你喜欢用黄金来对冲通胀复苏或其他灾难，那就真的可以考虑将一部分黄金配置转为比特币。它相比这种贵金属有一些优势，例如它的储存和转让更加方便。在某些地方，你甚至还可以花掉它。

比特币是一间非常小的夜店。相比之下，黄金看起来就像温布利球场般宽广。全部比特币的市值仅为所有已开采黄金价值的1%到2%。稀缺性正是

许多被视为有价值的事物共有的特征。不幸已于2015年去世的斯特兰奇就深谙这个道理。他曾说，“我最明智的举动就是把米克·贾格尔拦在了门外。”■



Demography

Go figure

The world's largest census begins

IN THE COMING weeks nearly every Chinese house will receive a knock on the door. On November 1st 7m functionaries began carrying out the country's ten-yearly census, a task that will take them until December 10th. The last such count, in 2010, found that China's total population was growing only half as swiftly as it did between 1991-2000. This year's megacount will provide further details about the country's demographic crunch.

Censuses are difficult everywhere, but China's is especially fraught. Its hundreds of millions of migrant workers are tricky to count, not least because some fear reprisals for having moved to parts of the country that the Communist Party would like them to leave. Some people do not want officials to find out that they have had more children than family-planning policies allow. Fraudsters and thieves who have posed as census-takers during past counts have given enumerators a bad name. And local governments have sometimes sought to inflate population figures in order to claim more subsidies from Beijing.

This time, says the government, new paperless systems will help to protect people's information and make it harder for anyone to fiddle the count. There are also plans to substitute door-to-door visits with phone calls and online forms, if census officials in some places have to work around local outbreaks of covid-19. Whereas many Chinese shy from the box-tickers, some are hoping to use this year's exercise to help make themselves more visible. A gay-rights group in the southern city of Guangzhou is encouraging people in same-sex relationships to make sure census-takers realise they are a couple, and to insist that they write this information into

an open field in the census form.

The findings from China's previous census helped persuade the party that it had to loosen its one-child-per-family policy. Since 2016 Chinese couples risk punishment only if they have more than two. Yet the total number of births is declining even faster than it was before the change. Last year the country produced the fewest babies since 1961, when its population was only half as large. The birth rate, of 10.48 babies per 1,000 people, was the lowest since the party took power in 1949.

The government reckons that China's working-age population has been shrinking since 2012. The share of people aged 60 and over has risen from 10.4% at the census in 2000 to an estimated 18% last year; this group could make up one-third of the population by 2050. The Chinese Academy of Social Sciences, a government think-tank, guesses that the number of Chinese will peak at 1.44bn in 2029. But some demographers think that the population may already have started to shrink.

Preliminary results from this year's census will not be released for some months. But it does not require an army of enumerators to see that the coercive regulation of Chinese couples' fertility is as absurd as it is cruel. In June Chinese journalists reported that a couple in Guangzhou had been fined 320,000 yuan (\$48,000) after declining to abort their third child—a sum equal to nearly three years of their household income. Someday, perhaps, Chinese people will be allowed to make their own reproductive choices. ■



人口统计

数数清楚

全球最大规模人口普查启动

接下来几周，几乎每户中国家庭都会有人登门造访。自11月1日起，700万名公职人员开展每十年一次的全国人口调查，这项工作会持续到12月10日。上次人口普查是在2010年，当时显示全国总人口的增长速度只有1991至2000年间增速的一半。今年的大规模统计将进一步提供有关中国人口紧缩的详情。

人口普查在任何地方都很难，但在中国格外艰巨。中国数以亿计的外来务工人员难以统计，尤其因为有些人担心因迁到了共产党希望他们离开的地区而遭到打击报复。有些人不想让官员发现他们的子女数量超出了计划生育政策的规定。过去的人口普查中曾有诈骗犯和小偷冒充人口普查员，败坏了这个职业的名声。而且地方政府为获得更多国家补贴，有时也会试图夸大人口数字。

中国政府表示，这一次新的无纸化系统将有助于保护群众的信息，也让统计数字更难被任何人做手脚。此外也有用电话和网上填表代替挨家挨户走访的备用计划，这样一旦某些地方爆发局部疫情，普查员可以有变通的办法。虽然很多中国人都避讳人口普查员，有些群体却希望通过今年的普查让自己“被看见”。广州一个同性恋权益组织正在鼓励同性恋伴侣确保普查员明白他们的关系，要坚持把这一信息写入普查表对应的栏目中。

上一次人口普查的结果出来后，共产党更加确信放宽独生子女政策已经势在必行。自2016年起，中国夫妇只有在生育超过两名子女时才会面临惩罚。但如今出生人口的下降速度甚至比实施这次政策转向之前更快了。中国去年的新生儿数量是1961年以来最少的，当年的人口总数只有现在的一半。去年出生率为每千人生育10.48个婴儿，是1949年共产党执政以来的最低值。

当局估计中国的劳动年龄人口自2012年以来一直在减少。60岁及以上人口的占比从2000年人口普查的10.4%升至去年估计的18%；到2050年可能会占到总人口的三分之一。政府智库中国社科院估计中国人口将于2029年达到14.4亿的峰值。但有些人口学家认为也许人口已经开始萎缩了。

今年人口普查的初步结果还要等几个月才会公布。但无需出动人口普查员大军也能看出，对中国夫妇生育的强制管控既荒谬又残酷。6月，中国记者报道称，广州一对夫妻在拒绝打掉第三个孩子后被罚32万元——相当于他们近三年的家庭收入。也许有朝一日，中国人能得以做出自己的生育选择。 ■



Samsung

The Lee way

Where the death of its patriarch leaves South Korea's biggest firm

IN THE SPRING of 1995 word got to Lee Kun-hee that a batch of Samsung's brand-new mobile phones, which it had doled out as new-year gifts, did not work. Incensed, the group's chairman ordered employees at the factory that had made the offending devices to pile up tens of thousands of them in a courtyard. A cool \$45m-worth of equipment then went up in flames.

The episode is emblematic of the way Mr Lee (pictured), who died on October 25th aged 78, turned a South Korean maker of knock-off electronics into a technology powerhouse. He was obsessed with quality and demanded total devotion from executives. Every decade or so he made bold bets. His last one, on smartphones and semiconductors, paid off handsomely. Samsung Electronics, the group's crown jewel, has a market value of \$311bn, more than JPMorgan Chase, America's biggest bank.

The patriarch's death was not unexpected—he had been incapacitated since a heart attack in 2014. It will not prompt leadership changes. But it highlights two challenges facing South Korea's biggest *chaebol* (conglomerate). The group must find growth beyond maturing smartphone markets. And it has to grapple with Mr Lee's other legacy: an over-cosy relationship with politics that has embroiled his company, as well as his son and successor, Lee Jae-yong, in corruption cases.

The rise of Samsung mirrors that of South Korea. When Lee *père* took over from his father in 1987, the country was an emerging economy that had yet to make the transition to democracy. When he fell ill in 2014 it was rich, thriving and democratic. On his watch Samsung abandoned the "fast follow" strategy adopted by South Korean firms since the 1970s and allowed

himself “to imagine that his company could be number one in its own right”, says Park Ju-gun of CEO Score, a corporate watchdog. This entailed some mistakes, such as an expensive foray into carmaking. But it mostly brought success.

Although the group maintains businesses from shipbuilding and life insurance to amusement parks, the younger Mr Lee, de facto boss since 2014, has kept a focus on electronics. Today Samsung is the world’s biggest maker of smartphones and its second-biggest of memory chips. It has defended its position in mobile devices against competition from China. Lee *fits* has forged global partnerships, including with competitors such as Apple, which Samsung Display, a subsidiary, supplies with screens for iPhones. He has also begun to move the company away from producing solid but unsexy hardware towards an emphasis on design and software, which accounts for American big tech firms’ trillion-dollar valuations.

It has not all gone the Lees’ way. Wielding economic influence to preserve a corporate structure that benefits the founding family has landed them in trouble. Lee *père* was twice convicted for corruption, including bribing the president—and twice pardoned when politicians deemed his continued involvement in Samsung to be in the national interest. His son has already spent time in prison, for bribing a confidante of Park Geun-hye, a former president, to gain approval for a merger, which prosecutors allege helped him consolidate control over the Samsung empire. Ms Park was removed from office and Mr Lee is facing retrial on those charges, plus a fresh one on related accusations of manipulating stock prices to facilitate the merger. Mr Lee and Samsung deny wrongdoing.

If either case lands Mr Lee in prison, his leadership may be in jeopardy. That need not spell doom—the day-to-day running of the company is in the hands of professional managers. But it may make it harder to perform the late patriarch’s occasional, sweeping changes of direction.

Some of his son's bets seem to be working. Samsung Biologics, the listed biotech subsidiary, is building a new \$1.5bn factory. Its share price is up by 50% this year. That of Samsung SDI, a battery affiliate, has nearly doubled (see chart); it has invested \$2.1bn since January and is eyeing the electric-car market. It is planning to expand a factory in China and build a new one in Hungary. But at a combined value of \$63bn they look small next to Samsung Electronics. And competition in both areas is hot.

Samsung Electronics' third-quarter results on October 29th beat forecasts. It plans to spend around \$10bn on its contract-manufacturing chip business over the next ten years. American sanctions against Chinese technology firms, which have already hurt its smartphone rivals such as Huawei, may help with that—and with its flagging foray into 5G telecoms. But the firm warned of lower chip demand in the short term. And the market share of its chip “foundries” lags behind Taiwan Semiconductor Manufacturing Company, the industry leader. No new mega-bet in the style of Lee *père* is on the horizon.

Lee *filis* has apologised for his group's run-ins with the law and vowed to break with tradition and not pass control to his own progeny. The Lee family says it plans to pay the full inheritance tax on the patriarch's \$16bn shareholdings. Honouring his positive legacy may prove harder. ■



三星

李家出路

大家长去世，韩国最大企业何去何从

一九九五年春天，三星集团会长李健熙得知一批作为新年礼物分发给员工的全新三星手机出现故障。怒火中烧的他立即命令制造这款问题手机的工厂员工把十几万部设备堆到工厂的空地上，把整整4500万美元付之一炬。

李健熙（如图）于10月25日去世，享年78岁。他把一家韩国的山寨电子产品制造商打造成了科技巨头，当年这一幕很能说明他是如何做到的。他执着于品质，要求高管全心投入工作。每隔十年左右，他都会做出大胆押注。最后一次是押注智能手机和半导体，获得了丰厚回报。集团的瑰宝三星电子的市值达到3110亿美元，超过了美国最大的银行摩根大通。

这位掌门人的去世并非意料之外——2014年心脏病发作后，他就丧失了行动能力。这不会引发公司领导层变动，但突显了这家韩国最大的财阀面临的两大挑战。三星集团必须在趋于成熟的智能手机市场之外寻求增长。此外，还需解决李健熙遗留的另一个问题：与政界过度亲密。这样的关系已使他的公司和接任的儿子李在镕陷入腐败案件。

三星的崛起是韩国腾飞的写照。1987年李健熙从父亲手中接管三星时，韩国是一个尚未过渡为民主政体的新兴经济体，到2014年他病倒时，韩国已经成了富裕繁荣的民主国家。企业经营评估机构CEO Score的朴洙根说，在李健熙的治理下，三星放弃了韩国企业自上世纪70年代以来普遍采用的“快速跟随”战略，让他“可以想象自己的公司能凭借自身成为第一”。这个过程中三星走了一些弯路，例如涉足汽车制造就损失惨重。但大多数情况下是成功的。

尽管集团的业务范围仍涵盖从造船、人寿保险到游乐场的众多行业，但李在镕这位2014年以来三星的实际掌舵人还是一直专注在电子产品业务上。如今三星已是全球最大的智能手机制造商和第二大存储芯片制造商。面对

来自中国的竞争，三星保住了自己在移动设备领域的地位。李在镕在全球建立起合作关系，包括与苹果公司等竞争对手合作——集团子公司三星显示（Samsung Display）为iPhone供应屏幕。他还着手把公司业务重点从生产实实在在但欠缺魅力的硬件转向设计和软件——美国大型科技公司万亿美元市值都是基于后一块。

但李家父子也不是一路顺风顺水。他们利用经济影响力维持有利于创始家族的公司架构，这让他们惹上了麻烦。李健熙两次因行贿被定罪，包括贿赂总统，但两次均获赦免，因为政客们认为让他继续掌管三星符合国家利益。他的儿子为了让一项合并案获批而贿赂前总统朴槿惠的闺中密友，为此已入狱过一次。检方称该合并案有助李在镕巩固对三星帝国的掌控权。朴槿惠遭弹劾下台，李在镕正面临对这些指控的重审，另外还有一项有关操纵股价促成合并交易的新指控。他和三星集团均否认行为失当。

如果有任何一项罪名让李在镕入狱，他在三星的领导地位就可能不保。公司倒未必会因此颓败，毕竟日常运营是由职业经理人负责。但要实施已故掌门人那种偶尔的大幅转向可能变难了。

李在镕押注的一些领域似乎已见成效。三星集团的上市生物技术子公司三星生物制剂（Samsung Biologics）正斥资15亿美元建设一座新工厂。它的股价今年上涨了50%。生产电池的子公司三星SDI的股价也几乎翻倍（见图表），自今年1月以来该子公司已投资21亿美元，且正瞄准电动汽车市场。它正计划扩建在中国的工厂并在匈牙利建设新厂。但相比三星电子，这两家市值共计630亿美元的公司仍显弱小。而且这两个领域的竞争都非常激烈。

三星电子10月29日发布的第三季度业绩优于预期。公司计划未来十年在芯片代工业务上投入约100亿美元。美国制裁中国科技公司的行动已损害了华为等三星的智能手机竞争对手，这可能有助三星这项计划，并提振它在进军5G市场时的低迷态势。但该公司已警告短期内芯片需求将减少，而且其芯片代工厂的市场份额落后于行业领先者台积电。目前看来，还没有李健熙式的新豪赌在酝酿。

李在镕已为集团的违法行为道歉，并誓言要打破传统，不再让子女接班。李家表示将为继承李健熙的160亿美元股权支付全额遗产税。但要继承他的积极的遗产也许会更难。 ■



The Economist Film

Public Debt - the Essentials (trailer)

Between April and June, America alone has borrowed 3 trillion dollars - the largest since records began. How much of a cause for concern should the world's rising public debt be?



经济学人视频

关于公共债务，你该知道什么？（预告）

今年4到6月，仅美国就已经举债3万亿美元，创下有记录来的新高。我们应该在多大程度上为全球公共债务的上升感到担忧？



The yuan

Caveat victor

Is China suppressing the yuan?

CHINA, AS ITS leaders like to observe, has fared better than any other big country this year. It has all but halted the covid-19 pandemic, got its economy back on track and, to top it off, reaped a cash windfall from abroad. The last has stemmed from a surge in its trade surplus, thanks in part to its factories running at full tilt, and a rush of money into its bonds, thanks in part to its growth outlook. Victors do, it seems, get the spoils. In economic terms, victors should also have a much stronger currency. But that has not happened. The yuan's recent appreciation against the dollar has merely kept it in line with the yen and the euro. This raises the question, sure to rankle with officials in Beijing, of whether China is again manipulating its currency.

It is much harder to answer than in the past. For two decades until mid-2014 China's prodigious accumulation of foreign-exchange reserves was the clear by-product of actions to restrain the yuan, as the central bank bought up cash flowing into the country. A sharp drop in reserves in 2015-16 was evidence of its intervention on the other side, propping up the yuan when investors rushed out. Since then, China's reserves have been uncannily steady. This year they have risen by just 1%. Taken at face value, the central bank seems to have refrained from intervening. That is certainly what it wants to convey, regularly describing supply and demand for the yuan as "basically balanced".

The past half-year therefore presents a puzzle. Given that China has racked up big inflows, how can the yuan have remained stable without an offsetting increase in foreign-exchange reserves? One possible explanation lies on the balance-sheets of its commercial banks. Their foreign assets, net

of liabilities, have soared by \$125bn since April. China's big banks are all state-owned, so it is conceivable that the government has used them as proxies. Adding their foreign holdings to official reserves paints a picture more suggestive of intervention to suppress the yuan (see chart).

Several currency traders sense the hand of the state, albeit more discreet than in the past. "My guess is that the central bank now has special trading accounts at the state banks," says one. Yet it is not an open-and-shut case. Exporters themselves have wanted to keep a large portion of their revenues in dollars, worried that friction with America could end up hurting the yuan.

China also has many tools for influencing the exchange rate beyond direct intervention. On October 12th the central bank made it cheaper to short the yuan in forward trades, a signal that it wanted to limit appreciation. Then on October 23rd a currency regulator said that a "smart market" would always consider upside and downside risks, a reminder that China wants the yuan to be volatile but within a fairly tight range. "Chinese officials have perfected the game of telling American officials that they are not intervening while persuading market participants that they will intervene if necessary," says Brad Setser of the Council on Foreign Relations, a think-tank, who also advises Joe Biden's team.

If China is intervening, the most charitable defence is that it views its big lead in GDP growth as transient. A big jump in the yuan when other countries are hobbled would set it up for a potentially destabilising fall when they recover. Leaning against appreciation helps prevent that.

But if China's outperformance endures without being reflected in the yuan, charitable feelings will quickly evaporate. ■



人民币

敬告赢家

中国在抑制人民币升值吗？

正如其领导人所乐见的，中国今年的表现比所有其他大国都要好。它已基本遏止了新冠疫情，让经济重回正轨，除此之外，还从国外发了一笔横财。这笔横财来自贸易顺差激增，以及大量资金涌入其债券市场。前者在一定程度上缘于中国工厂全面复工，后者和经济增长前景乐观有关。看起来赢家确实收获了战利品。从经济学的角度看，赢家的货币也应该大幅走强。但这并没有发生。近期人民币兑美元的升值仅仅与日元和欧元一致。这就引发了一个肯定会让北京的官员恼火的质疑——中国是否又在操纵货币汇率。

这一次要回答这个问题要比过去难得多。在2014年年中之前的20年里，中国人民银行大举买进流入的外汇，中国庞大的外汇储备显然是抑制人民币升值的副产品。2015至2016年间，外汇储备急剧下降则是政府在投资者争相离场时实施反向干预推高人民币汇率的结果。自那以后，中国的外汇储备水平一直出奇地稳定。今年仅上升了1%。从表面上看，央行似乎已经停止了干预。它当然希望传递出这样的讯息，经常称人民币供求“基本平衡”。

因此，过去半年的情况让人疑惑。既然有大量资金流入中国，人民币汇率是如何在没有增加外汇储备来抵消的情况下保持稳定的？从中国的商业银行的资产负债表上或许能找到一个解释。自4月以来，这些银行的国外资产（扣除负债）飙升了1250亿美元。中国的大银行都是国有的，所以可以想到是政府把这些银行用作代理。如果把这些商业银行持有的外汇加到官方储备数字上，就更能显现政府抑制人民币升值的干预行为了（见图表）。

一些外汇交易员感觉到了政府插手，尽管比过去来得隐蔽。“我猜央行现在在国有银行有特殊交易账户。”一位交易员说。但事情并没有那么简

单。出口商担心中美摩擦最终可能打击人民币汇率，所以想以美元持有自己收入的大头。

除了直接干预外，中国还有许多影响汇率的工具。10月12日，人行下调外汇风险准备金率，降低远期做空本币成本，这是想要限制升值的信号。之后在10月23日，中国外汇管理局的一名官员表示，“聪明的市场”会始终考虑上行和下行风险。这是提醒人们中国想要人民币汇率波动，不过只在相当窄的区间内。美国智库外交关系委员会（Council on Foreign Relations）研究员、拜登竞选团队的顾问布拉德·塞瑟（Brad Setser）说：“中国官员已经练就一套本领，一边对美国官员说他们不干预，另一边又说服市场参与者相信他们在必要时会干预。”

如果中国确实在干预，对此最宽容的一种辩护是中国认为自己的GDP增长大幅领先只是暂时的。如果人民币在其他国家陷入困境时大幅升值，等到各国复苏时就可能大跌而造成震荡。抑制升值有助防止这种情况。

但是，假如中国GDP增长持续领先，而人民币汇率依然不为所动，这种宽容将很快消散。■



Schumpeter

Free the data serfs!

The fight back against big tech's feudal lords has begun

SIR TIM BERNERS-LEE had a Romantic vision when he created the World Wide Web in 1989. In his words, he helped “weave” it together as a way of connecting anything to anything—as if he were sitting at a loom, not at CERN, a particle-physics laboratory in Geneva. But those were halcyon days. Now the web risks falling into what he has called a dystopia of prejudice, hate and disinformation. People around him talk of “digital feudalism” to describe the control big technology platforms have over data. As a result, Sir Tim has co-founded a startup, Inrupt, that aims to shift the balance of power. It is one of many incipient efforts aimed at putting data back into the hands of the people.

It sounds quixotic. The use of data, after all, is now the world’s biggest business. Some \$1.4trn of the combined \$1.9trn market value of Alphabet (the owner of Google) and Facebook, comes from users’ data and the firms’ mining of it, after stripping out the value of their cash, physical and intangible assets, and accumulated research and development. They are not sated yet. Around the world, sensors on everything from cars to kitchens are expected to churn out exponentially more personal information as the “Internet of Things” expands. The tech giants have their beady eyes on it.

Their relentless appetite for data is a mounting concern for policymakers in two ways. The first is political. The platforms’ business models depend on network effects and scale to keep users engaged and to sell more advertising. The result is a culture of virality that, while entertaining, poisons public discourse and disquiets governments. The second is economic. The bigger the tech firms are, the harder it is for potential rivals

to overcome their data advantage, which suppresses innovation. Viktor Mayer-Schönberger of Oxford University notes that access to capital is no longer the biggest problem for startups. It is access to data.

So trustbusters are on the warpath. The Department of Justice lawsuit in America against Google, filed on October 20th, accuses the company of using contracts with device-makers, such as Apple, to block other search engines. Google denies this, saying people use its services because they choose to, not because they have to. Whatever the merits of the case, for some the only remedy is to break up the tech giants. That is simplistic. The problems will not be solved just by cutting big tech down to size. Any solution must make data more evenly accessible so that potential rivals can grow.

This can be done in several ways. One is to empower individuals. Another is to consider collective action. A third is to rely on governments. All three will need to reinforce each other to have a chance of success.

Start with the individual. It is seductive to argue that each person should have ownership rights over their data. Yet unless laws change radically, in practice it is hard to wrest control back from the tech platforms, because an individual's bargaining power is woefully weak. Fortunately, other options are surfacing.

One is a subscription model, along the lines of Netflix or Spotify. MeWe, an "anti-Facebook" social network (with Sir Tim on its board), spares its users bombardments of advertisements and targeted news, and charges fees instead. Another option is to start gathering data on behalf of the individual from all sorts of sources. Inrupt, for instance, is working with the government of Flanders, a region of Belgium, to give every citizen a "pod" to store personal data. It hopes private firms will build user-friendly apps around the data, with people's consent, says John Bruce, its co-

founder. The better the apps, the more eager people will be to furnish it with their data. In India something similar is happening in financial services. Individuals' and firms' financial data can be transferred to financial-services firms via "account aggregators" that obtain the owners' consent. This can help speed up credit-scoring and loan underwriting. It could also be an alternative to huge data guzzlers such as Ant Financial, a Chinese fintech firm.

A second way to strengthen the power of those who provide data is by collective action—particularly important when so much value on the web comes not from individuals' data but from their interactions with others. Glen Weyl, an economist at Microsoft, a software colossus, proposes "unions" that bargain on behalf of groups of people for a share of the income generated from the use of their data. The aim, says Mr Weyl, is not to destroy the platforms, just as labour unions do not want to shut down factories. Andrew Yang, a former American presidential hopeful, has proposed a "digital dividend" to individuals via collective bargaining.

These efforts, however valiant, are in their infancy. They may not amount to anything unless governments, too, weigh in—as they have done with the European Union's General Data Protection Regulation, and the California Consumer Privacy Act. Though the chief aim of both is privacy, they have dramatically bolstered individuals' rights over their own data. The European Commission, the EU's executive arm, long more interventionist than America on tech regulation, plans to go a step further, proposing a Data Act in 2021 that will seek to wrench open the bloc's public and private data vaults. As with the American government, the EU continues to threaten the cudgel of antitrust law against the tech giants.

| *Domesday*

Silicon Valley says it has got the message. This year Facebook offered to pay users for recordings of their own voice, to improve speech recognition. The

tech firms are making it easier for users to shift photo files to other platforms. But they are token moves. Switching platforms remains fiendishly hard. Scale and virality are so vital to their business models that they lobby fiercely against regulation. They reassure themselves that most consumers continue to support the exchange of data for free stuff. Yet they must be aware that access to data is becoming one of the philosophical issues of the age. Feudalism eventually gave way to greater property rights. One day data serfdom will go the same way, too. ■



熊彼特

解放数据农奴！

对科技巨头封建领主们的反抗开始了

蒂姆·伯纳斯·李（Tim Berners-Lee）在1989年创建万维网时满怀浪漫主义的憧憬。用他的话说，他帮助“编织”了一张网，把世界万物联系在一起——就好像他是坐在织布机前，而不是在日内瓦的粒子物理实验室欧洲核子研究中心（CERN）里。然而，岁月静好已成往事。如今，互联网正陷入他所说的充满偏见、仇恨和虚假信息的废托邦。他身边的人用“数字封建制度”来形容大型科技平台对数据的控制。为此，蒂姆与他人共同创办了一家名叫Inrupt的公司，想要改变力量对比。其他很多人也开始行动起来，以求把数据控制权交回人们手里。

这听起来像异想天开。毕竟，对数据的使用是当今世界上最大的买卖。在Alphabet（谷歌的母公司）和Facebook合计1.9万亿美元的市值中，除去现金、有形和无形资产以及累积研发投入，大约有1.4万亿都来自用户数据以及对数据的挖掘。但它们并不满足于此。随着“物联网”的发展，全世界从汽车到厨房中的一切都会装上传感器，并以指数级的速度生成更多个人信息。科技巨头们对这些信息虎视眈眈。

它们对数据的永不饱足令政策制定者在两个方面越来越担心。首先是政治上的。这些平台的商业模式依赖网络效应和规模，以保持用户参与度和提高广告销量。由此产生了一种病毒式传播的文化，它虽有娱乐性，却败坏了公共话语空间，令政府不安。其次是经济上的。科技公司的规模越大，在数据上的优势就越难被潜在竞争对手超越，这就会抑制创新。牛津大学的维克托·迈尔-舍恩伯格（Viktor Mayer-Schönberger）指出，创业公司的最大问题不再是筹措资金，而是获取数据。

因此，反垄断者准备反击。10月20日，美国司法部向谷歌提起诉讼，指控它利用与苹果等设备制造商的协议来屏蔽其他搜索引擎。谷歌对此予以否认，表示人们使用它的服务是出于自愿而非被迫。不管该案的是非曲直如

何，在一些人看来，拆分科技巨头是唯一的解决办法。然而这过于简单化了。仅靠缩减大型科技公司的规模无济于事。无论哪种解决方案，都必须提供更均等的的数据访问权，这样潜在的竞争对手才有成长的机会。

这一目标可以从几方面达成。一是赋权个人。二是考虑集体行动。三是依靠政府。三者需要相互促进才有可能成功。

先说个人。很多人都会很想要提倡人人都该拥有对自己数据的所有权。但除非彻底改变法律，否则实际上很难从科技平台手中夺回控制权，因为个人的议价能力小得可怜。好在已经出现了一些其他选择。

一种是类似奈飞（Netflix）或Spotify的订阅模式。“反Facebook”的社交网络MeWe（蒂姆是其董事）让用户免受各种广告和定向新闻的狂轰滥炸，改成向用户收费。另一种选择是接受个人委托，逐步从各种来源收集数据。例如，Inrupt正在与比利时佛兰德斯大区（Flanders）的政府合作，给每个公民提供一个储存个人数据的“豆荚”。它的联合创始人约翰·布鲁斯（John Bruce）表示，Inrupt希望私人企业在征得人们同意的情况下，基于这些数据开发用户友好的应用。应用越好用，人们就越乐于向它提供自己的数据。在印度，金融服务业正在采取类似的做法。在得到所有者的同意后，个人和公司的财务数据可以通过“账户聚合平台”移交给金融服务公司。这有助于加快信用评分和贷款担保。它也可以作为诸如中国的金融科技集团蚂蚁集团等数据收集大户的替代品。

要加强提供数据的人的权力的第二个途径是集体行动。鉴于网络上有大量价值不是来自个人数据，而是来自人与人的互动，这种做法尤其重要。软件巨头微软的经济学家格伦·韦尔（Glen Weyl）提议建立代表不同群体的“工会”来谈判从个人数据使用的收益中分成。韦尔表示，这么做的目的不是要消灭平台，就像工会并不会想要工厂关门。美国前总统竞选人杨安泽曾提议通过集体谈判为个人争取“数字红利”。

这些努力不管有多坚决，也都还处在起步阶段。而且除非政府也参与其中，否则可能无所作为。欧盟的《通用数据保护条例》（GDPR）和美国

的《加州消费者隐私法案》（CCPA）就是政府参与的结果。尽管两部法规的主要目的都是保护隐私，但它们都极大增强了个人对自己数据的掌控权。长期以来，欧盟的执行机构欧盟委员会在科技监管方面比美国更倾向于干预，它计划还要更进一步，在2021年提出一项数据法案，力图撬开欧盟的公共和私人数据保险库。与美国政府一样，欧盟一直在挥舞反垄断法的大棒来威胁科技巨头。

| 末日审判

硅谷表示它已领会了精神。今年，Facebook表示将向那些录制自己的声音以供它改善语音识别技术的用户付费。科技公司正在改善用户往其他平台转移照片文件的便捷度。但这些都只是象征性的举动。切换平台依然极其困难。由于规模和病毒式传播对它们的商业模式至关重要，因此它们不遗余力地游说反对监管。它们自我安慰说，大部分用户会继续支持用个人数据换取免费服务。但它们必须意识到，获取数据已经成为这个时代的一个哲学命题。封建制度最终让位给了更大的财产权。总有一天，数据农奴制也会走上同样的道路。 ■



Some lessons from Microsoft

Blue-sky thinking

Parts of the digital economy are competitive. Look at the cloud

THE TERM “big tech” is often used as shorthand to describe the small group of digital firms that tower over the 21st-century economy. Together, they make up over a fifth of America’s stockmarket. But behind that phrase a lot is going on. As business lines have become monopolised, it has become commonplace to complain that tech firms are offering consumers a toxic deal. But in a growing number of areas the picture is healthier.

The largest tech companies have expanded into a dizzying range of industries. Amazon faces credible e-commerce rivals in the form of Walmart and Shopify. Video-streaming is a fight for supremacy between half a dozen firms. And cloud computing has become a fiercely contested market, too, as our analysis of the adventures of Microsoft shows. Its experience is a reminder of the benign power of competition—and of how governments should be surgical about taming tech.

Cloud computing took off about 15 years ago, as businesses began to outsource their web-hosting, data centres, core computer systems and many applications to a few big providers, particularly the pioneer AWS, run by Amazon. The pandemic has shown just how critical the cloud has become. Many of the economy’s main functions depend on it, including a wide range of e-commerce sites and applications that let you work from home. The scale of this activity is huge; approaching 10% of all technology spending is on the cloud. So are the sums of money being invested. Perhaps \$40bn is being ploughed this year into data centres and other physical gear by AWS and others.

The cloud brings obvious benefits. The firms using it replace lumpy capital

expenditure on rickety bespoke IT with a variable payment for a service that can easily expand its capacity as needed. That is one reason firms such as Zoom have been able to grow so fast during the lockdown. Having many users for each piece of infrastructure means they are put to work more efficiently.

The cloud has also been seen as an example of the internet's fragmentation. Alibaba's and Tencent's cloud arms dominate in China and are making some inroads elsewhere in Asia. Europe is so anxious about American firms that it has launched a state-backed rival, called Gaia-X. Businesses in poor countries may struggle for access to the cloud, slowing their development.

The biggest fear has been of a cloud monopoly. Here the news is encouraging. AWS remains the cloud's biggest firm, but Microsoft, the original antitrust bad boy, is putting up a fierce fight with its own service, Azure, and hopes to get more of its Office and Windows customers to use it for the cloud, too.

Alphabet is also putting its cloud forward. On October 8th IBM said it would spin off part of its services business to focus on the "hybrid-cloud", which marries old-fashioned on-site work with the cloud. Likewise Oracle's proposed bid for TikTok, a social-media firm, is in part an effort to secure an anchor-customer for its nascent cloud operation. Regulators need to be vigilant to ensure that cloud firms are not abusing other companies' data, erecting unfair barriers to entry or misusing their dominance in other businesses to get ahead. But broadly, the boom means more choice and keener prices.

This rivalry also offers a signal to governments. Treating big tech as a monopolistic monolith does not make sense when some markets are competitive. Nor does banning tech firms from entering adjacent new

markets—as a recent congressional report proposed. Better for governments to ensure that users have control over their data, and then vigorously tackle the areas like search and social media where monopolies have taken hold. If the main source of competition for big tech firms ends up being other big tech firms, so be it. ■



【首文】来自微软的一些经验

云端畅想

数字经济的一些领域充满竞争。看看云吧。

人们常用“科技巨头”（big tech）一词描述巍然屹立于21世纪经济中的一小群数字公司。它们合起来占到了美国股市市值的五分之一以上。但在这个名词的背后，很多事情正在发生。随着各类业务逐渐被垄断，常常可以听到人们抱怨科技公司给消费者提供了“有毒”的交易。但在越来越多的领域，情况实则更健康了。

规模最大的科技公司的触角已经伸向种类繁多的大批行业。亚马逊在电子商务领域面对来自沃尔玛和Shopify的有力挑战。在视频流领域有五六家公司在争霸。而正如我们对微软的历险的分析所示，云计算也已经成为一个竞争激烈的市场。微软的历程提醒着人们竞争的良性力量，以及政府在驯服科技巨头时应下手精准、切中要害。

云计算大约于15年前开始腾飞，那时企业开始把它们的主机托管、数据中心、核心计算机系统和许多应用外包给几个大型供应商，特别是亚马逊的AWS这一先行者。新冠疫情更是凸显了云的重要性。经济中的许多主要功能都依赖于它，包括各种电子商务网站和让人们可以居家工作的应用。云计算规模巨大，所有技术支出的近10%都花在了云上。这一领域的投资占比也一样。AWS等公司今年在数据中心和其他实体设备上的投入可能高达400亿美元。

云带来的好处显而易见。使用云服务的公司用可变的服务费替代在老旧的定制IT系统上的大笔资本支出，而且云服务可以轻松按需扩展。这就是Zoom之类的公司在疫情封锁期间成长如此之快的原因之一。每个基础设施都有大量用户意味着它们的使用效率得到了提升。

云还被视为互联网碎片化的一个例子。阿里巴巴和腾讯的云计算业务在中国占主导地位，并且正在进军亚洲其他地区。欧洲对美国公司的威胁十分

不安，为此专门推出了由政府支持的竞争云平台盖亚-X（Gaia-X）。贫穷国家的企业可能难以用上云服务，这拖慢了它们的发展。

人们最大的担忧是出现云垄断。这方面的进展令人鼓舞。AWS仍然是最大的云计算公司，但最初以反垄断坏小子的形象崛起的微软正通过自己的云计算服务Azure掀起一场激烈竞争，并希望让更多的Office和Windows用户也来使用它的云服务。

Alphabet也正在推动自己的云业务。10月8日，IBM表示将分拆部分服务业务以专注于“混合云”——把老式的实地运作与云相结合。同样，甲骨文提出收购社交媒体公司TikTok，原因之一是想为其新生的云计算业务争取到一家旗舰客户。监管机构必须保持警惕，以确保云公司不会滥用其他公司的数据，设置不公平的市场进入障碍，或滥用它们在其他业务中已有的主导地位来取得优势。但总体来讲，云市场的繁荣意味着选择更多，价格更低。

这种竞争态势也向政府发出了一个信号。当有些市场具有竞争性时，把科技巨头视为垄断巨头是没有道理的。像最近一份国会报告提议的那样去禁止科技公司进入相关新市场同样不合理。对政府来说，更好的做法是确保用户可以掌控自己的数据，然后再着力解决搜索引擎和社交媒体等领域里已经根深蒂固的垄断问题。如果科技巨头的竞争主要源自其他科技巨头，那就由它去吧。■



Bartleby

Fighting spirit

What the armed forces can teach business

WHEN CAPTAIN Gareth Tennant was patrolling with the Royal Marines in the Gulf of Aden in 2010, his team intercepted some Somali pirates on two skiffs. The pirates' weapons were confiscated and the marines waited for clearance to release their prisoners. The plan was to tow the ne'er-do-wells back to Somali waters. But the pirates misread the troops' intentions, and thought they were about to be abandoned at sea; a few jumped into the water while the rest attacked Mr Tennant's team.

For a brief period, there was chaos. Mr Tennant was unable to give any orders. But his team acted anyway. One boat rescued the Somalis who had jumped into the water; another came alongside to offer support in ending the fight.

His team acted that way, Mr Tennant argues, because they were used to working with each other and they had war-gamed what might go wrong. In contrast, the pirates were suffering from fear, stress and fatigue, and acted on gut instinct. "If you haven't gone through the decision-making process in advance, then gut instinct tends to kick in," Mr Tennant says.

Now Mr Tennant is back in civilian life, acting as an adviser to the Future Strategy Club, an association of consultants. And he believes the habits learned in the Royal Marines can be useful for business life.

Given the long history of blunders in warfare (such as friendly-fire incidents), it may seem odd to turn to the armed forces for tips on efficiency. It is an old joke that "military intelligence" is an oxymoron. But many a corporate titan has sought wisdom in the philosophies of

strategists like Sun Tzu and Carl von Clausewitz. And military expertise in emergencies was exploited by the British government to help build “Nightingale hospitals” early in the covid-19 pandemic, just as the armed forces had been used to counter Ebola in west Africa in 2014.

Soldiers regularly have to deal with the four forces dubbed VUCA (volatility, uncertainty, complexity and ambiguity). In particular, Mr Tennant cites the concept of mission command which developed during the Napoleonic wars. Armies found that, by the time messages had arrived at the front, the military situation had changed. The lesson was to establish what the army was trying to achieve before the battle and allow junior commanders to use their initiative and take decisions as the situation demanded.

The ideal command structure is not a rigid hierarchy, he argues, but a sphere, where the core sets the culture and the parts of the organisation at the edge are free to react to events outside them. In effect, the contrast is between centralised command and decentralised execution.

Business has been hit by two huge events this century: the financial crisis of 2007-09 and now the pandemic. These showed the extreme importance of resilience—and of preparation. The organisations that are dealing with the pandemic best are those which were already prepared for the unexpected, he says. The key lesson, Mr Tennant argues, was not having stocks of hand-sanitiser and plastic sheeting but knowing how to manage large changes in society and shifts in supply chains. It also requires training for the type of situations that managers may face.

Mr Tennant argues that in recent years companies have become overenamoured with predictive analytics, trying to make precise forecasts about the direction of markets. Instead, they should get involved in war-gaming, where they can discuss ideas that push the boundaries of what is possible. “The more we think about hypotheticals, the less space there is for

unknown unknowns,” he says, echoing that well-known American strategist (and ex-defence secretary), Donald Rumsfeld. Corporate executives know their own business really well. But when the environment changes, experience counts for less. The answer is to apply a test and adjust the process, in a feedback cycle.

When a crisis happens, bosses display a tendency to hold on tight and take control. But that is losing the benefit of the diversity of the organisation, Mr Tennant thinks. Companies need those at the sharp end of the business to be adaptive and responsive. Senior managers need to relinquish authority and allow juniors to make decisions. In a crisis, companies which have invested in building up leaders at the lowest ranks of the organisation are more likely to prosper. In business, as in conflict, it isn't the generals who carry the burden of the war; it's the troops. ■



巴托比

战斗精神

军队能教给企业什么

二〇一〇年，加雷斯·滕南特（Gareth Tennant）上尉随英国皇家海军陆战队在亚丁湾巡逻时，他的手下拦截了两艘小艇上的索马里海盗。他们收缴了海盗的武器，并等待释放这些俘虏的许可。原计划是把这帮无用之人拖回索马里海域，但是海盗们误解了部队的意图，以为自己就要被抛弃在海上。一些人于是跳入水中，其他人则开始攻击滕南特的人。

场面一度陷入了混乱。滕南特无法下达任何命令。但他的队伍还是采取了行动。一艘船营救跳入水中的索马里海盗，另一艘从旁协助，结束战斗。

滕南特认为，他的队伍之所以会那样反应，是因为他们习惯了彼此合作，并且事先已经针对可能出现的状况做过演习。而海盗们则饱受恐惧、压力和疲劳之苦，只凭直觉行事。“如果你没有提前预演一遍决策过程，那么往往就会跟着本能走了。”滕南特说。

现在，滕南特重回平民生活，在咨询师协会“未来战略俱乐部”（Future Strategy Club）担任顾问。他相信在皇家海军陆战队习得的习惯对商业也有助益。

战争中从来不乏军人犯下愚蠢错误（如友军误伤）的例子，因此，向军队寻求效率方面的建议似乎有些奇怪。有一句年头久远的笑话，说“军事情报”这个词根本就是自相矛盾。但许多企业巨子都从孙子和卡尔·冯·克劳塞维茨（Carl von Clausewitz）等战略家的思想中寻求智慧。而且，在新冠肺炎疫情初期，英国政府还利用军队应对紧急状况的专业知识来帮助建设临时的“南丁格尔医院”，就像2014年军队参与抗击西非的埃博拉病毒一样。

士兵们经常需要应对四种力量：波动性、不确定性、复杂性和模糊性。滕

南特尤以在拿破仑战争期间发展起来的任务式指挥法为例。军队发现，消息到达前线时，军事形势已经有变。由此得出的教训就是要在战斗打响前明确队伍试图达成的目标，并允许下级指挥官发挥主动性，根据情况需要做出决策。

他认为，理想的指挥结构不是一个僵化的上下级制度，而是一个球体，由核心来设定文化，处于组织边缘的部分则可以自由地对外部事件做出反应。在实践中，这形成了中心化的指挥和去中心化的执行之间的反差。

商业在本世纪受到了两起重大事件的冲击：2007至2009年的金融危机，以及现在的疫情。这样的事件显示出韧性和准备极其重要。滕南特说，在应对疫情时，表现最好的是那些已经为意外事件做好准备的组织。他认为，一个关键教训是不要囤积洗手液和塑料布，而是要知道如何应对社会的巨大变化和供应链的变动。此外还需要针对管理者可能遇到的情况开展培训。

滕南特认为，近年来企业对预测性分析过于着迷，试图精确预测市场的走向。它们其实应该开展演习，在此过程中它们可以讨论各种想法，拓宽可能性的边界。“假设性的问题考虑得越多，未知的空间就越小。”他说。这呼应了美国著名战略家（和前国防部长）唐纳德·拉姆斯菲尔德（Donald Rumsfeld）的说法。企业高管确实很了解自己的业务。但是一旦环境变了，经验的作用就不那么大了。应对之道是在反馈回路里开展测试并调整流程。

当危机发生时，老板们往往会咬紧牙关，竭力把控局面。但滕南特认为，这样就丢掉了组织的多样性的好处。企业需要身处第一线的人具备适应和响应的能力。高层管理者需要放下权威，允许下级做决定。在危机中，那些此前投入了资源在组织的最底层培养领导者的企业更有可能胜出。在商业领域和在战事中一样，肩负起作战重担的不是将军，而是士兵。■



Autonomous vehicles

Look, no hands!

A driverless lorry is put through its paces on a famous test track

THANKS TO “Top Gear”, a British television show for motoring enthusiasts that is now a global brand, a former second-world-war airfield called Dunsfold has become one of the best known testing tracks in the world. On October 15th, however, instead of reverberating to the roar of supercars driven by the show’s anonymous racing driver, the Stig, it witnessed the sight of what appeared to be the cabless trailer of an articulated lorry belting almost silently around the course at over 80kph.

The Pod (see picture), as this vehicle is known, was made by Einride, a Swedish firm founded in 2016 by Robert Falck, an engineer who used to work for Volvo. Mr Falck thinks that the technology of vehicle autonomy, long experimental, has now evolved sufficiently for driverless goods vehicles to begin earning their livings properly. Some Pods are already in trials for real jobs: running between warehouses, hauling logs from forests and delivering goods for Lidl, a supermarket group.

Pods use the same technology of cameras, radar, lidar (the optical equivalent of radar) and satellite-positioning as other contenders in the field, but they differ from those others in the way their maker tries to deal with the regulatory concerns which prevent fully autonomous vehicles from being let loose on public roads. Einride’s approach, at least at the moment, is to avoid these by avoiding the roads in question. Instead, the Pod’s first version operates on designated routes within the confines of enclosed, private areas such as ports and industrial parks. Here, Pods act like bigger and smarter versions of the delivery robots which already run around some factories—though by having the ability to carry 16 tonnes and with room on board for 15 industrial pallets’-worth of goods they are indeed

quite a lot bigger.

The second difference from most other attempts at vehicle autonomy is Einride's approach to the word "autonomy". Some makers take the idea literally, and aim to keep humans out of the decision-making loop entirely. Others, often prompted by traffic regulations, arrange things so that a normally passive human occupant can take the controls if necessary. Pods represent a third way. They always have a human in the loop to keep an eye on what is happening and to take over the driving for a difficult manoeuvre or if something goes wrong. But this human operates remotely.

Having the driver sitting back at HQ rather than in the vehicle itself is a departure from convention, but not a huge one. Aerial drones are usually controlled in this way. The radical step is that Mr Falck believes you do not need a remote driver for each Pod. Einride already uses one person to control two Pods, but plans eventually for a single driver to look after ten.

How regulators will take to that for use on open roads remains to be seen. Much will depend on how often the remote driver has to intervene. If not very often then monitoring simultaneous Pods might be considered acceptable. Again, this could come about in a similar way to that in which drones have entered the market. At first regulators banned flights that were out-of-sight of the remote pilot, but as operating experience has shown such flights to be safe, they are often allowed these days. Now, some test flights using multiple drones controlled by one remote pilot have been given permission.

Having tested the area-restricted version of the Pod, Einride is now developing Pods intended to venture onto local roads, and one suitable for motorways is planned for 2023—with remote operators, if allowed. Though Pods working in private enclosed areas have their speeds restricted to 30kph or so, to help with multiple remote-monitoring, those intended for

public roads will operate at higher speeds and be equipped with more powerful, long-range sensors. All these vehicles, if successful, promise not only a change in the way that goods are delivered, but also the possibility of another of the oddball races “Top Gear” is famous for—between the Stig in a conventional lorry and, with its speed governor disabled for the day, the electronic system guiding one of Mr Falck’s creations. ■



无人驾驶汽车 看，没用手

一辆无人驾驶货车在一条著名的试车跑道上经受考验

在成为《疯狂汽车秀》（Top Gear）这档面向汽车爱好者、现已成为全球品牌的英国电视节目的拍摄地之后，二战时期的敦斯福德机场（Dunsfold）变成了全球最闻名的试车场之一。但在10月15日这一天，场地上没有响起该节目的匿名赛车手试替哥（Stig）驾驶的超级跑车的轰鸣声，却出现了一台像是铰接式货车的无缆线拖车部分的东西，以80多公里的时速近乎悄无声息地在场地上绕圈。

这辆名为Pod（见图）的货车由瑞典公司Einride制造，该公司由曾在沃尔沃工作的工程师罗伯特·法尔克（Robert Falck）于2016年创立。法尔克认为，长期处于实验阶段的无人驾驶技术如今已发展充分，可以让无人货车开始营业赚钱了。一些Pod货车已经在试验实际工作，比如在仓库间穿梭，从森林中运输原木，为连锁超市利多（Lidl）送货。

Pod货车使用的摄像头、雷达、激光雷达（即运用光学原理探测的雷达）和卫星定位技术与行业内的其他竞争者无异，但它们的制造商尝试应对监管问题的方式与别人不同。现行法规不允许完全自动驾驶的车辆在公共道路上自由行驶。Einride规避法规的方法是避开公共道路——至少目前是如此。它选择让第一个版本的Pod在港口和工业园区等封闭的私人区域内的指定路线上运行。在这些地方，Pod就像那些已经在一些工厂中奔忙的送货机器人，只不过体积更大，也更智能。它们可真不是一般地大——可载重16吨，容纳15个工业托盘的货物。

Einride与其他大多数车辆自主性探索项目的第二个不同之处是对“无人驾驶”一词的理解。一些制造商按字面意思来，打算将人类完全排除在决策过程之外。其他一些公司往往是出于满足交通法规的需要，安排驾驶员在车内待命，必要时可以接管车辆。Pod代表了第三种方式。始终有一个人负责监控整个驾驶过程，在操作有困难或出现问题时接手。不过这个人

在远程操控。

让驾驶员坐在控制中心而不是车上算是另辟蹊径，但也没有偏离大路很远。无人机一般就是这样远程控制的。Einride更激进的地方在于法尔克认为不需要为每辆Pod都安排一位远程驾驶员。它已经在让一名驾驶员远程控制两辆Pod，但最终的计划是一名驾驶员负责十辆车。

监管机构对于让这样的车辆开上开放道路态度如何仍有待观察。这将在很大程度上取决于远程驾驶员必须出手干预的频率。如果不需要经常干预，同时监控多辆Pod也许就会被认为是可接受的。这同样可能与无人机进入市场的方式相似。监管机构起初禁止无人机在远程飞行员视线范围之外飞行，但由于运行经验表明这样的飞行是安全的，如今这种操作通常是被允许的。现在，由一名远程飞行员控制多架无人机的一些试飞项目已经获得许可。

在测试了限定区域的Pod后，Einride目前正在研发能进入市区道路的Pod，并计划在2023年推出配备远程驾驶员的高速路版无人货车——如果获批准的话。在私人封闭区域中行驶的Pod的时速被限制在30公里左右，以实现一对多的远程监控，而计划开上公共道路的Pod行驶速度将更快，并配备功能更强大的远程传感器。如果成功，这些货车不仅有望改变货物的运输方式，还可能让《疯狂汽车秀》再多一场令它出名的奇葩比赛——让试替哥驾驶传统卡车，和解除了限速的由电子系统引导的Pod一较高下。■



Buttonwood

A new career in a new town

How Berlin has become a centre for European venture capital

FOR BRITS of a certain age and inclination, Berlin is a city that is forever linked with David Bowie. When he lived there in the late 1970s, Bowie's life was in flux. He was estranged from his wife, splitting from his management and trying to slough off rock-star excess. Berlin was similarly unsettled: a refuge for artists, misfits and draft-dodgers on the front line of the Cold War. Bowie lived anonymously above a car-parts store. He did some of his best work there.

The block of flats where Bowie lived with Iggy Pop, another celebrated rock star, still stands. Berlin remains an edgy, in-between sort of place—it is Germany's capital, but is not quite German. And it remains a place where people go to try something new. It now vies with London and Paris as Europe's leading hub for technology startups.

That seemed unlikely a decade ago. Berlin had no real industrial base. Its early venture-backed successes were often knock-offs of American e-commerce firms. Risk capital was scarce. Berlin had no vast ranks of home-grown techies. In a strange way, these and other deficiencies have been strengths. For Berlin has no competing hierarchy for all-important status. Paris has fashion and food. London has famous musicians. In Berlin, the venture capitalists (VCs) and entrepreneurs are the rock stars.

Berlin's VC scene emerged in the years following the global financial crisis of 2007-09. The city had three things to recommend it. First, it was cheap. Berlin was a poor capital city by the standards of Western Europe. The only competing industry was government. So housing and office space were plentiful. If you were part of the early wave of startups that settled in the

city, you might be offered office space rent-free for several months. Second, it was hip. There were lots of cheap, cool places to eat and to meet others. Part of the allure was Berlin's history as a bolthole for creative types, such as Bowie and Iggy.

A third factor is that Germany is welcoming to migrants. Berlin has always been a cultural melting pot. High youth unemployment in southern Europe in the wake of the euro area's debt crisis was a spur to migration. A lot of engineers came from Eastern Europe. The Swedish founders of SoundCloud, a music-streaming site to which independent artists upload their output, based their company in Berlin, despite a vibrant scene in Stockholm. Often the working language is English; but it might be Russian or Portuguese. Plenty of people have poured in from other German cities, too. That reflects a cultural shift. A talented engineer who used to go to work for BMW or Mercedes now thinks about starting a company, says Ciaran O'Leary of BlueYard, a Berlin-based venture-capital firm.

The idea that one capital will dominate Europe is seen as old hat. Berlin's VC firms typically invest in startups in other European cities, which are all a short hop away. A lot of the money they deploy comes from outside Europe—from America or Asia. In Berlin this is mostly seen as a strength, an external validation. Another outdated notion is that Berlin is a location for "shallow tech", rather than original ideas. That is in part the legacy of Rocket Internet, a Berlin-based "clone factory", an incubator that aped the business models of America's online firms. But Berlin had to start somewhere, and there has since been a shift from consumer clones to tech startups that serve businesses.

The pandemic may be a kind of coming of age for Berlin's tech scene. Two of its listed graduates—HelloFresh, which sells meal kits, and Delivery Hero, a food-delivery firm—have been bolstered by it. Tech looks more than ever a better bet than Germany's old industries, such as carmaking. Even

the government has taken notice. Its stimulus package included tailored support for startups. “It was the first time the government listened to us and heard what we need to do to build a strong ecosystem,” says Christian Miele of the German Startup Association. There are hopes of a change to the tax treatment of share options, a bugbear of VCs. From a frayed and frazzled San Francisco, though, the stodgier bits of the German model (its bureaucracy, health care and social-safety-net) might now seem rather enviable.

With time, the hip becomes conventional. Bowie’s Berlin-period recordings were not universally embraced on their release. But by the 1980s every other pop group in Britain claimed them as a big influence. Similarly, Berlin’s VC hipsters no longer look like misfits. Its tech scene is in danger of going mainstream. ■



梧桐

新城新业

柏林如何成为了欧洲风投之都

对于上了一定年纪、爱好摇滚乐的英国人来说，柏林这座城市永远与大卫·鲍伊（David Bowie）联系在一起。上世纪70年代末他在柏林居住时，生活漂浮不定。他和妻子分居，与经纪人分道扬镳，试图摆脱摇滚明星的颓靡生活。当时的柏林同样动荡不安：这座位于冷战前线的城市成了艺术家、离群者和逃避兵役的人的避难所。鲍伊隐姓埋名，住在一家汽配店的楼上。在那里，他创作出了自己一些最好的作品。

鲍伊和另一位著名摇滚巨星伊基·波普（Iggy Pop）住过的公寓楼至今依然矗立。柏林仍然是一个大胆前卫、游离在中间地带的地方——它是德国的首都，但又不那么像德国。它仍然是人们前去尝试新鲜事物的地方。如今，它正和伦敦及巴黎争夺欧洲头号科技创业中心的地位。

十年前这似乎还难以想象。柏林没有真正的工业基础。由风险投资支持的一些早期成功案例往往不过是美国电商企业的翻版。风险资本稀缺。柏林也没有大批本地科技人才。奇怪的是，这些以及其他一些缺陷却成了它的优势。原因正是柏林没有什么抢眼的产业去争夺至高地位。巴黎有时尚和美食。伦敦有著名音乐人。而在柏林，现在风投家和企业家就是摇滚明星。

柏林的风投业在2007到2009年全球金融危机之后的几年里逐步兴起。这座城市有三点值得推荐。首先是便宜。以西欧的标准来说，柏林是个贫穷的首都城市。唯一的竞争性行业是政府部门。因此住房和办公空间非常充裕。如果你是在早期创业浪潮中落户柏林，可能还可以享受到几个月的办公空间免租金。第二是时髦。那里有许多便宜又酷炫的地方去享受美食和结交朋友。柏林曾是鲍伊和伊基这种创造性人才的避难所，这是它的魅力之一。

第三个因素是德国欢迎移民。柏林从来都是个文化大熔炉。欧元区爆发债务危机后，南欧青年失业率居高不下，刺激了移民潮。许多工程师来自东欧。音乐流媒体网站SoundCloud让独立艺术家上传他们的作品，其创始人来自瑞典，虽然斯德哥尔摩的音乐产业很有活力，但他们仍将公司设在了柏林。这里的工作语言通常是英语，但也可能是俄语或葡萄牙语。还有很多人从德国其他城市涌入。这反映了一种文化转变。以前一个优秀的工程师会去宝马或奔驰工作，但现在他们会考虑自己创业，总部位于柏林的风投公司BlueYard的夏兰·奥莱利（Ciaran O’Leary）说。

认为一个首都能主导欧洲的想法已被认为陈腐过时。柏林的风投公司通常都投资欧洲其他城市的创业公司，这些城市也不过是一步之遥。它们部署的资金很多来自欧洲以外的地方，包括美国和亚洲。在柏林，这更多被认为是一种优势，体现了外界对它的认可。另一个过时的观念是柏林只有“浅薄的科技”，没有原创理念。这在一定程度上源于对Rocket Internet的印象，这是一家位于柏林的“克隆工厂”，一个专门模仿美国互联网公司商业模式的孵化器。但毕竟柏林总归要先找个起点，而且自那之后，它已经从克隆消费者业务逐渐转向培养为企业提供服务的科技创业公司。

柏林的科技行业或许在这场疫情中经历了成人礼。其中两个已经上市的佼佼者——生鲜食材包电商公司HelloFresh和外卖订餐公司Delivery Hero——都在疫情中高歌猛进。和汽车制造等德国传统工业相比，科技业比以往任何时候都像更好的投资选择。它甚至还引起了政府的注意。其经济刺激方案中就包括了为创业公司量身定制的支持措施。德国创业公司协会

（German Startup Association）的克里斯蒂安·美诺（Christian Miele）说：“这是政府第一次听取我们的声音，了解我们要构建一个强大的生态系统都需要什么。”对股票期权的税收是风投公司的一大棘手难题，现在也有望获得调整。不过从焦躁而疲惫的旧金山看来，德国模式当中比较古板无趣的部分（包括繁文缛节、医疗保健和社会安全网）现在可能相当令人羡慕。

随着时间的推移，时髦会变成传统。鲍伊在柏林时期的音乐作品在刚刚发行时并没有怎么大受欢迎。但到了80年代，英国所有流行乐队都说自己深

受其影响。同样，柏林的风投潮人们看起来也不再格格不入。它的科技产业恐怕正在成为主流。 ■



Formula 1

Man v machine

Engineers, not racers, are now the true drivers of success in motor sports

“I ALWAYS THOUGHT records were there to be broken,” Michael Schumacher, a star Formula 1 (F1) driver, said in 2013. At the time, his record of 91 career F1 victories looked safe: the closest active racer had just 32. Yet on October 11th Lewis Hamilton of Britain equalled the mark. Mr Hamilton is also on pace to tie Mr Schumacher’s record of seven F1 championships later this year.

Mr Hamilton’s ascent has ignited debate over whether he is F1’s best driver ever. Comparing athletes across eras is always hard—especially in motor sports, where a racer depends on his car. Moreover, F1 has regularly changed its scoring system and its number of races, drivers and teams.

However, statistical analysis can address many of these nuances. We have built a mathematical model, based on a study by Andrew Bell of the University of Sheffield, to measure the impact of all 745 drivers in F1 history. It finds that Mr Hamilton’s best years fall just short of those of the all-time greats—but so do Mr Schumacher’s.

The model first converts orders of finish into points, using the 1991-2002 system of ten points for a win and six for second place. It adjusts these scores for structural effects, such as the number and past performances of other drivers in the race. Then, it splits credit between drivers and their vehicles. (Today, F1 has ten teams, each using two drivers and one type of car.)

Disentangling these factors is tricky. Mr Schumacher spent most of his peak at Ferrari, as Mr Hamilton has at Mercedes, leaving scant data on their work

in other cars.

However, their teammates varied. And drivers who raced alongside Mr Hamilton or Mr Schumacher tended to fare far better in those stints than they did elsewhere. If Ferrari's and Mercedes' engineers boosted lesser racers this much, they probably aided their stars to a similar degree. Because most drivers switch teams a few times, this method can be applied throughout history.

Between the two racers with 91 wins, the model prefers Mr Schumacher. He won 1.9 more points per race than an average driver would have done in the same events and cars, edging out Mr Hamilton's mark of 1.8. Limited to their five best consecutive years, the gap widens, to 2.7 points per race for Mr Schumacher and 2.0 for Mr Hamilton.

This difference stems mostly from the impact of their cars. Both stars raced in the finest vehicles of their day. But 20 years ago, cars from Williams and McLaren were nearly as strong as Ferrari's. In contrast, Mercedes now towers over its rivals, enabling Mr Hamilton and Valtteri Bottas, his teammate, to coast past lesser cars. Before joining Mercedes, Mr Bottas had never won a F1 race. He now has nine victories.

Yet on a per-race basis, the greats of yesteryear beat both modern stars. Three of the model's top four drivers stopped racing by 1973; the leader, the Argentine Juan Manuel Fangio, won five titles in the 1950s.

These pioneers had short careers. Fangio started just 51 races, to Mr Schumacher's 306. However, the model is impressed by them, because the impact of cars relative to drivers has grown over time. On average, it assigns drivers in the 1950s 58% of their teams' points; today, that share is 19%. Fangio, who was a mechanic by training and won titles using cars from four different firms, was known as "the master". The masters of modern F1 are

engineers who sit behind laptops, not steering wheels. ■



一级方程式赛车

人机对战

工程师而非车手才是如今赛车运动中真正的制胜引擎

“我一直认为纪录就是用来打破的。”F1明星车手迈克尔·舒马赫（Michael Schumacher）在2013年说。当时，他在职业生涯中总共拿下91个分站赛冠军的纪录看起来很安全：成绩最接近的现役车手只获得了32个冠军。不过在10月11日，英国车手刘易斯·汉密尔顿（Lewis Hamilton）追平了他的纪录。汉密尔顿还有望在今年晚些时候追平舒马赫七次夺得F1总冠军的纪录。

汉密尔顿的崛起引发了他是不是F1史上最佳车手的争论。比较不同时代的运动员总是很难，特别是在赛车运动中，因为车手还要依靠自己的赛车。而且F1还经常改变计分体系，以及比赛场次、车手和车队的数量。

不过，统计分析可以处理许多这类细微差别。基于谢菲尔德大学的安德鲁·贝尔（Andrew Bell）的一项研究，我们建立了一个数学模型来衡量F1历史上总共745名车手的影响力。模型发现，汉密尔顿的鼎盛时期还稍逊于历史上的最伟大车手们，不过舒马赫也一样。

该模型首先按照1991年至2002年的计分制度将名次转换成分数，即每站冠军计10分，亚军计6分。它根据结构性影响，如比赛中其他车手的人数和过往的表现，来调整这些分数。然后将最终得分拆开，分别计给车手和赛车。（目前F1有十支车队，每个车队有两名车手和一款赛车。）

要分拆这些因素不容易。舒马赫的巅峰时期大部分都在法拉利车队，汉密尔顿则在梅塞德斯车队，因此很少有他们在其他车队表现的数据。

但他们的队友一直在变。而那些和汉密尔顿或舒马赫搭档的车手在这些时段的表现往往要比其他时候好得多。如果法拉利和梅塞德斯的工程师们让较普通的车手提升了这么多，那么他们给明星车手的助益可能也一样。因

为大多数车手都会换几次车队，所以这种分析方法适用于整个F1历史。

在两位同样赢得了91站胜利的车手中，模型更青睐舒马赫。他每场比赛比一般车手多得1.9分（如果对方是在同样的赛事中开同样的车），略高于汉密尔顿的1.8分。比较他们各自最好的连续五年，差距扩大了，舒马赫每场比赛多得2.7分，而汉密尔顿是2.0分。

这一差距主要源于赛车的影响。两位明星车手驾驶的都是他们那个时代最好的赛车。但在20年前，威廉姆斯和迈凯伦的赛车几乎和法拉利的一样强劲。相比之下，现在的梅赛德斯已经远远超过了它的竞争对手们，因此汉密尔顿和他的队友瓦尔特里·博塔斯（Valtteri Bottas）能轻松超过其他赛车。在加入梅赛德斯车队之前，博塔斯一场F1比赛也没赢过。他已经取得了九站冠军。

不过，在场均得分的较量中，这两位现代明星都被昔日的伟大车手击败了。在模型中排名前四的车手中有三位到1973年已经不再比赛；排在第一位的阿根廷车手胡安·曼努埃尔·范吉奥（Juan Manuel Fangio）在上世纪50年代获得过五次总冠军。

这些前辈的职业生涯都不长。相比舒马赫参加了306场比赛，范吉奥只参加了51场。但他们在模型中表现惊人，因为随着时间的推移，赛车的作用变得比车手更大了。根据模型的计算，上世纪50年代的车手得分平均占车队分数的58%，今天这一比例为19%。机修工出身的范吉奥开着四支不同车队的赛车赢得了总冠军，被誉为“大师”。现代F1比赛的大师是坐在笔记本电脑而不是方向盘前的工程师。 ■



Interest rates

The eternal zero

The pandemic will leave a legacy of even lower interest rates—and even higher asset prices

FOR FINANCIAL markets the 2010s were a time when it was hard to tell good news from bad. Even as the world laboured to shake off the financial crisis, the prices of stocks and bonds—not to mention houses—kept climbing. But good news, such as wage growth picking up, could cause markets to wobble. The reason was uncertainty over how far growth would go before central banks, especially the Federal Reserve, raised interest rates. Anything presaging monetary tightening caused bearishness. In the link between economy and markets, monetary policy was a signal dampener.

When covid-19 struck, there was no such ambiguity. Global stockmarkets tanked in March. For a time even American Treasury bonds, the world's safest asset, fell in price amid a scramble for cash and dysfunctional money markets. But eventually the signal dampener kicked in. The Fed cut interest rates and unleashed a torrent of liquidity to keep dollar markets functioning, preventing a credit crunch, mass bankruptcies and lay-offs. Other central banks followed suit. Since January central banks in America, Britain, Japan and the euro area have created new money worth \$3.8trn, much of which has kept yields on long-term government debt close to zero.

Markets were not just calmed: they began a bull run that defied gloomy forecasts. Between the start of April and the end of August, with central banks pinning bond yields down, global stockmarkets rose by 37%, fuelled by rising technology shares. America's corporate-bond markets saw record issuance in the first half of the year. Many housing markets also defied gravity. In August house prices in Sydney were 10% higher than a year earlier; and Britain's house prices hit an all-time high, said the Nationwide

building society. Tech stocks had a torrid start to September but the market shed only about a month of gains. Asset prices remain high.

The show of force by central banks, and the divergence between high financial markets and the real economy, marks the apotheosis of trends that began in the 2010s. Before covid-19, central banks were already accused of keeping so-called “zombie” firms alive, exacerbating wealth inequality and putting home ownership beyond the reach of young renters, even amid weak economic growth. Since the pandemic hit these side-effects of monetary policy have all, in a short space of time, got worse.

This is not central banks’ fault. They have no choice but to respond to the economic conditions they face. For decades interest rates—both short- and long-term—have been on a downward trend as central banks have fought shocks to the economy. That monetary stimulus has not provoked much inflation in consumer prices demonstrates only that central banks have been reacting to market forces, not distorting them; the global desire to save has grown faster than the desire to invest.

When interest rates are low, the arithmetic of discounting makes future income streams, and hence assets, more valuable. A recent paper by Davide Delle Monache of the Bank of Italy, Ivan Petrella of Warwick University and Fabrizio Venditti of the ECB finds that the decline in the “natural” rate of interest, which balances saving and investment without causing unsustainable recessions or booms, can explain most of the rise in the ratio of prices to dividends in America’s financial markets all the way back to the 1950s.

The pandemic is just the latest shock bearing down on the natural rate of interest. In America, the 30-year interest rate has fallen by almost a percentage point since January. This fits the historical pattern. Recent research by Òscar Jordà of the Federal Reserve Bank of San Francisco, and

Sanjay Singh and Alan Taylor, both of the University of California, Davis, studies 19 pandemics since the 14th century and finds that they have suppressed interest rates long afterwards—longer, even, than financial crises. Twenty years after a pandemic, they estimate, interest rates are about 1.5 percentage points lower than they would otherwise be. Covid-19 is not entirely comparable to episodes that include the Black Death and Spanish flu, because it is killing few young workers. But an effect even half as large would still be significant, given how low interest rates were already.

There are several ways in which covid-19 is strengthening structural forces pulling interest rates down. One is by boosting the desire of households and firms to hoard cash. Savings rates have surged as economies locked down and it became hard to spend. Some see the resulting swollen bank balances of consumers as potential fuel for an inflationary boom. But it is more likely that damage to the labour market leads to a prolonged period of “precautionary” saving, as is normal after recessions.

| *Pandemic-driven rates*

This is not a typical recession. It might have depressed interest rates by drawing attention to the danger of massive disasters, when the world was already becoming more attuned to the risks of climate change. Economists have long suspected that the risk of disasters weighs on interest rates by buoying demand for safe assets. (Decades ago, some were arguing that disaster risk explains the “equity premium puzzle”: the outsized gap between safe interest rates and the returns from shares.) In a recent paper, Julian Kozlowski of the Federal Reserve Bank of St Louis, Laura Veldkamp of Columbia University and Venky Venkateswaran of NYU Stern model the effect of covid-19 on beliefs about risk and estimate that it might depress the natural rate of interest by two-thirds of a percentage point. “Whatever you think will happen over the next year,” they write, “the ultimate costs of

this pandemic are much larger than your short-run calculations suggest.”

A third way in which the pandemic may depress the natural rate of interest is by boosting income inequality. Before it, many economists were arguing that, because the rich save a higher proportion of their incomes than the poor, higher rates of income inequality in America and other rich countries had, over a period of decades, contributed to a decline in the natural rate of interest. One estimate by Adrien Auclert of Stanford University and Matthew Rognlie of Northwestern University finds that nearly a fifth of the decline in the natural rate of interest since 1980 is attributable to rising inequality. The pandemic could compound this effect if it leaves labour markets less equal.

Against these forces is an enormous rise in government debt. One explanation for low interest rates and weak growth after the financial crisis was that there was a shortage of safe assets to absorb the world's savings. But the pandemic has seen a flood of such assets created as governments have issued debt to fund emergency spending. In June the IMF projected that global public debt would rise from a weighted average of 83% of GDP in 2019 to 103% in 2021. Covid-19 has even seen the creation of a new safe asset: the EU plans to issue €750bn (\$875bn) of joint debt. In theory, new debt should soak up savings, pushing up the natural rate of interest.

Yet there is little sign of these huge deficits eliminating the shortage of safe assets. That is partly because central banks have bought public debt in a bid to create growth and inflation by keeping long-term interest rates low. Oxford Economics, a consultancy, projects that safe-asset supply will decline in the next five years to just over a quarter of world output, against two-fifths before the financial crisis. The upshot is that the world economy increasingly resembles Japan, where even decades of deficits and net public debts of over 150% have not broken a low-inflation, low-interest-rate equilibrium.

This does not guarantee stagnation. Japan's economic woes are often overstated because its growth is weighed down by ageing. In the 2010s its GDP per working-age person grew faster than America's. But Japanification does create a dilemma: whether to increase deficits in an attempt to break the low-inflation, low-rate spell, or to rein in borrowing in the knowledge that the debt-to-GDP ratio cannot rise for ever. Low rates make it easier for politicians to pay for all sorts of demands on the public finances, including more spending on health care and pensions as societies age and on fighting climate change. But they also leave governments dependent on loose monetary policy and vulnerable to rising interest rates, should they ever return. During the pandemic governments and inflation-targeting central banks have been working hand in hand, but the question of what happens if their goals diverge is an open one.

Low interest rates also mean that high asset prices are all but guaranteed. This will reinforce complaints about wealth inequality and intergenerational unfairness—complaints that carry more bite given the unequal distribution of job losses this year. Homeowners, mostly drawn from the professional classes, will benefit as they can take advantage of cheaper mortgages. So will homebuyers. One reason why housing markets are holding up is that the downturn has not hit the typical house-hunter. Those without wealth or access to finance will feel understandably aggrieved.

Most significantly, central banks will be deprived of their traditional tool for fighting recessions: cutting short-term interest rates. The recovery from covid-19, and from future recessions, will instead hinge on the willingness of governments to provide an adequate fiscal response. Even central-bank bond-buying is of declining importance, because long-term rates are close to zero. The most that monetary policy can do is to stop long-term rates rising. The Fed's recent promise to allow inflation to overshoot its 2% target during the recovery will take effect only if fiscal stimulus brings about

more inflationary conditions.

If there is an overarching impact of low interest rates, it is fragility. The public indebtedness they allow might cause problems when circumstances change. It becomes harder to fight recessions. Investors find it harder to hedge risk, because with yields near zero, bond prices cannot rise much further, however bad the news. And high asset prices, especially when accompanied by income inequality, threaten the social contract. It is against this background that economic policy needs a fundamental rethink. ■



利率

永恒的零

疫情将留给世界进一步走低的利率，和继续攀升的资产价格

对于金融市场而言，2010年代是一个很难区分好消息和坏消息的时期。在全世界努力摆脱金融危机的影响之际，股票和债券的价格持续攀升，房屋就更不用说了。但像工资增长提速这样的好消息又可能引发市场动荡。原因是人们不确定这种增长还能走多远就要引来央行（尤其是美联储）出手加息了。任何预示货币紧缩的因素都导致了市场看跌。在经济和市场的联系中，货币政策是一个信号衰减器。

新冠疫情爆发时，市场上没有这种含混不清。全球股市在3月暴跌。人们急着囤积现金，货币市场失灵，即使是全球最安全资产的美国国债价格也一度下跌了。但最终，信号衰减器亮相了。美联储降息并释放大量流动性以保持美元市场运转，这防止了信贷紧缩、大量破产和裁员。其他央行纷纷效仿。自1月以来，美国、英国、日本和欧元区的央行共印钞3.8万亿美元，其中大部分得以把长期国债收益率维持在接近零的水平。

市场不仅恢复了平静，还开始了一轮牛市，与灰暗的经济预期背道而驰。从4月初至8月底，随着央行压低债券收益率，全球股市在科技股大涨的带动下上涨了37%。上半年美国公司债发行量创下历史新高。多地房地产市场大涨。8月，悉尼的房价比去年同期上涨了10%；据全英房屋抵押贷款协会（Nationwide building society）称，英国房价创历史新高。科技股在9月开局不利，但股市仅跌去了一个月左右的收益。资产价格仍居高不下。

央行秀肌肉，加之高端金融市场和实体经济间的分歧，标志着始于2010年代的趋势达到了巅峰。疫情前，央行已经被指斥为“僵尸”企业续命、加剧了财富不平等、让年轻租户族无法拥有自住房，即便是在经济增长疲弱的时期。自疫情爆发以来，货币政策的这些副作用在短时间内全部恶化。

这不是央行的错。它们别无选择，只能对眼下的经济状况做出反应。几十年来，在央行对抗各种经济危机之时，短期和长期利率一直都处于下行趋势。货币刺激措施并没有触发消费者价格上升很多，这表明央行一直只是在对市场力量做出反应，而不是扭曲它们；全球的储蓄意愿比投资意愿增长得更快。

利率在低位时，折现算法使得未来的收入流变得更有价值，从而提高了资产价值。意大利银行的达维德·德莱莫纳凯洛（Davide Delle Monache）、华威大学的伊万·彼得雷拉（Ivan Petrella）和欧洲央行的法布里齐奥·文迪蒂（Fabrizio Venditti）最近发表的一篇论文发现，“自然”利率（即可以平衡储蓄和投资而不会引发不可持续的衰退或繁荣的利率水平）的下降可以解释自1950年代以来美国金融市场中本利比的大部分上涨。

疫情只是令自然利率承压的最新一轮冲击。1月以来，美国的30年期利率已下降了近一个百分点。这符合历史规律。旧金山联储的奥斯卡·约尔达（Òscar Jordà）以及加州大学戴维斯分校的桑贾伊·辛格（Sanjay Singh）和艾伦·泰勒（Alan Taylor）近来研究了14世纪以来的19次全球大流行病，发现它们在之后很长的一段时间里抑制了利率，甚至比金融危机更久。他们估计，在一次大流行病发生的20年后，利率比如果没有这场瘟疫的情况低约1.5个百分点。新冠肺炎不能完全与黑死病和西班牙流感等瘟疫相提并论，因为它对年轻劳动力致死率很低。但由于利率本来就已经很低，即使后续影响只有一半仍然会很显著。

新冠疫情正通过几个方式加强压低利率的结构性力量。其一是提高家庭和企业囤积现金的意愿。随着经济体实施封锁隔离，花钱变得更难，储蓄率飙升。一些人认为，由此导致的消费者银行存款余额膨胀是通胀上升的潜在推动力。但是，更有可能的是，劳动力市场遭受的破坏导致了一个长久的“预防性”储蓄期——经济衰退后的常见现象。

| 疫情驱动利率

这不是一场典型的衰退。在世界已变得更关注气候变化的风险之时，这场

衰退可能引起了人们对大规模灾难的危险的关注，从而压低了利率。长期以来，经济学家怀疑灾难的风险会通过增加对安全资产的需求而压低利率。（几十年前，一些人提出，“股权溢价之谜”也就是无风险利率和股票收益间的巨大差距可由灾难风险来解释。）在最近的一篇论文中，圣路易斯联储的朱利安·科兹洛夫斯基（Julian Kozlowski）、哥伦比亚大学的劳拉·维尔德坎普（Laura Veldkamp）和纽约大学斯特恩商学院的文奇·文卡特斯瓦兰（Venky Venkateswaran）共同模拟了新冠肺炎对风险理念的影响，并估计它可能使自然利率降低三分之二个百分点。“无论你认为未来一年会发生什么，”他们写道，“这次疫情的最终损失都远大于你的短期计算所显示的。”

疫情可能压低自然利率的第三种方式是加剧收入不平等。在此之前，许多经济学家认为，由于富人比穷人存下了自己收入中更大一部分，美国和其他富裕国家更高的收入差距在过去几十年中部分导致了自然利率下降。斯坦福大学的阿德里安·奥克莱尔（Adrien Auclert）和西北大学的马修·龙利（Matthew Rognlie）的一项估算发现，自1980年以来自然利率下降的近五分之一是由不平等加剧造成的。如果疫情使得劳动力市场变得更不平等，就可能加剧这种影响。

和这些力量方向相反的是政府债务猛增。对金融危机后的低利率和增长低迷的一种解释是缺乏安全资产来吸收全球储蓄。但是，疫情后政府通过发债为紧急开支融资，创造出了大量这类资产。国际货币基金组织6月预测，全球公共债务将从2019年占GDP加权平均值的83%增加到2021年的103%。新冠疫情甚至催生了一类新的安全资产：欧盟计划发行7500亿欧元（8750亿美元）的共同债务。从理论上讲，新债务应该会吸收储蓄，推高自然利率。

不过，并没有多少迹象表明这些巨额赤字消除了安全资产的短缺。部分原因是央行购买国债以期把长期利率维持在低位，从而促进增长和通胀。咨询公司牛津经济研究院（Oxford Economics）预测，未来五年安全资产的供应量将下降至仅占全球总产值的四分之一略多，而金融危机前为五分之一。其结果是，世界经济越来越像日本——该国数十年的赤字和超过GDP

150%的净公共债务都没有打破低通胀与低利率并存的局面。

这未必会造成经济停滞。日本的经济困境往往被夸大了，因为它的增长受到老龄化的拖累。在2010年代，日本劳动年龄人口的人均GDP增速快过美国。但是，“日本化”确实制造了一个两难困境：究竟是该增加赤字以求打破低通胀加低利率的魔咒，还是该控制借贷，毕竟大家都很清楚债务与GDP之比不可能无止境地提高。低利率让政客更容易为公共财政的各种需求砸钱，包括随着社会的老龄化而提高在医疗和养老金上的支出，以及对抗气候变化。但是，它们也使政府依赖宽松的货币政策，暴露于利率上升（如果有这么一天的话）的风险之中。疫情期间，各地政府和以提高通胀为目标的央行携手并进。但如果哪天它们的目标不一致时会如何，答案并不清楚。

低利率也意味着高资产价格近乎是板上钉钉的事。这将加剧人们对财富不均和代际不公的抱怨。而鉴于今年岗位流失的分布不均，这些抱怨也变得更具有杀伤力。房屋业主多来自专业人士阶层，他们将因为能利用更便宜的抵押贷款而获益。买房的人也一样。房地产市场之所以保持坚挺，原因之一是经济下滑并未打击到典型购房人群。那些没有财富或无法获得融资的人自然会愤愤不平。

最重要的是，央行将失去它们对抗衰退的传统工具：下调短期利率。要从疫情和从未来其他衰退中复苏，将转而取决于政府是否愿意提供恰当财政应对。甚至央行买债的重要性也在下降，因为长期利率已经接近于零。货币政策能做的主要就是阻止长期利率上升。美联储近日承诺将允许通胀率在复苏期间超过其2%的目标，但这只有在财政刺激措施带来了更多通胀条件的情况下才会发生作用。

如果说低利率有一种关乎全局的影响，那就是脆弱性。当环境改变时，它们所容许的公共负债水平可能会引发问题。要对抗衰退变得更难了。投资者则发现更难对冲风险了，因为收益率已经接近零，无论面对多么糟糕的坏消息，债券价格都涨不了多少了。而高资产价格威胁着社会契约，尤其是当它伴随收入不平等时。正是在这种背景下，经济政策需要根本性的反

思。■



The World Trade Organisation

The home straight

What the race to lead the WTO says about some thorny trade issues

MEMBERS OF THE World Trade Organisation (WTO) are not known for co-operating with each other. So when in June they began the process of choosing a new director-general, many feared deadlock. But now, as the process draws to a close, officials are feeling hopeful. Two candidates are still in the running: Nigeria's Ngozi Okonjo-Iweala, the chairwoman of GAVI, a vaccine-finance agency, and a former World Bank official and finance minister; and Yoo Myung-hee, South Korea's trade minister. A winner is due to be announced by November 7th, and support seems to be coalescing around Ms Okonjo-Iweala. Yet the contest says more about the discord in the trading system than the harmony.

The candidates themselves did a good job of highlighting various divisions in the course of the selection process (while dutifully noting that only members have the power to resolve them). Between them they identified a long list of problems: jammed negotiations that have left the WTO's rule book out of date; a broken system of solving disputes; members' lacklustre commitment to transparency; and a trade war between America and China.

Disagreements between members also explain the candidates' rather limited ambitions. A bold agenda might include a grand bargain on agriculture that lowers tariffs in poor countries and limits subsidies in rich ones. Ms Myung-hee is a seasoned negotiator and not one to shy away from tricky talks. Even so, rather than shooting for a big deal, she now reckons that restoring the WTO's credibility as a negotiating forum means just agreeing on something. She would prioritise ongoing talks to curb members' fishing subsidies. (Even that narrower deal will be a stretch, given that negotiators do not yet agree on what counts as fish.)

Ms Okonjo-Iweala has emphasised her experience fighting covid-19 as her strong suit. As head of GAVI she understands the importance of open trade so that vital supplies can get to where they are needed. But this too is a thorny topic. Rich countries are more interested in lowering others' tariffs than limiting their own right to apply export controls. They also hate a recent proposal from India and South Africa to suspend intellectual-property protection for products that could prevent, contain or treat the disease. So instead Ms Okonjo-Iweala has spoken only vaguely of exploring new trade rules and intellectual-property and licensing rights for drugmaking.

If she wins, Ms Okonjo-Iweala has also promised to empower the WTO's secretariat. That could be controversial—some members will resist what they see as a threat to their power over negotiations. But it could also help poorer countries, some of which lack the capacity to draft proposals on their own, making it hard to participate in talks. Her political clout will be useful too. If the problems of the global trading system were purely technical, “they would have been solved long ago”, she told members in July.

But Ms Okonjo-Iweala's success would also say something about the geopolitics of trade. China could reject Ms Myung-hee if that allows it to keep its deputy-director-general spot. (Historically, jobs have been divvied up among regions.) Japan's nasty trade dispute with South Korea makes it unlikely to support Ms Myung-hee. Brazil, a big exporter of farm products, may be put off by South Korea's membership of the G10 group of countries, which staunchly defends agricultural subsidies. The agreement on the next director-general could be born from a host of disagreements.

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by November 7th 2020. ■



世贸组织

最后冲刺

世贸组织掌门人的角逐反映出一些棘手的贸易问题

世贸组织（WTO）的成员国并不以相互合作闻名。所以当该组织6月开始遴选新任总干事时，很多人担心会出现僵局。但现在，随着遴选工作接近尾声，官员们看到了希望。两位候选人仍在角逐：疫苗融资机构全球疫苗免疫联盟（GAVI）的主席、前世界银行官员、尼日利亚前财政部长恩戈齐·奥孔约-伊维拉（Ngozi Okonjo-Iweala），以及韩国贸易部长俞明希。结果将在11月7日前宣布，支持的声音似乎开始向奥孔约-伊维拉聚结。不过，这场竞逐更多地显现了这一贸易体系中的分歧而非和谐。

在遴选过程中，候选人各自成功地突显了各种分歧（同时也尽职地指出只有成员国才有能力解决它们）。两人提到了一长串问题：谈判长期僵持不下，以至于世贸组织的规则手册已经过时；争端解决机制运作失灵；成员国在保证透明度的问题上态度敷衍；还有中美之间的贸易战。

成员国之间的分歧也解释了候选人的抱负为何相当有限。一个大胆的议程可能包括推进农业上的重大协议，它将降低贫穷国家的关税，限制富裕国家的补贴。俞明希是个经验丰富的谈判高手，不会回避棘手的对话。即便如此，她现在认为，要恢复世贸组织作为谈判论坛的信誉，可以先谈成点什么，而不是要竭力达成一项重大协议。她会优先考虑正在进行的限制成员国渔业补贴的谈判。（考虑到谈判代表们还没有就“鱼”的定义达成一致，即使这个更小的协议也不容易实现。）

奥孔约-伊维拉强调自己抗击新冠肺炎的经验作为竞选主打牌。身为GAVI的负责人，她理解开放贸易的重要性。唯有贸易开放，至关重要的物资才能运到需要的地方。但这同样是个棘手的问题。富裕国家更感兴趣的是降低其他国家的关税，而不是限制自己实施出口控制的权利。它们也讨厌印度和南非最近提出的一项建议，即暂停对可能预防、控制或治疗新冠肺炎的产品的知识产权保护。因此，奥孔约-伊维拉只是含糊地提到了探索新

的贸易规则以及药品生产的知识产权和许可权。

奥孔约-伊维拉还承诺，如果她当选，会赋予WTO秘书处更多权力。这可能有争议，一些成员国会抵制，因为它们认为这会威胁到自己对谈判的影响力。但此举也可能帮助较贫穷的国家，其中一些国家缺乏自己起草提案的能力，因此难以参与谈判。她的政治影响力也将有所帮助。如果全球贸易体系的问题纯粹是技术性的，“那早就解决了”，她7月时对成员国说。

但奥孔约-伊维拉若成功当选，也将揭示出贸易的地缘政治问题。中国可能否决俞明希，如果这能让它保住自己副总干事的位置的话。（就以往经验看，职位是按地区分配的。）日韩之间的贸易争端难分难解，日本不太可能支持俞明希。农产品出口大国巴西可能会对身为G10成员国的韩国心怀芥蒂，因为G10坚决维护农业补贴政策。对谁出任下一任总干事的一致意见可能在纷繁的歧见中产生。





Schumpeter

All the president's moolah

How good a businessman is Donald Trump?

“THE APPRENTICE makes me \$3m a day. Ker-ching. That’s the music it makes. It sure beats bricks and mortar, hey?” So a British businessman, imitating Donald Trump’s distinctive drawl, recalls a conversation the two men had by telephone years before Mr Trump became president. It was a high point of their relationship that the Brit still savours.

Broadly speaking, Mr Trump was right. As the *New York Times* reported on September 27th, after trawling through almost two decades of his long-concealed tax records, the president’s 50% stake in the reality-TV show, which helped craft his image as a successful tycoon and catapult him to the White House, was the shrewdest business move of his career.

Yet the self-styled property Midas almost blew the windfall on bricks and mortar. Before becoming president Mr Trump spent much of his money on golf courses, hotels and other trophy assets that the *Times* says have since racked up huge tax losses. Thanks to that red ink, it said he paid a mere \$750 in federal income taxes in both 2016, the year he was elected, and his first year in office—and not a cent in ten of the previous 15 years.

In the presidential debate on September 29th Mr Trump disputed the account, saying he had paid “millions” in income taxes. A lawyer for the Trump Organisation told the *Times* that “most, if not all, of the facts appear to be inaccurate” but only directly questioned the amount of tax the president reportedly paid. In the past Mr Trump might have shrugged it all off. In 2016 he said minimising his taxes “makes me smart”. But even if the revelations hurt him politically, many businesspeople will see them in a kinder light. For them, the most intriguing question is not whether Mr

Trump is a boy scout but whether he is a good businessman.

It is a hard question to answer. Mr Trump has never released his tax returns, and his businesses are privately held. The financial disclosures he made as president last year covered more than 100 business entities, ranging from skyscrapers to books. He can inflate assessments of his own wealth by billions of dollars just in the course of a conversation. The *Times* scoop provides another important piece of the jigsaw puzzle. But because it refers to tax accounts, it probably represents what Mr Trump wants the taxman to believe, rather than the full reality.

To get the measure of the business, it helps to consider the Trump Organisation, Mr Trump's main vehicle, as a relatively modest, America-centric enterprise. Its bedrock is property. Its biggest assets are two buildings in New York and San Francisco in which Mr Trump owns a minority stake, and his two Manhattan stalwarts, 40 Wall Street and Trump Tower. The *Times* says that these four have produced big profits—until the pandemic, that is. But if Mr Trump, like other property barons, uses the wear and tear on his buildings, known as depreciation, to generate tax deductions, it is possible that they have done even better than the tax records make out.

Then there is “The Apprentice”. According to the tax records, his appearance on the show generated \$200m, which is a spectacular result. He also reported \$230m of additional income from the licensing and endorsement deals that came out of it, on everything from Trump-branded hotels to Oreo cookies. Beyond that are some puny international branding endeavours on buildings in other countries, some of which are white elephants. The tax records indicate that his biggest losses have come from golf courses, into which he has poured money over the past decade. The *Times* says some of the biggest ones, including two in Scotland and one in Ireland, are loss-making even before depreciation.

How solid the Trump business remains depends on four factors about which the full picture is still unclear. The first is debt. The *Times* reports that he has \$300m in loans coming due in the next few years for which he is personally liable. It is not known whether he mortgaged these borrowings against solid assets. If he did, they are probably manageable. If not, the debt could become contagious—but it doesn't have to. Banks will nevertheless be jumpy. In a compliance-obsessed era, few are keen to engage with politicians of any stripe—particularly one with Mr Trump's profile. There may be other liabilities. Mr Trump is the subject of an ongoing federal tax audit for a \$73m refund he claimed a decade ago—and which he may need to return. Of immediate concern is covid-19. Many of his commercial tenants will be reeling from the pandemic. Hotels are suffering from low occupancy; high-density office buildings in New York could fall in value because of remote working; footfall has fallen among luxury retailers who occupy his buildings at street level.

| *In the 18th hole?*

Ultimately, the future will depend on the durability and value of the Trump brand. "The Apprentice" showed how lucrative it could be. But whether he could get a similar television deal in America whenever he leaves power may depend on his popularity at the end, and the manner in which he leaves the White House. He could look for TV opportunities abroad, where his recognition is far higher now than it ever was during "The Apprentice". There are plenty of international media moguls who would be keen to profit from another chapter in the Trump soap opera. Or he may simply retire, handing over the keys of the kingdom to his children to manage or to liquidate.

That is unlikely. The best time to do so would have been before taking office. In a new book about the president's business interests, "White House, Inc", Dan Alexander, a journalist at *Forbes* magazine, calculates that

had Mr Trump done so back then and invested the proceeds in the S&P 500 stockmarket index, by March of this year he would have been richer by \$415m—twice what he earned on “The Apprentice”. To a businessman that must rankle, whether he is an astute one or not. ■



熊彼特

总统的全部身家

特朗普是多出色的商人？

“《学徒》一天能给我挣300万。哗啦啦，钱进来了。这是它的主题曲。它肯定比那些砖头水泥强，你说是吧？”一名英国商人模仿着特朗普独特的腔调，拖长了声音说道。他在回忆在特朗普当上总统的几年前两人的一通电话。这是二人交情的一个高潮，他到今天还在回味。

大体上讲，特朗普说的没错。《纽约时报》查阅了他长期掩藏的近20年的纳税记录。正如该报在9月27日的报道中所述，这位总统在这档真人秀节目（帮助他塑造了成功大亨的形象并一跃登上白宫宝座）中持有50%的股份是他职业生涯中最精明的商业决策。

不过，这位自封的房地产点金神手几乎把这笔横财全都挥霍在了砖头水泥上。在成为总统之前，特朗普把大部分钱都花在了高尔夫球场、酒店和其他炫耀性资产上。《纽约时报》称，这些资产之后造成了巨大的税收流失。该报称，拜这些资产的亏损所赐，特朗普在他当选的2016年和上任的第一年都只缴纳了750美元的联邦所得税，而在此前的15年中，有10年他一分钱也没缴过。

在9月29日的大选辩论中，特朗普对该报道提出异议，称他已缴纳“几百万”美元的所得税。特朗普集团（The Trump Organisation）的一名律师回应《纽约时报》称，“就算不是全部，大部分内容似乎也是不准确的”，不过他只直接质疑了报道中所述特朗普缴纳的税款金额。过去，特朗普可能完全不会把这些放在心上。他曾在2016年说过，尽可能少缴税“是我机智”。但是即使这些披露会对他造成政治上的损害，许多商人还是会以更宽容的眼光看待它们。他们最感兴趣的问题不是特朗普是不是个正派人，而是他是否是一名优秀的商人。

这个问题不好答。特朗普从未公布过他的报税单，他的企业也是私人控股

的。去年他作为总统披露的财务信息涵盖了从摩天大楼到图书的100多个商业实体。他光是动动嘴皮子就可能把自己的财富评估夸大数十亿美元。

《纽约时报》的独家新闻提供了拼图的另一个重要部分。但因为该报道查阅的是纳税记录，所以它展现的可能是特朗普希望税务人员相信的东西，而不是完整的真实情况。

要摸清特朗普的生意做得如何，更好的视角是把他的主要财务载体特朗普集团看作一家不算太大、以美国为中心的企业。它的基石是房地产。它最大的资产是特朗普拥有少数股权的两栋位于纽约和旧金山的建筑，以及他在曼哈顿的两块磐石——华尔街40号和特朗普大厦。《纽约时报》称，这四栋大楼产生了丰厚的利润——直到疫情爆发。但是，如果特朗普像其他房地产大亨一样利用建筑的磨损（即折旧）来为自己减税，那么这些房产的效益可能比税收记录显示的还要好。

然后是《学徒》。根据纳税记录，他在节目中的亮相带来了两个亿的收入，令人叹为观止。他还报告了2.3亿美元的额外收入，来自该节目带来的从特朗普品牌酒店到奥利奥饼干的各种许可和代言协议。除此之外，他还在其他国家的建筑上做出了些不起眼的品牌国际化努力，其中一些成了昂贵的摆设。纳税记录显示，他最大的损失来自高尔夫球场，过去十年他在这方面投入了大量资金。《纽约时报》称，其中一些最大的球场，包括在苏格兰的两家和爱尔兰的一家，即使在折旧前也是亏损的。

特朗普的生意还会多稳固取决于四个因素，不过这些因素的全貌仍难以探清。首先是债务。《纽约时报》报道称，他有三亿美元的贷款将在未来几年到期，由他个人负责。不知他这些贷款是否以固定资产作了抵押。如果是，它们可能就还可控。如果不是，这笔债务可能会变得有传染性——但这也还是可以避免的。尽管如此，银行还是会心惊肉跳。在一个合规至上的时代，很少有人热衷和政客打交道——不管是什么类型的政客，更别说特朗普这号人物。他可能还有其他债务。特朗普正在就10年前申领的7300万美元退税接受联邦税务审计——他可能需要退还这笔钱。摆在眼前的麻烦是新冠肺炎。他的许多商业租户将因疫情受到打击。酒店入住率低；纽约的高密度办公楼可能因远程办公的兴起而贬值；他临街建筑中的

奢侈品零售店租户的客流量已经下降。

| 在第18洞?

说到底，未来将取决于特朗普这个品牌的持久性和价值。《学徒》显示了它的吸金力。但是，他是不是不管何时卸任都能在美国获得类似的电视节目协议，可能要看他在最后时刻受欢迎的程度，以及以什么样的方式离开白宫。他或许可以到国外寻找做电视节目的机会，现在他在那里的知名度可比《学徒》时期高得多。许多国际媒体巨头都会很想从特朗普肥皂剧的下一个篇章捞一笔。或者他可能干脆会退休，把王国的钥匙交给子女管理或变现。

这不太可能发生。真要这么做，最好的时机其实是在他上任以前。《福布斯》记者丹·亚历山大（Dan Alexander）在关于这位总统的商业利益的新书《白宫股份有限公司》（White House, Inc）中估算，如果特朗普当时这么做了，并将所得投资于标普500股市指数，那么到今年3月，他的身家会增加4.15亿美元——是他在《学徒》中赚到的两倍。这一定会令一名商人捶胸顿足，不管他精明与否。■



The future

What is real, anyway?

The Metaverse is coming

WITNESS ANY videoconference call, and it is striking how awkward it still is—everyone is in boxes, looking off in random directions. Microsoft tried to fix this recently with “Together” mode for its Teams application. Created by Jaron Lanier, a virtual-reality pioneer, it does away with boxes and puts everyone in a shared virtual space such as an auditorium. All participants see the whole group at once, as if they were all being reflected in a huge virtual mirror. Mr Lanier says this allows social and spatial awareness functions in the brain to work more naturally, and makes it harder to notice irregularities in eye contact.

For Mr Lanier, “Together” mode is a small contribution to a philosophy he holds dear—that, as technology develops, it should keep people in mind. Instead of asking “is videoconferencing good or bad?” or “is VR good or bad?”, he says, the real question is “how can we make this more human-centred?” He sees virtual realities as a path to that goal, by making computing more human-friendly.

Take posture, for example. Sitting at a keyboard, locked in position for hours and focusing on a fixed screen is a recipe for a range of physical complaints, from sore necks to tingling hands. “Humans have not evolved to sit for long periods of time at a desk, staring at a screen whilst hammering away on a keyboard,” says Mark Mon-Williams of the University of Leeds. Humans evolved to walk around and use their hands to explore the world that is in front of them. Virtual and augmented realities afford the option of using more natural movements when interacting with computer-generated environments—grasping and pointing at text or objects, for example, and physically moving them around a workspace.

Alex Kipman, a computer engineer at Microsoft and inventor of the company's Kinect and HoloLens devices, poses a similar question: why are humans required to conform to the needs of computers, rather than the other way around? "Why don't we flip it?" he asks. "Why don't we ask technology to understand our world? How do we get digital technology to come out into our analogue space, as opposed to trying to get us into the digital space?" His inventions are specifically aimed at tackling those challenges. The Kinect sensor's microphones and infrared cameras let people use speech and gestures to control games and other functions on Microsoft Xbox devices. The HoloLens extends that by mapping and understanding the user's environment, too. Both devices bring technology out of screens and into the real world.

These sorts of ideas will bring increased ease and richness to interactions between humans and computers. The same technologies could also be used to push people beyond their own, or even any, human experiences. Scientists know that, as long as an avatar in a virtual world is programmed to respond in real time to a user's actions, those users will often co-opt the avatars as almost-real extensions of their own bodies. People can easily inhabit avatars of a different gender or ethnicity, for example. They can even easily learn to control drastically different bodies, soaring over landscapes as virtual eagles or munching grass as virtual cows.

This is more than just a curiosity. Mr Lanier wants to know what would happen if inhabiting different bodies in virtual reality gave people access to new forms of human intelligence and understanding—the kind that “peeks out once in a while with a great athlete or with somebody playing jazz piano”. And if that could be made more accessible, he believes, then it might get interesting. “Can you turn yourself into a mathematical equation...in order to gain the kind of rapid body intelligence that's possible?”

That is the future of extending human experience. Travis Scott's concert in "Fortnite" hinted at some of the creative opportunities already available. His was not the first concert in that virtual world. In 2019 Marshmello, a DJ and producer, performed a set in the game watched by more than 10m fans, but that was just a musician playing a concert on a virtual stage in a game world. By contrast, Mr Scott's event played with the idea of how a concert might look if it did not have to take place in the real world. The audience could therefore fly around beaches, in outer space and underwater. "You can think of this as, how would you tele-concert if you were God?" says Matthew Ball, a tech guru. "If you controlled physics."

| *Virtual mosh pit*

That the event took place during a pandemic, when this was the only type of concert people could participate in, is important. Such events might in the past have been dismissed as "video-game experiences". But as interactions through Zoom and other services come to be seen as "legitimate" meetings, parties and performances, so events such as Mr Scott's should also be seen as legitimate concerts, says Mr Ball. "We can't go to physical concerts," he says. "So, either we have to say it's a concert or we have to accept that there are no more concerts."

There are still many technical hurdles to making the digital and physical worlds work together. As fast and capable as computer graphics have become, for example, VR focuses only on just two of the senses through which people experience reality: sight and sound. In the physical world, it would be difficult to imagine life without the other senses and, in particular, touch—grasping and manipulating objects is a fundamental part of the way people experience and gather information about their surroundings.

If history is a guide, computing platforms and internet connectivity will become faster and more widespread, latency will go down, input and

output devices will improve and game engines (and their successors) will be able to create customised virtual worlds on the fly. At some point in the future, anyone who wants to may be able to switch in and out of fully immersive virtual worlds, flitting in and out of whatever the real version of Neal Stephenson's Metaverse turns out to look like.

What seems certain is that sophisticated 3D digital worlds will appear on ever more of the screens of successive generations of devices that people already use every day. As activities, particularly interactions between people, in virtual realities can generate practical and aesthetic outcomes that have moral consequences and personal meanings, the idea that the "real" world is limited to that which is physically present nearby will seem increasingly bizarre. What, after all, is real, anyway? ■



未来

何谓真实

“虚拟实境”来了

随便看看哪个视频会议，你会吃惊地发现一切还是那么叫人尴尬：每个人都在一个方框里，眼睛望向不知什么地方。微软最近在它的Teams应用中推出了“共聚”（Together）模式来尝试解决这个问题。它由虚拟现实先驱杰伦·拉尼尔（Jaron Lanier）创建，去掉了方框，把所有人都放进一个共享的虚拟空间，比如一个礼堂里。所有与会者都能一眼看到所有人，就像他们都映照在一面巨大的虚拟镜子里一样。拉尼尔说，这会令大脑中的社交和空间意识功能运作更自然，也更难注意到眼神交流的紊乱。

对拉尼尔而言，“共聚”模式是他为自己坚信的一个理念做出的一个小小贡献——他相信随着技术不断发展，技术应把人铭记于心。他说人们不该问“视频会议是好是坏？”或者“虚拟现实技术是好是坏？”，真正的问题是“我们如何把它变得更以人为本？”他认为虚拟现实是实现这个目标的途径之一，因为它让计算变得更人性化。

以身体姿态为例。在键盘前一坐几小时，一动不动地盯着一块固定屏幕，从脖子酸到手发麻等一连串身体不适随之而来。利兹大学的马克·蒙-威廉姆斯（Mark Mon-Williams）说：“人类的进化并没有准备好长时间坐在办公桌前，盯着屏幕，敲打键盘。”人类的进化让人可以四下走动，用双手探索眼前的世界。虚拟现实和增强现实带来了选择，让他们可以在与计算机生成的环境交互时使用更自然的动作，例如抓握和指向文本或物体，在现实办公空间中四下移动它们。

微软的计算机工程师、Kinect和HoloLens设备的发明者艾利克斯·基普曼（Alex Kipman）提出了一个类似的问题：为什么要求人类符合计算机的需求，而不是相反？“为什么不把它反过来呢？”他问道，“为什么不让技术来理解我们的世界？我们如何能让数字技术走出屏幕，走进我们的模拟空间，而不是努力让我们进入数字空间？”他的发明专注于攻克这类挑战。

Kinect传感器的麦克风和红外摄像头让人们可以用语音和手势来控制微软Xbox设备上的游戏和其他功能。HoloLens通过测绘和理解用户所处的环境来拓展这种体验。两种设备都将技术带出屏幕，进入现实世界。

此类创意将使人机交互变得更轻松和丰富。同样的技术也可以用来推动人们超越自身甚至任何人的经验。科学家们知道，只要对虚拟世界中的化身编程使其实时响应用户的动作，用户通常就会把化身纳为自己身体几乎真实的延伸。例如，人们可以轻松地栖身于不同性别或种族的化身中。他们甚至可以轻松学习如何控制截然不同的身体，化身为虚拟的鹰翱翔于各种地形之上，或是虚拟的母牛咀嚼着青草。

这不只是个稀罕的玩物。拉尼尔想知道，假如在虚拟现实植入不同的身体能让人们获得新形式的人类智力和理解力，那会发生什么呢？这里所说的是“一位伟大的运动员或某个弹奏爵士钢琴的人有时展露出来”的那种能力。他认为，如果可以更容易地获得这种体验，那这就可能很有意思了。“你能否把自己变成一道数学公式……以获得可能存在的那种快速身体智能？”

那就是人类体验被延展的未来。从特拉维斯·斯科特（Travis Scott）在堡垒之夜（Fortnite）游戏中举行的音乐会中可以一窥一些已经存在的创造性机遇。这不是在那个虚拟世界中的第一场音乐会。2019年，DJ兼音乐制作人“棉花糖”（Marshmello）在这个游戏中的表演吸引了超过1000万名粉丝观看。但这还只是一个音乐家在游戏世界的虚拟舞台上演奏音乐而已。相比之下，斯科特的这场音乐会实验了如果音乐会不需要在现实社会中举行，它可能是什么模样。于是观众可以在海滩翱翔或是上天入海。“你可以这样想，如果你是上帝，你会怎么做远程音乐会呢？”科技顾问马修·鲍尔（Matthew Ball）说，“如果你控制着物理的话。”

| 虚拟摇滚区

重要的是，这场演出是在疫情期间举办的，此时这是人们唯一可以参加的一种音乐会。过去，此类活动可能会被不屑地斥为“视频游戏体验”。但鲍尔说，随着通过Zoom和其他服务发生的互动被视为“正统”的会议、聚会

和表演，斯科特的这一场也应被视为正统的音乐会。“我们不能去实体音乐会现场，”他说，“所以，要么我们不得不说这是一场音乐会，要么我们就得接受不再有音乐会。”

要让数字世界和实体世界协同工作仍存在许多技术障碍。例如，虽然计算机图形已经变得快速而强大，虚拟现实仍只专注于人们用以体验现实的两种感官：视觉和听觉。在实体世界中，很难想象没有其他感官方式的生活，尤其是触觉——抓握和操控物体是人们体验周遭环境和收集环境信息的基本元素。

以历史经验看，计算平台和互联网连接会变得更快、分布更广，延迟将减少，输入和输出设备会改善，游戏引擎（及其后续产品）将能即兴创建定制的虚拟世界。将来某个时候，任何人如果愿意，都可以在真实世界和完全沉浸式的虚拟世界中来回切换，在尼尔·斯蒂芬森（Neal Stephenson）描绘的“虚拟实境”（Metaverse）的某种真实版本里进进出出。

看起来确定无疑的是，在人们已经每天都在使用的设备的未来几代的屏幕上，将越来越多地展现复杂的三维数字世界。当虚拟现实中的活动，尤其是人与人的互动，能产生带有道德后果和个人意义的实际而优美的结果时，认为“真实”世界仅限于眼前物理世界的想法将会日益显得古怪。本来嘛，到底什么才是真实呢？ ■



Trumponomics

Watered with liberal tears

How the American economy did under Donald Trump

IN HIS NEW book Casey Mulligan offers an intriguing explanation for why President Donald Trump makes outlandish economic claims. Mr Trump knows he is hyperbolising when he says that America has enjoyed “the greatest economy in the history of the world” on his watch, suggests Mr Mulligan, who was until recently the chief economist on the president’s Council of Economic Advisers. It is a “strategy for getting the press to cover a new fact, which is to exaggerate it so that the press might enjoy correcting him and unwittingly disseminate the intended finding”. Journalists’ dislike for Mr Trump, according to Mr Mulligan, blinds them to many of the administration’s genuine economic successes. He may have a point.

Assessing leaders’ economic records is fraught with difficulty. Presidents typically get credit when the economy is doing well and blame when it does badly—but short-term economic outcomes are usually more influenced by central banks, demography and what is happening in the rest of the world, among other factors. Even today, political scientists continue to argue over whether the economy in the 20th century did better under Democratic or Republican administrations. All this is of little use to the American public, whose vote for a president must be based, in part, on a real-time assessment of economic competence.

Mr Trump came to power with unrealistic promises to create 25m jobs and supercharge economic growth, and to that end cut taxes and boosted spending, widening the fiscal deficit (see chart 1). Economists will continue to weigh up the specific costs and benefits of those policies. A true evaluation will take some time. At present, however, it is possible to assess whether the American economy overall did better or worse under Mr

Trump. That involves comparing actual American economic performance, on the one hand, with what an impartial spectator could reasonably have expected, on the other. To that end *The Economist* has gathered a range of economic data, from business investment to wage growth, wherever possible comparing American economic performance to that of other rich countries.

The bulk of the analysis covers the period from 2017, when Mr Trump took office, to the end of 2019. We stop in 2019 in part because some data are released only annually, and in part because the pandemic has turned economies across the world upside down. Our conclusion is that, in 2017-19, the American economy performed marginally better than expected. (That conclusion remains if we follow the practice of some political economists, who argue that the influence of presidents on the economy can be discerned only after a year in office, and limit our analysis to 2018-19.)

Take gross domestic product (GDP), a measure of output which is the most common yardstick of economic performance. GDP growth was somewhat faster in 2017-19 than it was in either Barack Obama's first or second term, according to official data. America also did well relative to other countries. The world economy peaked in 2017. In 2018 it slowed but America accelerated. In 2019 America slowed too, but stayed ahead of others.

Another way to look at this question is to assess whether America in 2017-19 exceeded or fell short of economists' expectations (see chart 2). In October 2012 the IMF forecast that in the subsequent four years (those of Mr Obama's second term), the American economy would grow by an annual average of 3%. In fact that proved to be too optimistic; it actually grew by closer to 2% a year. But the IMF was too pessimistic in its projections for 2017-19, released shortly before the election of 2016. In those years America outperformed the forecasts.

But if the American economy did better than expected in some respects, it disappointed in others. Take the corporate sector, which Mr Trump helped with lighter taxes. Corporation-tax cuts did increase post-tax earnings, one reason why the American stockmarket has done relatively well since Mr Trump came to power (see chart 3). America has also become a more favoured destination for foreign direct investment (see chart 4). But there is little evidence of the promised business-investment boom (see chart 5).

America's labour-market performance is similarly nuanced. Though Mr Trump particularly likes to boast about monthly employment figures, it is hard to make the case that in 2017-19 the jobs machine was whirring. Jobs growth was slower than it had been during Mr Obama's second term. In 2009-16 America's unemployment rate fell relative to the average for other G7 economies (see chart 6). Under Mr Trump unemployment did fall to the lowest since the 1960s, but this was not internationally exceptional. America's improvement relative to employment in other countries stopped under Mr Trump.

The lot of working-class Americans, however, definitely improved in 2017-19. Comparing household incomes between countries is difficult, certainly for recent years. But though there is some dispute about the reliability of the data gathered in 2020, where the pandemic made it difficult for researchers to conduct surveys, there is clear evidence of an acceleration in the growth of America's median household income from 2017 onwards (see chart 7). A tight labour market also helped raise the wage growth of the lowest-paid Americans, relative to others, to a degree not seen since Bill Clinton was president (see chart 8).

And what of the economy in 2020? Mr Trump's loose fiscal policy before the pandemic left America with much higher debt going into the crisis. On top of that splurge, this year America has implemented the world's largest fiscal package (see chart 9), posting stimulus cheques worth up to \$1,200 per

person and temporarily bumping up unemployment-insurance payments by \$600 a week. It is possible, though unlikely, that Congress will pass even more stimulus before the election. Even without another package, however, and even though it is enduring a deep recession, America will probably be the best-performing G7 economy in 2020—perhaps by some margin. Just before the pandemic, the American economy looked slightly stronger than other rich countries. Before long, the gap may be more impressive. ■



特朗普经济学

用自由派的泪水浇灌

特朗普治下的美国经济表现如何

在他的新书中，凯西·马利根（Casey Mulligan）对特朗普为何经常在自夸经济成就时言语荒唐地给出了一个有趣的解释。不久之前还在担任总统经济顾问委员会首席经济学家的马利根表示，当特朗普说美国在他任内取得了“世界历史上最伟大的经济成就”时，其实他知道自己是在夸大其词。这种策略就是“为了让媒体去报道一个新事实，就是通过夸大事实来诱使媒体起劲地反驳和纠正，从而不知不觉地将预期内容传播出去”。马利根表示，记者们对特朗普的反感导致他们对其政府取得的许多真正的经济成就视而不见。他讲的也许有点道理。

要评估领导人的经济政绩很不容易。总统们通常在经济好时被夸，在经济糟糕时被骂——然而短期经济表现往往更多地受央行、人口结构、世界局势以及其他因素的影响。即使在今天，政治学家们仍在争论20世纪的经济到底是在民主党还是共和党执政时表现得更好。这些对美国民众来说都没什么用处，因为他们对总统的投票必然在一定程度上基于对其经济领导力的实时评估。

特朗普上台时许下了不切实际的承诺，包括要创造2500万个就业岗位和推动经济高速增长，还要为此减税、增加支出、扩大财政赤字（见图表1）。经济学家还将继续衡量这些政策的具体成本和收益。要得出真正的评价还需时日。然而，现在仍有可能评估美国经济在特朗普的领导下整体上是变好还是变坏了。这就需要将美国的实际经济表现与一个中立的旁观者会有的合理预期做比对。为此，本刊收集了从商业投资到工资增长的一系列经济数据，尽可能将美国的经济表现与其他发达国家做比较。

我们的分析主要涵盖从特朗普2017年上任到2019年底的这段时间。分析截止于2019年，原因之一是有些数据仅每年发布一次，另外也因为新冠疫情已经让世界各国的经济陷入混乱。我们的结论是，在2017到2019年间，美

国经济的表现略好于预期。（一些政治经济学家认为，总统对经济的影响只有在其就职一年后才能分辨出来，如果按这种说法把分析限于2018到2019年，这一结论仍然成立。）

以衡量经济产出的GDP为例，这是衡量经济表现时最常用的指标。官方数据显示，2017至2019年美国GDP增速比奥巴马的第一或第二任期时的增速都略高一些。美国相对于其他国家的表现也不错。世界经济在2017年见顶。2018年，全球经济放缓，美国反而加速。2019年，美国经济也开始放缓，但仍好于其他国家。

分析这个问题的另一种方法是评估美国2017到2019年的表现是超出还是低于经济学家的预期（见图表2）。2012年10月，IMF预测，美国经济在随后四年内（即奥巴马的第二任期）将每年平均增长3%。事实证明该预测是过于乐观了——实际年均增长更接近2%。但在2016年大选前不久，IMF发布的2017到2019年预测则过于悲观了。这几年美国的表现超出了它的预期。

然而，如果说美国经济在某些方面好于预期，那在其他方面就令人失望了。以企业界为例，特朗普通过减税来助力公司发展。公司税的削减确实提振了税后盈利，这也成为特朗普上台以来美国股市相对强势的原因之一（见图表3）。同时美国也成为更受青睐的外国直接投资目的地（见图表4）。但没什么证据显示他承诺的商业投资繁荣已经到来（见图表5）。

美国劳动力市场的表现同样不能笼统地概括。尽管特朗普特别喜欢夸耀月度就业数据，但很难证明2017到2019年就业机器在高速运转。工作岗位的增速低于奥巴马的第二任期。2009至2016年，美国的失业率相对于七国集团（G7）其他经济体的平均水平下降了（见图表6）。在特朗普任内，失业率确实降到了上世纪60年代以来的最低水平，但这在国际上并非特例。在特朗普任期内美国相对于其他国家的就业改善终止了。

不过，美国工人阶层的境遇在2017到2019年明显改善。在不同国家之间比较家庭收入本就不易，最近几年无疑更难了。由于疫情给研究者开展调研

增加了难度，对2020年收集的数据是否可靠还存在一些争议，但有明确证据显示，美国家庭收入中位数自2017年以来加速增长（见图表7）。相对其他人群，劳动力市场吃紧也更有助于提升美国最低收入人群的工资增长，达到克林顿任总统以来的最高水平（见图表8）。

那么2020年的经济又将如何？由于特朗普在疫情前实施宽松的财政政策，美国在进入这场危机时背负的债务要高得多。在这种挥霍之上，今年美国又实施了全球最大规模的财政刺激计划（见图表9），给每个人寄出高达1200美元的刺激支票，并暂时将失业保险金提高了每周600美元。尽管可能性不大，但国会仍有机会在大选前通过更多刺激方案。然而，哪怕没有新一轮刺激措施，且即使正在经历一场严重衰退，美国还是很可能成为G7当中在2020年表现最好的经济体——甚至可能领先一段距离。疫情爆发前，美国经济看起来比其他发达国家略强。不久之后，这一差距可能会更加明显。■



Schumpeter

Lighting up Japan Inc

What Warren Buffett sees in Japanese trading giants

TO UNDERSTAND WHY it was a shock in August when Berkshire Hathaway invested \$6.5bn in five Japanese trading houses that have been around for far longer even than its 90-year-old chairman, go back to a talk Warren Buffett gave to business students in Florida in 1998. As a sprightly sexagenarian with his sleeves rolled up, the Sage of Omaha was at his witty—and wicked—best.

The first question he fielded was about investing in Japan. He replied that the country's 1% interest rates made it look attractive. Nonetheless, he considered Japanese firms poor bets because of their lousy returns. Low-profit businesses could be worth buying based on what he called the "cigar-butt" approach. "You walk down the street and you look around for a cigar butt someplace. Finally you see one and it is soggy and kind of repulsive, but there is one puff left in it. So you pick it up and the puff is free." But not even this theory would draw him to Japan Inc, the pride of the country's post-war revival, he explained. It is hard to think of an analogy more distasteful in a spick-and-span country like Japan.

Some 22 years of rock-bottom interest rates later, Mr Buffett has finally overcome his stogy-phobia. Berkshire's investment in 5% each of Itochu, Marubeni, Mitsubishi, Mitsui and Sumitomo, though small relative to his investment firm's \$140bn mound of cash, was its biggest outside America. It said its stakes could increase to as much as 9.9% over time. But the acquisitions were a head-scratcher. What, if anything, had changed over the past few decades to make the trading houses appealing all of a sudden? Or had Mr Buffett simply succumbed to the temptation of a few cheap puffs because money was burning a hole in his pocket?

At first glance, the acquisitions make it look like he has lost the plot. The trading houses, or *sogo shosha*, make a mockery of many of the investment principles he has stuck to all his life. He says he likes easy-to-understand businesses like Coca-Cola and Apple. He argues that companies should not just be cheap but have reliable returns—and, ideally, “moats” to keep competitors at a safe distance. On each count the trading houses fail dismally.

Start with simplicity. In Western eyes no Japanese company is a model of Anglo-American shareholder capitalism. But few seem as far-removed from it as the trading houses. They are shaped by history, which dates back to the 19th-century *zaibatsu* and post-war *keiretsu* system of corporate loyalties and cross-shareholdings. In the modern era their business models have twisted and turned. From the 1950s to the 1980s they acted as go-betweens, scouring the world for energy, metals and minerals, helping to underpin Japan’s economic miracle. Then they invested in mines and hydrocarbons to feed the China-led commodities boom before shifting “downstream”, buying everything from convenience stores to cable companies. In the process they accumulated assets faster than they sold them. The results are unwieldy. Mitsubishi peddles everything from coking coal to Kentucky Fried Chicken. Itochu, the most profitable, calls its consumer division the 8th Company, implying it has run out of names after seven other units.

What about returns and value? Undoubtedly, the trading companies are cheap. Of the five, only Itochu trades at a market price higher than the book value of the net assets on its balance-sheet. That is not to say they are a bargain, though. Kikkawa Tatsuya of JPMorgan Chase, a bank, says their low-return legacy assets, which sometimes suffer big write-downs, increase investors’ perception of risk. Their complexity raises their cost of equity, which is higher than for more focused commodities producers, such as ExxonMobil or Rio Tinto.

And then there is the traders' competitive position. Perhaps Mr Buffett is betting that as a venerated corporate species in Japan, the *sogo shosha's* survival is safe. But as individual companies, their returns suggest they have nothing like the moats of other Berkshire stalwarts. If anything, they are each other's bitterest rivals.

Look below the surface, though, and there may be a method in Mr Buffett's madness. As he admitted in 1998, his view on Japan could change if managers became "more shareholder responsive". In recent years they have, even in the trading houses, which once viewed corporate governance with disdain. Zuhair Khan of Union Bancaire Privée, a Swiss bank, says views started to change as a result of shareholder-friendly reforms promoted from about 2014 by Abe Shinzo, who stepped down as prime minister earlier this month. In some trading houses, executives bought large quantities of shares to align their interests with those of other shareholders. Pay became more performance-based. The focus moved from investing to generating cash and beefing up dividends. The pandemic is expected to slow but not derail the trend. Suga Yoshihide, Mr Abe's successor, looks keen on further measures to empower shareholders, Mr Khan says.

Mr Buffett may see other attractions. He likes energy firms, and all the trading houses, particularly Mitsui and Mitsubishi, have big energy businesses. They stand to benefit from a post-pandemic economic rebound that boosts demand for power. The companies are also wellsprings of talent. Jeremy White of Baker McKenzie, a law firm, says they maintain a tradition of recruiting from the best Japanese universities, and rival investment banks and tech firms as the most prestigious companies to work for. And if anyone can find their way around bewildering corporate organigrams and balance-sheets, it must be the people behind Berkshire Hathaway, America's biggest financial conglomerate.

| *Stogy? Or just stodgy?*

It is no sure bet. History is littered with fortunes lost to the belief that Japanese firms can become more Anglo-Saxon. If that is the case, Berkshire's shareholders will rue Mr Buffett's nonagenarian adventure. If, by contrast, his investments reinforce a view taking root in Japan that shareholders, domestic and foreign, are a constituency worth fighting for, he will deserve a fat Cohiba. ■



熊彼特

点燃日本公司

巴菲特看中了日本贸易巨头什么

八月，伯克希尔·哈撒韦公司（Berkshire Hathaway）向五家日本贸易公司投资了65亿美元，这些公司历史悠久，岁数甚至远高过伯克希尔90岁的董事长沃伦·巴菲特。这让人大感意外。为何？可以回看一下巴菲特1998年在佛罗里达对商学院学生的讲话。那时的他尚在花甲之年，袖管卷起，精神矍铄，“奥马哈圣人”的风趣——还有顽皮——都在巅峰期。

当时他回答的第一个问题就与在日本投资有关。他说，日本1%的利率让它看上去很有吸引力。但是，他认为日本公司不是好的投资选择，因为回报不佳。按他所说的“烟屁股”投资法，低利润企业可能值得一买。“你走在街上，满地找雪茄烟屁股。终于看到一个，潮乎乎的有点恶心，但还能抽最后一口。于是你捡起来，抽了口免费烟。”不过，他解释说，即便这种投资理论也不会吸引他去投资日本公司这一日本战后复兴的骄傲成就。在日本这样干净卫生的国家里，很难想到比烟屁股更让人倒胃口的比喻了。

经过约22年的超低利率之后，巴菲特终于克服了烟屁股恐惧症。伯克希尔收购了伊藤忠、丸红、三菱、三井和住友各5%的股份，尽管这相对于该投资公司1400亿美元的现金储备而言不算什么，却是它在美国以外最大的投资。伯克希尔表示可能会逐渐增持到9.9%。但这些收购让人摸不着头脑。难道过去几十年中发生了什么变化，让贸易公司突然变得有吸引力了？还是只是因为巴菲特钱太多了烧得慌，因而没顶住几口廉价烟的诱惑？

乍看之下，这些收购让他看起来已经丧失了判断力。在日本被称为综合商社的贸易公司让他毕生坚持的许多投资原则都沦为了玩笑。他说他喜欢可口可乐和苹果这样好懂的企业。他认为，公司不能只是便宜，还要有可靠的回报，最好还要有“护城河”，从而能对竞争对手保持足够的优势。从哪一方面来看贸易公司都远不达标。

先来看好懂这一点。在西方人眼中，没有一家日本公司是英美股东资本主义的典范。但与之相去最远的似乎就是贸易公司了。它们由历史塑造而成，可以追溯到19世纪的财阀和战后的经连会，彼此之间保持忠诚，并交叉持股。它们的商业模式在现代经历了一些曲折变化。上世纪50年代到80年代，它们充当中间人，在世界各地搜寻能源、金属和矿产，帮助撑起了日本的经济奇迹。后来它们投资矿山和碳氢化合物，满足中国主导的大宗商品繁荣的需求。之后它们转入“下游”，从便利店到有线电视公司，什么都买。在此过程中，它们积累资产的速度快于出售资产的速度。结果企业变得庞大而笨拙。三菱销售的产品从焦煤到肯德基快餐无所不有。利润最高的伊藤忠管自己的消费者部门叫“第八公司”，可见在命名了七个部门之后都没名字可用了。

回报和价值又如何呢？这些贸易公司无疑都不贵。五家公司中，只有伊藤忠的市值高于其资产负债表上净资产的账面价值。但这并不是说它们就物美价廉。摩根大通的吉川龙也表示，这些公司低回报的传统资产（有时会被大量减记）增加了投资者对风险的感知。它们的复杂性增加了其股本成本，高于埃克森美孚或力拓等业务更专注的大宗商品生产商。

最后就是这些贸易公司的竞争力。也许巴菲特认为，综合商社这类企业在日本受到尊敬，其生存是有保障的。但从单个公司来看，它们的回报表明它们没有伯克希尔投资的其他公司那样的护城河。事实上，它们彼此互为劲敌。

不过，深入来看，巴菲特的失常中也许有某种条理。正如他在1998年承认的那样，他对日本的想法可能会改变，如果管理层变得“对股东利益更敏感”的话。近年来管理层确实发生了一些转变，即使是在曾经对公司治理不屑一顾的贸易公司。瑞士瑞联银行（Union Bancaire Privée）的祖海尔·可汗（Zuhair Khan）表示，9月初卸任首相的安倍晋三自2014年左右推动了股东友好的改革，从那时起观念开始转变。在一些贸易公司中，高管购买了大量股票，使自身利益与其他股东保持一致。薪酬变得更多与绩效挂钩。关注重点从投资转移到了产生现金和增加股息。预计这一趋势将因疫情而放缓，但不会被阻断。安倍晋三的继任者菅义伟看来希望采取进一

步措施赋权股东，可汗说。

巴菲特可能还看到了其他亮点。他喜欢能源公司，而这五家贸易公司都有大规模的能源业务，尤其是三井和三菱。疫情后的经济反弹将增加对电力的需求，让它们从中受益。这些公司也是人才的源泉。贝克·麦坚时律师事务所（Baker McKenzie）的杰里米·怀特（Jeremy White）说，它们保持了从日本顶尖大学招募人才的传统，与投资银行和科技公司同为最负盛名的热门就业选择。而且，要说有谁能理清令人头晕眼花的公司组织结构和资产负债表，那一定是美国最大的金融企业集团伯克希尔·哈撒韦背后的人。

| 只是廉价雪茄吗？还是会消化不良？

这些投资没有十足的把握。因为相信日本企业能变得更接近盎格鲁-撒克逊模式而赔钱的例子在历史上比比皆是。如果巴菲特的投资也是这样，伯克希尔的股东就要对他在耄耋之年的冒险感到懊恼了。但如果他的投资巩固了国内外股东都是值得争夺的支持者这种正在日本扎根的观点，那么该递给他一支大号科伊巴雪茄了。■



International trade

Changing places

The pandemic will not end globalisation, but it will reshape it

FOR A TIME economic contagion seemed more threatening than the pathological kind. Though the spread of covid-19 was mainly in China, the damage was appearing along supply chains that produce the world's goods, notably cars and consumer electronics. China is the world's second-biggest exporter of parts, so as its factories shut down, manufacturers everywhere faced delays. Even before the virus took off in South Korea, Hyundai had halted production because of a shortage of imported parts. The World Economic Forum (whose annual bash in Davos epitomises globalisation) advised companies to bring production closer to customers.

As the pandemic spread, location ceased to matter much. There was no escaping the disease: the world economy saw its deepest, most synchronised collapse on record. Some of the least globalised economic activities—restaurants, cinemas, fitness classes and other services—suffered most. More than goods, people stopped crossing borders; Davos 2021 was postponed. However, the supply-chain panic has left a lasting impression. For business, it is further evidence of the risks of distant disruption. For governments it offers more reasons to turn inward. The result is to accelerate changes to globalisation that were already in train.

Global supply chains were forged in the period from the mid-1980s until the financial crisis 25 years later. Trade surged in volume and changed in nature. It grew nearly twice as fast as global output, as emerging markets in Asia were bedded in to the world economy. After China joined the World Trade Organisation in 2001, its share of world exports of many parts and capital goods grew from under 10% to over 30%. Countries often

specialised not in specific goods, but in bits of them. Taiwan, South Korea and Japan made semiconductors for the consumer-electronics industry. China supplied parts to German carmakers. The rise of computing made such complexity manageable. Globalisation brought cheaper goods to the rich world and, thanks to what Ben Bernanke, then Fed chairman, called a “global saving glut”, low interest rates. It also displaced many workers. Perhaps a million Americans lost their jobs to Chinese competition.

The 2010s slammed on the brakes. Trade stagnated as a share of GDP; foreign direct investment fell. As China’s middle class grew, it consumed domestically more of what it produced. Its share of world exports stopped rising in 2015, but its share of world imports continued to grow. As manufacturing became more automated, savings from locating production where workers were cheapest shrank. The rise of social media made consumer fads more volatile, necessitating faster production and shipment to satisfy impatient buyers. “Just in time” delivery of parts worked better with closer suppliers. And disasters highlighted the risk of a specialised economy. The tsunami that hit Japan in 2011 cut Toyota’s production in America by nearly a third because of a shortage of parts, while flooding in Thailand inundated factories producing a quarter of the world’s hard drives. Firms began to see long supply chains as unwieldy and risky. Trade started to concentrate in regional blocks. Globalisation became slowbalisation.

Then Donald Trump was elected in November 2016, and a trade war began between America and China. Companies realised they were exposed to political risk from economic nationalism, as much as from distant disruption. In 2019, as average American tariffs on Chinese imports rose from 12% to 21%, and tariffs in the other direction rose from 17% to 21%, America’s share of Chinese imports and exports fell to its lowest in 27 years, before China’s WTO entry. America circumvented and then sabotaged the WTO, stopping the nomination of judges to its appeal board and thus its

ability to adjudicate trade disputes. In Europe Britain voted for Brexit in June 2016. Many European leaders grew frustrated with unfettered markets, wishing to have national champions that could compete with China's state-backed giants.

The blow struck by covid-19 has made supply chains a "CEO and board level topic," says Susan Lund of McKinsey, a consultancy. Until this year, she says, many firms did not realise how much their supply chains depended on China. In a survey conducted by McKinsey in May, some 93% of firms reported plans to make supply chains more resilient. The firm finds 180 products for which a single country accounts for over 70% of exports and reckons the production of 16-26% of goods exports could change location in the next five years. Firms are worried not just about trade wars and other shocks, but about their environmental footprint and labour standards. These are easier to monitor closer to home.

Covid-19 has also given politicians a chance to indulge their protectionist instincts. The origin of the virus in Wuhan gave Mr Trump a stick with which to beat China, and another multilateral institution, the World Health Organisation, on which to pour scorn (and, in this case, begin withdrawing from). There has been an upsurge in government intervention to protect jobs and rescue firms; by the end of April the EU had approved more than €2.2trn (\$2.6trn) in state aid. Even before the pandemic France and Germany wanted Europe's state-aid and competition rules loosened in the name of promoting national champions.

| *Interdependence days*

Politicians have also come to realise how much health-care systems depend on trade. Shortages of personal protective equipment (PPE) spurred many to limit or block exports of these and similar goods. The IMF counts 120 new export restrictions this year. For many medical goods production is highly concentrated: China accounts for 60% or more of exports of antibiotics,

sedatives, ibuprofen and paracetamol. Britain has launched “Project Defend”, which will try to reduce reliance on Chinese production of critical products with a mix of reshoring and guarantees that supplies pass through friendly countries.

Unhappily, the political appeal of protectionism grows during slumps. When economies lack demand, governments covet spending that leaks overseas on imports. This is what led to a devastating round of protectionism in the 1930s. Protection also rose after the financial crisis. It does not help that China’s stimulus has tried to keep production going, whereas rich-world governments have supported household incomes. Brad Setser of the Council on Foreign Relations, a think-tank, notes that China’s current-account surplus, which was shrinking, has exploded this year. Its exports have recovered strongly, outward flows of tourists have all but stopped and commodity prices have fallen, making imports cheaper. Were China’s trade surplus in July sustained for a year it would add up to \$700bn, surely enough to worsen the trade war with America even if Joe Biden replaces Mr Trump.

Such is the confluence of forces bearing down on global trade—organic slowbalisation, trade wars, suspicion of supply chains—that some draw comparisons between today and the early 20th century. Then, a peak in globalisation collapsed under the weight of the first world war, Spanish flu and then the 1930s depression.

The comparison is too pessimistic. Trade has not done as badly as feared. In April the WTO forecast that goods trade would fall by 13-32% this year; today it seems more likely to be just 10%. The IMF says the decline in trade will be commensurate with the slump in demand from the recession. That is in contrast to the aftermath of the financial crisis, when trade fell by more than its usual relationship with GDP suggested. It also shows that supply chains have not been wholly wrecked. They were crucial for the

response to PPE shortages, argues Sébastien Miroudot of the OECD club of mostly rich countries. South Korea, which has been exporting millions of test kits to America and Europe, was uniquely placed to ramp up production using existing supply chains and relationships.

The logic of turning inward in response to the pandemic is shaky. A recent working paper by Barthélémy Bonadio of the University of Michigan and three co-authors studies 64 countries and finds that one-quarter of the drop in GDP this year was transmitted along supply chains, but that reshoring production would not have reduced the damage. Mr Miroudot distinguishes a supply chain's robustness (the ability to keep working through a crisis), from its resilience (the ability to bounce back from one). The history of supply chains is that they are not robust but they are resilient, because companies are quick to find workarounds. Their robustness could be improved, but not by repatriating production, since disaster can strike at home as well. Had New York been the centre of mask production when covid-19 struck, the result would have been a "real big mess", argues Shannon O'Neil of the Council on Foreign Relations.

Governments might choose to ignore all this in favour of protection. But most firms are not about to abandon their cross-border investments. A survey by the US-China Business Council shows little change in the number of American firms saying they have moved or plan to move out of China. The survival of the "phase one" trade deal struck in 2019 suggests that even the Trump administration knows there are limits to the desirability of decoupling from China. Rather than a wholesale break, covid-19 is likely to cause an acceleration of forces already in motion. Firms will trade off a bit of efficiency for more robustness, realising that in the long run the robotisation of manufacturing may lead to more local production anyway. Governments will shorten and diversify supply chains for medical equipment. But America and China will trade under a darker cloud of mutual suspicion, balancing commercial and geopolitical

interests.

Further ahead the future of globalisation will be determined less by goods than by services. Before covid-19 services trade was not suffering from slowbalisation: it was growing faster than GDP. Exports of services account for around a fifth of all trade, according to the WTO (although what exactly counts as services trade is a matter of some debate). Like trade in goods, trade in services has suffered this year as tourist flows have collapsed. But consumers are unlikely to have suddenly lost their taste for travel, and countries have little long-term incentive to close borders to tourists. It seems likely that tourism will eventually rebound.

Meanwhile, the surge of investment in remote working during 2020 might open the door to more trade in digital services. When work is carried out remotely, it does not matter where it is done. On the more futuristic end, this involves remote presence. Whereas the export of repair services previously required high-skilled engineers to cross borders, virtual- and augmented-reality technologies now allow experts in one country to help lower-skilled workers fix machines in another, says Ms Lund. Richard Baldwin of the Graduate Institute in Geneva points to the potential for remote workers in poor countries to carry out basic office tasks for firms in the rich world. Before the pandemic the WTO was already talking up the potential for more trade in digital services, predicting that if developing countries adopted digital technologies, they could reap the rewards of a higher share of international services trade.

Services trade is hard to liberalise because it often means harmonising regulations. Fields such as education, health care, accounting and finance are littered with barriers to entry and requirements for local credentials. The most successful model for remotely provided services is India's IT sector, which faces few regulatory hurdles. But disputes over cross-border data flows and the taxation of internet giants augur badly for faster digital

integration. Digital trading, just like trade in goods, is increasingly concentrated in regional regulatory blocks. Yet Mr Baldwin argues that the rise of online services trade will bypass tensions between East and West, because it will take place within time zones: South America will supply cheap digital services to North America, Africa to Europe, and South-East Asia to North-East Asia.

The increased digitisation brought on by covid-19 can only help services trade, even as goods trade continues to slowbalise. But the extent of that help depends on how much the pandemic reshapes labour markets. ■



国际贸易 换位子

疫情不会结束全球化，但会重塑全球化

经济传染病的威胁一度似乎比真正的疾病还要大。尽管新冠肺炎曾主要在中国蔓延，但损害却出现在为全世界生产商品的供应链上，尤其是汽车和消费电子产品。中国是世界第二大零部件出口国，因此随着其工厂的关闭，各地的制造商都面临着延误。甚至在韩国爆发疫情之前，现代汽车就因为进口零件短缺而停产了。世界经济论坛（在达沃斯举行的年度盛会是全球化的标志）建议公司让生产更靠近客户。

随着疫情的蔓延，地理位置不再那么重要了。没有什么地方能逃脱疫情影响：世界经济出现了有史以来最深重、最同步的崩溃。全球化程度最低的一些经济活动（餐馆、电影院、健身班和其他服务）遭受的打击最大。不再越过边境的不只是货物，还有人；2021年的达沃斯论坛被推迟了。但是，供应链恐慌给人们留下了持久的印象。对于企业来说，这进一步证明了发生在远方的中断带来的风险。对于政府而言，它提供了更多向内转的理由。其结果是全球化本已在进行中的变化加速了。

从1980年代中期到25年后的金融危机，全球供应链在这个期间建立了起来。贸易量激增，性质也改变了。随着亚洲新兴市场融入世界经济，贸易的增速几乎是全球产出的两倍。中国于2001年加入世贸组织后，它在世界上许多零部件和资本货物出口中所占的份额从不到10%增长到30%以上。国家和地区擅长生产的往往不是特定的商品，而是其中的一些部分。台湾、韩国和日本为消费电子行业生产半导体。中国向德国汽车制造商提供零部件。计算的兴起使得这种复杂性变得可管理。全球化为富裕世界带来了更便宜的商品，而且由于当时的美联储主席本·伯南克口中的“全球储蓄过剩”，它还带来了低利率。它也使许多工人失业。也许有一百万美国人因中国竞争而丢了饭碗。

这一切在2010年代猛踩刹车。贸易在GDP中所占份额停滞不前，外国直接

投资下跌了。中国中产阶级的增长推动它在本国消费更多自家产品。它在世界出口中所占的份额在2015年不再上升，但在世界进口中所占的份额继续增长。随着制造业变得更加自动化，将生产转移到人工最便宜的地方能节省下来的钱变少了。社交媒体的兴起使消费者的风潮更加飘忽不定，需要更快的生产和发货来满足没有耐心的买家。邻近的供应商更能够满足零部件的“及时”交付。灾难凸显了专业化经济的风险。2011年袭击日本的海啸使丰田汽车在美国的产量因零部件短缺减少了近三分之一，而泰国的洪水淹没了生产世界四分之一硬盘的工厂。企业开始认为漫长的供应链笨重又高风险。贸易开始向区域性板块集中。“全球化”变成了“慢球化”。

然后，特朗普在2016年11月当选总统，美国和中国开打贸易战。企业意识到自己面临经济民族主义带来的政治风险，程度不亚于远方的中断。2019年，由于美国对中国进口商品的平均关税从12%上升至21%，而另一方向的关税从17%上升至21%，美国在中国进出口中的份额下跌到了27年来的最低水平——27年前中国还没有入世。美国先是绕开了世贸组织，然后再从中作梗，阻止其上诉委员会法官的提名，导致它无法裁决贸易争端。在欧洲，英国于2016年6月公投支持脱欧。许多欧洲领导人对不受限制的市场感到沮丧，希望拥有能与受国家支持的巨头一争高下的领军企业。

麦肯锡咨询公司的苏珊·隆德（Susan Lund）说，新冠疫情的打击使供应链成为“首席执行官和董事会一级的话题”。她说，直到今年，许多公司才意识到它们的供应链对中国的依赖程度。在麦肯锡5月开展的一项调查中，约93%的公司报告了使供应链更具弹性的计划。该公司发现了单个国家或地区占出口70%以上的180种产品，并认为未来五年内有16%到26%的出口商品可能会改变生产地点。企业不仅担心贸易战和其他冲击，还担心环境足迹和劳工标准。这些事务在大本营附近更容易监控。

疫情还为政客们提供了机会来尽情放任他们的贸易保护主义直觉。病毒源于武汉这一点给了特朗普一根大棒来打击中国，也让他能大肆嘲讽另一个多边机构世界卫生组织（他还开始退出这个组织）。为了保护就业和救助公司，政府的干预大幅增加。到4月底，欧盟已批准了超过2.2万亿美元（2.6万亿美元）的国家援助。甚至在疫情之前，法国和德国就希望以支

撑领军企业的名义放宽欧洲的国家援助和竞争规则。

| 相互依存的日子

政客们也开始意识到医疗体系对贸易的依赖有多大。个人防护装备（PPE）的短缺促使许多人去限制或阻止此类及类似商品的出口。国际货币基金组织IMF今年统计到了120项新的出口限制。许多医疗产品的生产高度集中：中国占抗生素、镇静剂、布洛芬和扑热息痛出口量的60%或更多。英国启动了“防卫计划”，试图通过回流生产和保证供应路径通过友好国家来减少对中国生产关键产品的依赖。

不幸的是，在经济衰退期，贸易保护主义的政治吸引力会变大。当经济体缺乏需求时，政府会垂涎因进口而泄漏到海外的开支。1930年代毁灭性的贸易保护主义就是这样来的。金融危机后，贸易保护同样抬头了。雪上加霜的是，中国的刺激计划试图使生产保持运转，而富裕国家的政府却在支撑家庭收入。智库对外关系委员会的布拉德·塞瑟（Brad Setser）指出，中国的经常项目盈余原本在萎缩，但今年却呈爆炸性增长。它的出口强劲恢复，出境游客流几乎停止，而大宗商品价格下降，使进口价格更便宜。如果中国7月份的贸易顺差能够维持一年，总计将达到7000亿美元。即使拜登取代特朗普，这一点也足以加剧与美国的贸易战。

逐步演进的慢球化、贸易战、对供应链的疑虑——这些令全球贸易承压的力量就这样汇合到了一起。这让一些人把今天和20世纪初相比较。当时，在第一次世界大战、西班牙流感以及1930年代大萧条的重压下，全球化在顶峰处崩溃了。

这种比较太过悲观了。贸易的表现并不像人们此前担心的那么糟糕。世贸组织在4月份预测今年的货物贸易将下降13%至32%，如今看来很可能仅下跌10%。IMF表示，贸易下滑的程度将呼应经济衰退带来的需求下滑。这与金融危机的后果形成鲜明对比，当时金融危机造成的贸易降幅超过了按照它与GDP之间通常的关系所做的预测。这也表明供应链还没有完全崩溃。大多由富裕国家组成的经合组织（OECD）的塞巴斯蒂安·米鲁多（Sébastien Miroudot）认为，这对于应对PPE的短缺至关重要。韩国已经

向美国和欧洲出口了数百万套测试套件，它有得天独厚的条件来利用现有的供应链和合作关系提高产量。

因疫情而向内转的逻辑是站不住脚的。密歇根大学的巴特雷米·伯纳第奥（Barthélémy Bonadio）和三位合著者最近发表的工作论文研究了64个国家，发现今年GDP下降的四分之一是通过供应链传递的，但是让生产回流并不会减少损失。米鲁多把供应链的稳健度（在危机中保持运转的能力）和它的复原力（从危机中反弹的能力）区分开来。从供应链的历史看，它们并不稳健但复原力很高，因为企业可以迅速找到变通的方法。它们的稳健度有改进的余地，但回流生产无济于事，因为灾难也可能袭击本国。外交关系委员会的香农·奥尼尔（Shannon O'Neil）认为，如果在新冠疫情袭击时纽约是口罩生产的中心，结果将是“一场大麻烦”。

各国政府可能忽略所有这一切而选择保护性政策。但是大多数公司不会放弃它们的跨境投资。美中贸易理事会的一项调查显示，自称已经搬出或计划搬出中国的美国公司数量几乎没有变化。2019年达成的“第一阶段”贸易协议的存续表明，即使特朗普政府也知道与中国脱钩的意愿存在局限性。新冠疫情可能会让已经启动的力量加速，而不是造成全盘脱钩。企业将以牺牲一点效率为代价来换取更高的稳健度，因为它们意识到，从长远来看，制造业的机械化可能无论如何都会带来更多的本地生产。政府将让医疗设备的供应链更短、更分散。但是美国和中国将在相互怀疑的阴云之间开展贸易，在商业和地缘政治利益之间寻求平衡。

再往远了说，全球化的未来将更多地取决于服务而非商品。在疫情之前，服务贸易并未遭受慢球化的影响——其增长速度超过了GDP。根据世贸组织的说法，服务出口约占所有贸易的五分之一（尽管究竟什么才算是服务贸易尚有争议）。像货物贸易一样，今年的服务贸易也受到了影响，因为游客流量锐减。但是，消费者不太可能突然失去对旅行的兴趣，而且各个国家和地区也没有什么长期的动力来对游客关闭边境。看起来旅游业最终是会反弹的。

与此同时，2020年对远程办公的投资激增可能为更多数字服务贸易打开大

门。当工作远程进行时，在哪里做事就无所谓了。从更未来主义的角度来看，这意味着远程存在。隆德说，以前出口维修服务需要有技术的工程师跨越国界，而虚拟现实和增强现实技术如今可以让一国的专家帮助另一国的低技术工人修理机器。日内瓦高级国际关系学院的理查德·鲍德温

（Richard Baldwin）指出，贫穷国家偏远地区的工人有可能为富裕国家的公司执行基本的办公任务。在疫情之前，世贸组织已经在谈论数字服务贸易的增长潜力，并预测如果发展中国家采用数字技术，它们将因国际服务贸易份额的提升而获益。

服务贸易很难放开，因为这通常意味着要协调法规。教育、医疗、会计和金融等领域充斥着准入门槛和本地的证书要求。最成功的远程服务供应模板是印度的IT部门，它几乎没什么监管障碍。但是，有关跨境数据流和向互联网巨头征税的争端对加快数字整合而言不是什么好兆头。就像货物贸易一样，数字贸易也越来越集中在区域化监管板块里。然而鲍德温认为，在线服务贸易的兴起将绕过东西方之间的紧张局势，因为它将发生在时区内：南美将向北美供应廉价数字服务，非洲向欧洲供应，东南亚向东北亚供应。

哪怕货物贸易继续放缓，新冠疫情带来的数字化增长也只会提升服务贸易。但是这种提升的程度取决于疫情如何重塑劳动力市场。 ■



Health care

Getting better

How surgery and mental-health treatment can benefit

A SOLDIER WATCHES a car approaching a check-point on a hot, dusty road. As the vehicle slows to a stop in front of him, he asks the driver to get out and show his identification. Seconds later, the rattle of gunfire pierces the air, followed by a bang and an intense, searing flash. Knocked to the ground and scrambling to safety, the soldier turns to see a flaming wreck where the car had been just moments before.

The scene pauses. A voice in the soldier's ear says: "Let's rewind the simulation to the seconds just before the explosion—describe exactly what happened." The voice is a therapist, speaking to a veteran who is placed in a virtual environment. The simulation they are watching has been modelled on the veteran's own experiences in a war zone, events that have led him to develop post-traumatic stress disorder (PTSD).

This is the Bravemind system, developed in 2005 by Albert "Skip" Rizzo and Arno Hartholt, experts in medical virtual reality at the University of Southern California, to treat soldiers returning home from the wars in Iraq and Afghanistan. Immersed in a virtual environment that mimics their traumatic experiences, veterans narrate the scene to a therapist, who can control how the events in the simulation unfold. The sounds, time of day and number of people or vehicles on the scene can all be customised. Over several sessions, the veteran is exposed to increasingly intense scenarios that get closer to reliving the memory of the original trauma. The aim of the therapy is to steadily dampen the veteran's negative reactions to the memory. Bravemind is now used in around 60 treatment centres around the world.

Bravemind builds on a well-established psychological technique known as exposure therapy, in which people are brought to face their fears in a controlled way. VR adds a way of creating detailed, carefully tuned scenarios that can elicit different levels of fear. It works because, even when people know they are watching computer graphics, their brains nonetheless react to virtual environments as if they were real.

Someone who is afraid of heights will find that their heartbeat quickens and palms get clammy even if the precipitous drop they can see is clearly a computer graphic in a VR headset. This is because the brain's limbic system, which controls the fight-or-flight response, activates within milliseconds in response to potential threats, long before the logical part of the brain—which knows the VR experience is not physically real—can intervene.

| *May contain graphic content*

Scientists have used VR systems to create and control complex, multi-sensory, 3D worlds for volunteers in their labs since the 1990s. Rather as an aircraft simulator can train and test pilots in a wide variety of settings, virtual worlds allow psychologists and neuroscientists to watch people's cognitive and emotional responses in situations that are difficult to set up or control in the real world. But the technology has usually been too clunky and expensive for widespread clinical use.

That has started to change, thanks to the falling costs of computing and the increasing capability of the new generation of VR systems. At the same time, the scientific evidence base for the clinical uses of VR has grown. The technology has been successfully applied to tackling schizophrenia, depression and phobias (including the fear of flight, arachnophobia, social anxiety and claustrophobia), and reducing pain in cancer patients undergoing chemotherapy. It can help train spatial-navigation skills in children and adults with motor impairments and assist in rehabilitation

after a stroke or traumatic brain injury. The kit can also be used to monitor people and identify medical problems: VR has been used to diagnose attention-deficit hyperactivity disorder (ADHD) and Parkinson's and Alzheimer's diseases.

Though each condition is unique, researchers have found common ground rules for designing virtual experiences that work: therapists need to be in control of the scene, deciding what a patient sees and hears in order to modify the strength of the fearful stimulus; the therapy works best when the patient is embodied within an avatar, rather than floating, so that they feel present within the scene; and the patient needs agency, so that they can leave the scene if it gets too overwhelming for them. All this adds up to giving the patient the illusion of control and makes the VR experience feel psychologically "real".

In some cases the therapeutic regime is so robust that, instead of a real-life therapist guiding a patient through an anxiety-inducing simulation, an animated avatar can do the job instead. A clinical trial showed that such an automated system, designed by Daniel Freeman, a psychiatrist at the University of Oxford, helped people reduce their fear of heights. In the simulation, a virtual counsellor guided patients up a virtual ten-storey office complex, where the upper floors overlooked a central atrium. At each floor, the counsellor set the patient tasks designed to test and help them manage their fear responses, such as walking to the edge of a balcony while the safety barrier was lowered or riding on a moving platform over the space above the atrium.

Dr Freeman found that six sessions of virtual, automated therapy over two weeks significantly reduced people's fear of heights, compared with people who had no therapy. A similar automated virtual therapy for arachnophobia, developed by Philip Lindner at Stockholm University, helped patients eventually touch spiders. The reduction in fear was still

apparent when the participants were followed up a year later.

For doctors, virtual environments also provide a risk-free way to practise important procedures. Surgeons operate in high-pressure environments with a lot of cognitive demands. “You’ve got to learn very rapidly, and you’ve got to make decisions under time pressure, with millimetre precision,” says Faisal Mushtaq, a cognitive neuroscientist at the University of Leeds in England.

Practising with computer simulations can help. In the NeuroVR system, developed by a group of Canadian hospitals and universities, surgeons can use MRI scans from their patients to rehearse removing brain tumours before going in with the knife for real. The surgeon gets a 3D view of the tumour on screens and practises cuts and movements by manipulating instruments attached to a robotic arm that responds with haptic feedback. This allows users to sense whether they are cutting through hard or soft material, or through a tumour versus healthy tissue. An advantage of such a system is that, once a doctor is trained, the technology can be used to perform remote surgery. Both virtual training and remote procedures for patients are useful at a time when covid-19 has forced health-care systems around the world to keep doctors and non-emergency patients apart.

| *In operation*

When surgeons try to reconstruct a limb, a key problem is identifying important blood vessels that need to be protected during the surgery. In the past a surgeon would try to identify those vessels using an ultrasound probe, but the process is lengthy and imprecise. So James Kinross, a consultant surgeon at Imperial College London, has been experimenting with Microsoft’s HoloLens, an augmented-reality headset, which can overlay computer-generated text and images onto the real world.

Dr Kinross has used a CT scan of a patient’s limb to highlight the most

important blood vessels. He reconstructed that scan as a 3D model in Unity, a games engine. The HoloLens then overlaid that simulation onto the patient's real limb in the operating theatre during treatment. "What it meant was that the surgeon could immediately visualize, and very precisely map, the anatomy of these blood vessels, and very quickly identify them and protect them," says Dr Kinross, who has also used this technique during cancer surgery to help surgeons identify and protect healthy tissue. The adoption of the technology has proceeded very smoothly, he adds, because it is easy to learn and provides "an immediate and very obvious advantage to the clinician".

He thinks the technology could be pushed much further and wants to try some real-time collaboration with his colleagues during a surgical procedure. "So if you're running an operation that's challenging, or you want to have a discussion with a peer, it's very easy to do and they can have a first-person view of what you're looking at," he says.

Medical uses for computer simulations are promising, but how useful they are will take time to evaluate. That will require robust clinical trials and discussions of frameworks for data protection on technologies that could, if their potential is achieved, become a new type of medical device.

"We don't want to poison the well," says Dr Mushtaq. "We don't want to put out systems that are ineffective, that are going to cost our health-care system, and that are going to negatively impact on the growth of this sector." His research focuses on closing some of those knowledge gaps by examining how the lessons users learn from practising on virtual simulators translate into skills in the real world. Surprisingly, the fidelity of the images to real surgery is not so important. "Something can look very, very, flashy...it's got all the blood spewing everywhere and so on," he says. "But it doesn't necessarily translate to better learning."

Defining the validity of a simulator can take several forms. The most basic is “face validity”, which reflects how well a simulation looks like the task in the real world. “Construct validity” is a way of comparing performance differences on the simulation between experts and novices. Finally, “predictive validity” is most useful, because it measures how well a person’s performance on a simulator predicts their ability to do the same task in the real world.

| *Just like real life*

This can also be used to flag when learners are struggling, and provide early intervention and support. Dr Mushtaq and his colleagues have demonstrated both construct and predictive validity for the Nissin (formerly Moog) Simodont dental-surgery simulator, used by the University of Leeds to train its students. In research published in 2019, they found that scores on the simulator predicted someone’s performance in a clinic two years later.

Video-game engines have made face validity easier to achieve for simulators. The next step is to measure construct and predictive validity more robustly. Unfortunately, precious little of this kind of validation work is undertaken by academics or companies selling simulators. To help grease the wheels and encourage researchers to build a body of knowledge, Dr Mushtaq and his colleagues recently created a set of tools and protocols that streamline human-behaviour research and make use of the Unity game engine as a platform. This Unity Experiment Framework takes care of the tedious programming steps—downloading files that track all of a user’s movements, for example, or anonymising participants—needed to turn the game engine into an environment optimised for studying people.

Mark Mon-Williams, a cognitive psychologist at the University of Leeds who has worked with VR for more than two decades, reckons simulated worlds have huge potential for improving education and physical and

mental health. “But if you’re going to make the most of that powerful set of tools,” he says, “then use the scientific process to ensure that it’s done properly.” ■



医疗保健

渐入佳境

手术和心理治疗如何能受益

在炙热而尘土飞扬的道路上，士兵看着一辆车驶近检查站。当车在他面前减速停下时，他要求驾驶员下车并出示身份证件。几秒钟后，一阵枪声划破长空，接着是一声巨响和强烈而灼热的闪光。士兵被掀翻在地。他奋力爬向安全处，转身看到那车已变成一团燃烧的残骸。

场景暂停。士兵耳边的声音说：“让我们把模拟倒退到爆炸发生前的几秒钟，准确地描述发生了什么。”这是治疗师的声音，正在与被置入虚拟环境中的退伍军人交谈。他们正在观看的模拟场景是仿照这位退伍军人自己在战区的经历建立的，这些事件使他患上了创伤后应激障碍（PTSD）。

这就是南加州大学医学虚拟现实专家艾伯特·“斯基普”·里佐（Albert “Skip” Rizzo）和阿尔诺·哈斯霍尔特（Arno Hartholt）在2005年开发的“Bravemind”系统，用于治疗从伊拉克和阿富汗战争中返回家园的士兵。退伍军人沉浸在模仿他们的创伤经历的虚拟环境中，向治疗师讲述场景，而治疗师可以控制模拟事件的推进方式。声音、发生的时间以及现场的人数或车辆数都可以自定义。在几次治疗中，这位退伍军人目睹越来越激烈的场景，它们越来越接近于重现原始创伤的记忆。该疗法的目的是逐步减轻退伍军人对记忆的负面反应。现在全球已有约60个治疗中心使用Bravemind。

Bravemind是建立在一套被称为“暴露疗法”的成熟的心理学方法之上，这种技术让人们有控制地面对自己的恐惧。虚拟现实（VR）提供了一种途径来创建细致入微、精心调试的场景，可以触发不同程度的恐惧。它之所以有效，是因为即使人们知道自己看到的只是计算机画面，大脑仍然会对虚拟环境做出反应，就好像它们是真实的一样。

恐高的人会发现自己心跳加快、手掌出汗，哪怕他们看到的急坠明显是

VR头盔中的计算机图形。这是因为控制着战斗或逃跑反应的大脑边缘系统会在几毫秒内被激活来应对潜在威胁，此时大脑的逻辑部分（它知道VR体验并不真实）还远远来不及介入。

| 可能包含逼真内容

自1990年代以来，科学家一直在使用VR系统为实验室中的志愿者创建和控制复杂的多感官3D世界。就像飞机模拟器可以训练和测试飞行员应对各种情形一样，虚拟世界让心理学家和神经科学家创建难以在现实世界中设立或控制的场景，并在其中观察人们的认知和情感反应。但这项技术以前往往过于笨重且昂贵，无法广泛应用于临床。

由于计算成本的日益下降和新一代VR系统的功能越来越强，这种情况已经开始改变。同时，将VR用于临床的科学证据也在累积。这项技术已成功用于治疗精神分裂症、抑郁症和恐惧症（包括飞行恐惧、蜘蛛恐惧、社交焦虑和幽闭恐惧），并减轻接受化疗的癌症患者的痛苦。它可以帮助训练有运动障碍的儿童和成人的空间导航能力，并协助中风或脑外伤后的康复。这套工具还可用于监测人员并发现健康问题：VR已被用于诊断注意力不足过动症（ADHD）、帕金森氏症和阿尔茨海默氏症。

尽管每种情境都是独特的，但研究人员发现了一些通用的基本规则来设计有效的虚拟体验：治疗师需要控制现场，决定患者看到什么、听到什么，以调节恐惧刺激的强度；当患者存在于某个化身里而不是如游魂般飘荡时，他们感觉自己身处场景之中，治疗效果最佳；并且患者需要服务人员在侧，以便在场景变得不堪忍受时离开。所有这些加在一起，给患者带来了控制的幻觉，并使VR体验在心理上感觉“真实”。

在某些情况下，治疗方案已经非常可靠，可以使用动画化身代替真人治疗师来引导患者完成诱发焦虑的模拟。一项临床试验表明，由牛津大学精神病医生丹尼尔·弗里曼（Daniel Freeman）设计的一套这样的自动化系统可以帮助人们减轻恐高症。在模拟中，一名虚拟咨询师将患者引导到一栋虚拟的10层办公大楼中，其高层俯瞰中央天井。咨询师在每个楼层为患者设置任务来测试恐惧反应并帮助他们应对，例如在安全栅栏降低后走到阳

台边缘，或坐在天井上方的移动平台上。

弗里曼发现，与没有接受治疗的人相比，在两周内接受六次虚拟自动治疗大大降低了人们的恐高情绪。斯德哥尔摩大学的菲利普·林德纳（Philip Lindner）开发了一种类似的针对恐惧症的自动虚拟疗法，帮助患者最终触摸了蜘蛛。一年后随访参与者发现他们恐惧的减轻仍然很显著。

对于医生来说，虚拟环境还提供了一种无风险的方法来练习重要的手术。外科医生工作的高压环境有很多认知方面的要求。英格兰利兹大学的认知神经科学家费萨尔·穆斯塔克（Faisal Mushtaq）说：“你必须非常迅速地学习，并且在时间压力下做出毫米精度的决策。”

用计算机模拟来练习会有帮助。在由加拿大多家医院和大学开发的NeuroVR系统中，外科医生可以在真正动刀子之前使用患者的MRI扫描来练习切除脑部肿瘤。外科医生可在屏幕上看到肿瘤的三维视图，并通过操纵连接在有触觉反馈的机械手上的仪器练习切割和移动。这让用户可以感觉到自己正在切开硬质还是软质材料、是肿瘤还是健康组织。这种系统的优势在于，一旦医生培训好了，就可以用这种技术操作远程手术。当新冠疫情迫使世界各地的医疗系统把医生和非急诊患者分隔开时，为患者提供虚拟治疗和远程手术都非常有用。

| 手术中

当外科医生尝试修复肢体时，一个关键问题是识别在手术期间需要保护的重要血管。过去，外科医生会尝试使用超声探头来识别那些血管，但过程冗长且不精确。因此，伦敦帝国学院的顾问外科医生詹姆斯·金罗斯（James Kinross）一直在试用微软的增强现实头盔HoloLens，它可以把计算机生成的文本和图像叠加到现实世界中。

金罗斯使用了患者肢体的CT扫描来突出显示最重要的血管。他在游戏引擎Unity中将扫描重建为三维模型。然后，HoloLens在手术过程中会将这一模拟叠加到手术室中患者的真实肢体上。金罗斯说：“这意味着外科医生可以立即看到并非常精确地描绘这些血管的解剖结构，迅速识别并保护它

们。”他在癌症手术中也使用了这种技术来帮助外科医生识别并保护健康组织。他补充说，采纳这项技术的进展非常顺利，因为它易于学习，并且“为临床医生提供了直接且非常明显的优势”。

他认为这项技术的应用还可以深远得多，并希望在手术过程中尝试与同事实时协作。他说：“因此，如果你正在做一台高难度的手术，或者想和某个同行讨论一下，这就非常容易操作了，他们可以以第一人称视角看到你看到的东西。”

计算机模拟的医学应用前景广阔，但到底多有用需要时间来评估。这需要可靠的临床试验，并探讨相关技术的数据保护框架——如果这些技术能够发挥其潜力，可能会成为一种新型的医疗设备。

“我们不想把自己的名声搞坏，”穆斯塔克说，“我们不想推出不好用的系统，这会损害我们的医疗体系，会对这个部门的增长产生负面影响。”他的研究重点是审视用户从在虚拟模拟器上的练习中学到的经验如何转化为现实世界中的技能，从而补上一些知识缺口。出人意料的是，图像对真实手术的保真度并不是那么重要。“有些东西看起来非常、非常炫……鲜血喷得到处都是之类的，”他说，“但这不一定会让人学得更好。”

对模拟器效度的定义可以有多种形式。最基本的是“表面效度”，它反映了模拟看起来有多像现实世界中的任务。“建构效度”是一种比较专家和新手在模拟中的表现差异的方法。最后，“预测效度”是最有用的，因为它衡量的是一个人在模拟器上的表现是否能预测他们在现实世界中完成相同任务的能力。

| 栩栩如生

这也可以用来标记学习者何时感到吃力，并提供早期干预和支持。穆斯塔克和他的同事们已经证明了利兹大学用来训练学生的Nissin（原Moog）品牌的Simodont牙科手术模拟器的建构和预测效度。在2019年发表的研究中，他们发现某人在模拟器上的分数可预测两年后在诊所中的表现。

电子游戏引擎使模拟器更容易实现表面效度。下一步是更稳健地衡量建构

和预测效度。遗憾的是，此类验证工作很少由学界或销售模拟器的公司承担。为了帮助推进这项工作，并鼓励研究人员建立知识体系，穆斯塔克和同事最近创建了一套工具和协议，可以简化人类行为研究并使用Unity游戏引擎作为平台。这个Unity实验框架处理了繁琐的编程步骤（例如下载跟踪用户所有动作的文件，或是把参与者匿名），这些都是将游戏引擎转变为针对人员研究而优化的环境所需要的。

利兹大学的认知心理学家马克·蒙-威廉姆斯（Mark Mon-Williams）在VR领域工作了20多年，他认为模拟世界在改善教育和身心健康方面具有巨大的潜力。“但如果你要充分利用这些强大的工具，”他说，“那就需要科学流程来确保你做得恰当。”■



Gut microbes

Germ lines

How to arm Caesarean babies with the bacteria they need

CHILDBIRTH IS MESSY. When a baby comes out, a lot else comes out with it. Some of this material is inevitable, such as the amniotic fluid that presages birth and the placenta which follows it. But a fair bit of faeces is discharged, too.

From an evolutionary perspective, that seems surprising. Exposing newborns to such bacteria-laden excrement looks risky. Yet no mechanism has arisen to stop it happening. Evidence is mounting, moreover, that far from being harmful, this exposure is actually important for the development of the child's immune system. Interaction with the multitude of microscopic organisms a baby picks up when it is born helps that system to learn friend from foe. Without it, immune disorders like allergies and type-1 diabetes may follow. Components of the gut flora are also involved in digesting certain foodstuffs containing complex carbohydrates, and an unbalance in the relevant microbial mix is implicated in obesity.

Babies born via Caesarean section (ie, surgical removal directly from the womb) do not get such a biological baptism, and their guts are left bacterially bereft as a consequence. That has left doctors wondering how best to give them what they are missing. In the past, researchers have skirted around the central point by swabbing the faces of newborns with bacteria collected from their mothers' vaginas. To no avail. Willem de Vos and Sture Andersson of the University of Helsinki, have therefore taken the bull by the horns. In a paper just published in *Cell* they demonstrate that feeding newborns a dose of their mothers' gut bacteria, in the form of faeces inoculated into breast milk, seems more fruitful.

Dr de Vos and Dr Andersson selected seven mothers-to-be who had elected, for medical reasons, to have their children delivered by Caesarean. They were screened to make sure they had no pathogenic bacteria in their faeces. And none had recently taken antibiotics.

Collectively, these seven women gave birth to five girls and two boys, all healthy. Each of the newborns was syringe-fed a dose of breast milk immediately after birth—a dose that had been inoculated with a few grams of faeces collected three weeks earlier from its mother. None of the babies showed any adverse reactions to this procedure. All then had their faeces analysed regularly during the following weeks. For comparison, the researchers collected faecal samples from 47 other infants, 29 of which had been born normally and 18 by Caesarean section.

Dr de Vos and Dr Andersson found that, though the bacterial populations in the faeces of the seven treated infants initially resembled those found in the faeces of the untreated Caesarean-born infants, this quickly changed. Within three weeks their gut floras had come to resemble the bacterial mix seen in the vaginally born infants. Whether this shift to normality will reduce the chances of children treated in this way developing immune-related maladies later in life remains to be determined by longer and larger studies—which Dr de Vos and Dr Andersson are now planning. ■



肠道微生物 细菌防线

如何为剖宫产新生儿提供他们需要的细菌

生孩子的场景一片狼藉。孩子离开母体时会带出很多别的东西。有些是不可避免的，比如在分娩开始前就会流出的羊水和分娩后排出来的胎盘。但也会排出一些粪便。

从进化的角度看，这似乎令人意外。让新生儿接触这种充满细菌的排泄物看起来很危险，但人体并没有产生什么机制来阻止它发生。此外，越来越多的证据表明这种接触不仅无害，实际上对新生儿免疫系统的发育很重要。出生时接触多种微生物能帮助新生儿的免疫系统学习分清敌友。如果没有这种接触，以后可能会出现诸如过敏和1型糖尿病等免疫性疾病。肠道菌群中的一些细菌也参与消化某些含有复杂碳水化合物的食物，这种微生物群组合中的失衡与过度肥胖有关联。

剖宫产的婴儿（即手术切开子宫直接取出婴儿）没有经过这种生物洗礼，他们的肠道也就缺乏这些菌群。医生们思考着如何以最好的方式弥补他们的缺失。过去，研究人员采用了间接方式，用采集自母亲阴道的细菌擦拭新生儿面部，但没有效果。赫尔辛基大学（University of Helsinki）的威廉·德沃斯（Willem de Vos）和塞特·安德森（Sture Andersson）因此大胆地采取了更直接的方式。在刚刚发表在《细胞》（Cell）杂志上的一篇文章中，他们展示了直接给新生儿喂食一定剂量的母亲肠道内的细菌（在母乳中加入母体粪便）的做法似乎更有成效。

德沃斯和安德森挑选了七位因医学原因选择剖宫产的准妈妈。她们接受了筛查，以确保粪便中没有致病菌。而且她们近期都没有服用过抗生素。

这七名产妇共生下五名女婴和两名男婴，都很健康。每个新生儿在出生后都立即用注射器服食了一剂母乳，其中加入了三周前从各自母亲那里采集到的几克粪便。所有新生儿对此均未见任何不良反应。在接下来的数周

里，他们的粪便都定期接受了分析。为了进行对比，研究人员还采集了另外47名新生儿的粪便样本，其中29名顺产，18名剖宫产。

德沃斯和安德森发现，尽管最初这七名婴儿粪便中的菌群与未经菌群移植的剖宫产婴儿相似，但事情很快发生了变化。在三周内，七名婴儿的肠道菌群已变得与阴道分娩的婴儿相似。这种向常态的转变是否会降低接受了菌群移植的婴儿日后出现免疫性疾病的几率，还有待更长时间和更大范围的研究——德沃斯和安德森正在计划后续研究。■



Economic rebound

A big splash

In a world mired in recession, China manages a v-shaped recovery

ONE SCENE more than any other from China's coronavirus recovery has caught the world's attention: a giant pool party in August in Wuhan, the city where the pandemic began. Nearly four months after their 11-week lockdown, revellers were crammed together in waist-high water, jumping and shouting in exhilaration as a DJ spun bass-heavy beats. The video went viral. It was a moment of pure release and a sign of how China is far ahead of most other countries in returning to normality (of a sort). Economic data are rarely as exciting as pool parties, but China's latest GDP figures, released on October 19th, were, roughly speaking, the statistical equivalent of Wuhan's aquatic festivities.

Officials reported that the economy expanded by 4.9% in the third quarter compared with a year earlier, just shy of its pre-pandemic pace. Whereas most other countries are mired in recession and grappling with a new wave of covid-19 cases, China has just about completed the upward leg of a V-shaped rebound. Analytically, its success is easy to explain. China got one crucial thing right. By almost stamping out the virus it was able to allow activity to resume with few restrictions. Schools are fully open, factories are humming and restaurants are buzzing. China is also lucky in one crucial way. It is better insulated from weak global demand than smaller peers such as New Zealand that have done a good job of containing the pandemic, too. Until vaccines are rolled out, others will struggle to match China's feat.

Yet China's headline resilience has masked an unbalanced recovery. Back in February, when the government began cautiously to relax its lockdown, it focused on reopening factories and launching infrastructure projects. It

correctly reasoned that maintaining strict health protocols in factories and on construction sites, which can be managed as semi-closed environments, would be easier than in shopping malls or schools. On top of that, China's meagre provisions for unemployment insurance meant that the millions of people who found themselves out of work had to cut back on spending. Early in its recovery, China's economy was thus fuelled by factory production and investment. Capital formation—the category in GDP accounting that encompasses these endeavours—contributed five percentage points to growth in the second quarter, whereas consumption subtracted more than two percentage points. Back then that left China with a 3.2% year-on-year growth rate.

The latest data reflect a slightly more balanced recovery (see chart). The contribution to third-quarter growth from capital formation fell to less than three percentage points, in line with the pre-pandemic norm, as infrastructure spending tailed off. Consumption added nearly two percentage points, which was below its pre-pandemic heights but a big improvement—easily noticeable in the crowds that have returned to tourist sites, restaurants and shops. Trade was the cream on top. China's share of global merchandise exports has risen to a record high during the pandemic. It received a boost by being the first manufacturing power to resume operations, in addition to being the world's biggest producer of protective equipment, from masks to surgical gowns.

Whenever Chinese data look so rosy, it is natural to ask whether they are believable. In this case a range of non-GDP indicators, including other countries' exports to China, lend credence to the picture of a robust rebound. The bigger worry is whether the recovery has been at the expense of efforts to rein in debt. The initial sharp economic slowdown followed by a government-directed boom in bank lending will push China's debt-to-GDP ratio to about 275% this year, up by 25 percentage points. It will be the biggest annual increase since 2009 during the global financial crisis.

Yet China is far from alone. Governments around the world have run up huge tabs to lessen the economic fallout from the pandemic. With its growth back on track, China has a chance to tighten the spigots again. S&P, a credit-rating agency, notes that the country's real lending rates (ie, adjusted for inflation) have recently climbed to a five-year high, a dampener on investment. If successful, China will confine irrational exuberance to pools. ■



经济反弹

大水花

全球深陷衰退之时，中国实现V型复苏

最能体现中国从新冠疫情中复苏的一幕曾引发全球关注：最早爆发疫情的武汉在8月举办了一场大型泳池派对。持续11周的封城过去近四个月，狂欢的人群挤在水深及腰的泳池中，随着DJ播放的重低音节拍兴奋地蹦跳欢呼。这段视频片段在网上疯传。那是人们完全释放的一刻，也显示出中国在恢复（某种程度的）常态上远远领先其他大多数国家。经济数据很少像泳池派对那样让人兴奋，但粗略地讲，中国在10月19日发布的最新GDP数据可与武汉这场水上庆祝相比拟。

官员们称，中国经济在第三季度同比增长4.9%，仅略低于疫情前的增速。在其他国家普遍陷入经济衰退，而且还要应付第二波疫情之际，中国却已差不多完成了V型反弹。分析起来，其成功不难解释。中国做对了至关重要的一点。它基本扑灭了病毒传染，使得人们在无需多少限制的情况下恢复活动。学校全面复课，工厂轰鸣复工，餐馆忙碌迎客。中国在另一个关键方面也算幸运。相比新西兰这类同样成功遏制了疫情的小国，中国受全球需求疲软的影响相对较小。在疫苗推出前，中国的复苏壮举将是其他国家难以企及的。

不过，中国这引人瞩目的反弹掩盖了复苏的不平衡。2月政府开始小心翼翼地解封，重点是工厂复工及启动基础设施项目。这样的考虑合情合理：在工厂和建筑工地这样可按半封闭环境管理的场所保持严格的卫生防疫措施要比在购物中心或学校里更容易。而且，中国的失业保险保障程度低，意味着千百万失业人员只能被迫减少开支。因此，在复苏的初期，中国经济主要是靠工厂生产和投资带动的。在第二季度，资本形成（GDP核算中包含上述活动的部分）为中国经济增长贡献了五个百分点，而消费将其拉低了超过两个百分点。这使得当时的同比增速为3.2%。

从最新数据看，复苏变得稍微平衡了一些（见图表）。随着基建支出逐步

减少，资本形成对第三季度增长的贡献回落至不到三个百分点，与疫情前常规水平相当。消费则助力经济增长近两个百分点，虽然仍低于疫情前的高位，但已大幅改善——这一点从旅游景点、餐馆和商店重新变得人头攒动也很容易看出来。贸易也锦上添花。疫情期间，中国在全球商品出口的占比升至历史新高。中国不仅是率先复工复产的制造业大国，也是口罩、手术服等防护装备的全球最大生产商，这都提振了出口。

每当中国发布如此亮眼的数据，人们自然会质疑它们是否可信。这次的强劲反弹有其他国家的对华出口数据等一系列GDP以外的指标来印证。更大的忧虑是，眼前的复苏会不会是牺牲之前减债的努力换来的。在疫情之初经济急剧放缓后，政府主导了一轮银行放贷激增，这将使中国今年的债务占GDP之比达到275%左右，上升25个百分点。这将是自2009年全球金融危机以来的最大年度增幅。

但这样做的绝非中国一家。世界各地的政府都大举借债来减轻疫情对经济的影响。随着经济增长重回正轨，中国有机会再次收紧水龙头。评级机构标准普尔指出，中国的实际借贷利率（经通胀调整后的利率）最近已升至五年来的最高位，对投资造成抑制。如果成功，中国将把非理性狂热限制在泳池里。■



Personal finance

The saver's dilemma

In a world of low interest rates, savers have few good options

IN THE 1980S comedy, “Trading Places”, Jamie Lee Curtis plays a prostitute who has been saving for her future; she has \$42,000 “in T-bills, earning interest”. If she followed the same strategy today, she would be disappointed with the return. The one-year Treasury bill yields 0.13%, so her annual interest income would be just \$55. If she reinvested the income, it would take more than 530 years for her money to double.

Savers around the world face the same problem. Bank accounts, money-market mutual funds and other short-term instruments used to offer a decent return. Not any more (see chart). Rates are lower in nominal terms than they were 30 years ago because of a long-term decline in inflation, but they are also lower in real terms. The pandemic has made the dilemma acute. This year American, British and German nominal ten-year bond yields have all touched their lowest levels in history.

Savers are likely to respond to this situation in one of three ways. They can save less, and spend more of their incomes. Another approach is to set aside more money, to make up for lower returns. A third option would be to put more savings into risky assets, such as equities, which should deliver a higher return over the long run.

So what will savers actually do? Unfortunately, history is not a particularly helpful guide. You might think that central banks had looked into the question, given their low policy rates are intended to boost consumption (and thus the economy) and reduce how much people stash under their mattresses. But the Federal Reserve and the Bank of England have done surprisingly little research into the subject.

More work has been done in Germany, where low interest rates are a hotter political issue. But this suggests that the impact of rates on savers' behaviour is murky, at best. The Bundesbank has found that the level of returns has become less important over time as a determinant of savers' behaviour. A study by Allianz, an insurer, also finds that other factors play a bigger role. The more money governments devote to social spending, for instance, the less people save, because they expect the state to help them in tough times. Demography also affects the saving rate: people tend to save more as they near retirement. But once retired, most live off their savings, so an increase in the number of retirees could cause the aggregate saving rate to fall. Research by Charles Yuji Horioka of Kobe University suggests that this has been the main cause of the long-term decline in Japan's household-saving rate.

To the extent one can tell, the historical relationship between rates and the level of savings seems to be weak. The Allianz study finds that, across Europe as a whole, for every one-percentage-point drop in interest rates, saving rates increased by 0.2 percentage points. Even then cause and effect is hard to disentangle. Central banks cut rates in response to bad economic news, and such news, rather than lower rates, may be the main reason that savers become more cautious. America's saving rate fell from more than 10% before 1985 to less than 5% in the mid-2000s. That could have been related to the downward trend in rates. But shorter-term fluctuations seem to have been driven by recessions.

If history is an unreliable guide to what savers will do now, what signals can be gleaned from their behaviour so far this year? Anxiety about the pandemic helped push the saving rate in America to a record high earlier in the year; in August it was still relatively elevated, at 14.1%. The Investment Company Institute (ICI), a lobby group for American fund managers, reports that \$115bn flowed into money-market (ie, short-term deposit) funds in March this year. "Fear came into discussions with clients," says

Andy Sieg, president of Merrill Lynch Wealth Management. “Their concern was safety of principal.” If you are worried about losing your job, then the return on your savings is a minor concern. The main thing is to have some.

Yet as the panic subsided some savers turned to another strategy, of piling on risk. The American stockmarket rallied, due in part to central-bank action. Many retail investors rushed in, buying shares through platforms such as Robinhood. With returns on bonds and cash so low, stocks seemed attractive, particularly as some offer a dividend yield that exceeds the return savers get in the bank. For investors who turned to shares in March, this wealth effect easily compensated them for the lower returns on other savings. This greater risk-taking is part of a longer-term trend. Mr Sieg says that, ten to 15 years ago, rich American retirees may have parked a lot of their savings in municipal bonds. Now they have a more diverse portfolio including equities and corporate debt.

The approach of taking more risk to compensate for lower interest rates has not always paid off, though. America’s frothy stockmarket has been an outlier. Savers elsewhere have been less well compensated for risk. Britain’s FTSE 100 index is below its level in 1999. In Germany a boom in the 1990s did cause equities to rise from 20% to 30% of household assets. But when the bubble burst, retail investors’ enthusiasm waned. By 2015 shares were 19% of household assets. Japan’s stockmarket is still below its high in 1989. Around half of total household financial assets is still in cash and bank deposits, says Sayuri Shirai of Keio University.

Moreover, not all savers are the same. Even in America, stockmarket gains have mainly accrued to the rich. The wealthiest 1% owns 56% of the stockmarket, up from 46% in 1990; the top 10% own 88% of the market. One way of thinking about this is that most people set aside cash for emergencies. Poorer people may be unable to save any more than that; rich ones can afford to venture into equities.

Even if they don't punt on stocks, ordinary workers in rich countries still have exposure to riskier assets through their pension schemes. But these tend to be quite small. The median balance in an American 401(k) plan for those aged 55 to 64 was only \$61,738 in 2019. A pension of 4-5% of that pot amounts to just \$2,500-3,100 a year. In Britain, where auto-enrolment has brought many low-income employees into the pension system, the median defined-contribution pot in 2019 was just £9,600 (\$12,200). And the solvency of final-salary pension schemes has deteriorated as a result of the shifts in markets. When they calculate the cost of meeting their pension promises, funds have to discount the cost of their liabilities using bond yields; as yields have fallen sharply, these costs have risen. The average public-sector pension plan in America was 72.2% funded in 2019, down from 78.4% in 2009, according to the Centre for Retirement Research (CRR), despite the long bull market in shares.

The danger is that individual savers faced with bewildering movements in markets and rickety pension schemes may choose to keep their savings in deposits. Many may lack access to financial advice, and are unaware of the scope for higher returns or indeed of the scale of savings they need to set aside to prepare for their old age. A worrying signal can be gleaned from Britain, where rules were changed in 2015 to allow people to withdraw money from their pension pots without using the proceeds to buy an annuity (which offers a guaranteed income). Annuity returns on bond yields were stingy, making them an unpopular choice.

With their savings stuck in cash elderly people around the world risk running out of money before they die. This is already happening in Japan. "The decline in interest rates to virtually zero has sharply reduced the interest income that the retired were counting on, requiring them to draw down their savings more than they had been planning to," says Mr Horioka. Governments have long urged people to make provision for retirement, but low rates have made that harder to achieve. With society yet to square the

circle, and rates going nowhere anytime soon, savers' lives are set to get even more difficult. ■



个人财务

储蓄者的困境

在低利率时代，储蓄者没什么好的选择

在上世纪80年代的喜剧《颠倒乾坤》（Trading Places）中，杰米·李·柯蒂斯（Jamie Lee Curtis）饰演了一个一直在为自己的未来存钱的妓女，她有4.2万美元的“短期国债，可以生利息”。如果今天她用同一套理财策略，会对收益感到失望。按照美国一年期国债0.13%的收益率，她每年的利息收入只有55美元。如果把利息再投资，她的钱需要530多年才能翻倍。

世界各地的储蓄者都面临同样的问题。过去，银行账户、货币市场共同基金和其他短期投资工具都有不错的收益。如今好景不再（见图表）。由于通货膨胀率长期下降，名义利率低于30年前的水平，但实际利率也一样。新冠疫情让这种困境雪上加霜。今年，美国、英国和德国的十年期债券的名义收益率全部下探历史新低。

储蓄者的反应大概不出以下三种：他们可能会少存钱、多花钱。或者多省钱，填补低收益造成的缺口。第三种选择是把更多积蓄投入股票等可能在长期带来更高收益的风险资产。

那么储蓄者实际上会怎么做呢？遗憾的是，历史并没有提供特别有用的线索。既然各国央行设定低政策利率是为了刺激消费（进而刺激经济）并减少人们藏在床垫下的钱，你可能会认为它们已经研究过这个问题。但美联储和英国央行在这方面的研究少得令人吃惊。

相比而言低利率在德国是更热门的政治议题，因此那里开展的研究更多。但结果表明，利率对储蓄者行为的影响顶多只能说是模糊不清。德国央行发现，随着时间的推移，收益率水平在决定储蓄者行为时的重要性已经降低。保险公司安联（Allianz）的研究也发现，其他因素的影响更大。例如，政府在社会支出上投入的资金越多，人们存的钱就越少，因为他们预期政府会在困难时期出手相助。人口结构也会影响储蓄率：人们在临近退

退休时往往会多存钱，而一旦退休，大多数人就靠积蓄生活，所以退休人数的增加可能导致总储蓄率下降。神户大学的查尔斯·堀冈雄二的研究表明，这是日本家庭储蓄率长期下降的主要原因。

基于现有信息和观察，历史上利率和储蓄水平之间的关系似乎并不大。安联的研究发现，在整个欧洲，利率每下降1个百分点，储蓄率会上升0.2个百分点。即便这样也很难说明两者之间有明确的因果关系。各国央行会用降息来应对负面经济消息，但让储蓄者变得更加谨慎的主因可能不是低利率，而是这类消息。美国的储蓄率从1985年以前的超过10%下降到2005年前后的不足5%。这可能与利率的下降趋势有关。但更短期的波动看起来是由经济衰退驱动的。

如果历史在储蓄者眼下会怎么做的问题上没能提供什么可靠的线索，那么是否能从他们今年迄今为止的行为中获得什么信号？今年早些时候，对疫情的焦虑推动美国的储蓄率达到历史新高，到了8月份仍然处于14.1%的相对高位。美国基金管理公司的游说团体投资公司学会（Investment Company Institute）称，3月有1150亿美元流入货币市场（即短期存款）基金。“客户在商谈中表现出忧虑，”美林证券公司（Merrill Lynch Wealth Management）的总裁安迪·西格（Andy Sieg）表示，“他们担心的是本金的安全。”如果人们担心失业，那么储蓄能有多少收益就不是什么大事了，最重要的是得有一些储蓄。

不过，随着恐慌情绪的消退，一些储蓄者转向了另一种策略，持有更多风险资产。美国股市的反弹一定程度上是美联储行动的结果。许多散户投资者蜂拥而上，通过Robinhood等平台购买股票。债券和现金的回报率如此之低，让股票显得很有吸引力，尤其是一些股票的股息收益率超过了储户从银行获得的回报。对于在3月转向股票的投资者来说，这种财富效应轻松弥补了其他储蓄产品的低回报带来的损失。长期来看，这种更高风险的投资会成为一种趋势。西格表示，10到15年前，美国富有的退休人员可能把大量的储蓄用来购买市政债券。现在他们的投资组合更加多样化，包括了股票和公司债券等资产。

不过，为弥补低利率带来的损失而承担更多风险的做法并不总能取得回报。美国充满泡沫的股市只是个特例。其他地方的储蓄者在风险资产上的回报就没有那么好了。英国富时100指数低于它在1999年的水平。在德国，90年代的股市繁荣的确让股票占家庭资产的比例从20%上升到了30%。但随着泡沫的破裂，散户投资者的热情也减退了。到2015年，股票占家庭资产的比例为19%。日本股市仍低于它在1989年创下的最高点。家庭全部金融资产中约有一半仍是现金和银行存款，庆应义塾大学的白井早由里表示。

此外，储蓄者之间也有差别。即便在美国，股市收益也主要流向了富人。最富有的前1%人群拥有的股市资产份额从1990年的46%上升到现在的56%；而最富有的前10%人群的份额为88%。对此，一种解释是，大多数人都会留出现金以备不时之需。穷人在这笔钱以外可能存不下更多了，而富人有更多闲钱投资股票。

富裕国家的普通劳动者即使不押注股票，仍会通过养老金计划接触到风险较高的资产，不过数额往往很小。2019年，美国55至64岁年龄段人群的401(k)计划的余额中位数仅为61,738美元。提取这笔钱的4%至5%用作养老金，相当于每年只有2500至3100美元。在英国，“自动登录”把很多低收入员工纳入了养老金体系，2019年固定缴款额的中位数只有9600英镑（12,200美元）。而且由于市场的变化，“最终薪金制”养老金计划（final-salary pension）的偿付能力已经恶化。当核算兑现其养老金承诺的成本时，养老基金必须使用债券收益率对计划的负债成本贴现。而由于收益率骤降，负债成本上升了。根据波士顿学院退休研究中心（Centre for Retirement Research）的数据，尽管美国股市处于长期牛市，但美国一般公共部门养老金计划的融资比率从2009年的78.4%下降到2019年的72.2%。

危险的是，个人储蓄者在面对市场扑朔迷离的变化和摇摇欲坠的养老金计划时，可能会选择把积蓄存进银行。许多人得不到理财建议，不了解更高回报的空间，或者实际上也搞不清楚到底需要为养老准备多少钱。从英国可以看到令人担忧的信号。2015年英国修改了相关规定，允许人们从养老

账户中取现而不必用账户中的钱购买年金保险（可提供收入保障）。年金依赖债券收益，回报率很低，因而不怎么受欢迎。

在世界各地，由于老人们的积蓄主要为现金，他们面临着“人活着，钱没了”的风险。这在日本已经成为现实。堀冈表示，“利率降到几乎为零的水平，大幅降低了退休人员赖以生存的利息收入，为此他们只能比原计划更多地动用积蓄。”长期以来，政府一直敦促人们为退休做好准备，但低利率让这更加难以实现。由于社会还无法解决这个难题，而利率在短期内也不会有变化，储蓄者的日子势必会变得更加艰难。■



Chinese IPOs in America

Red capitalism

Why companies from China still flock to Wall Street

CHINESE FIRMS get a frosty reception in America these days. President Donald Trump is a relentless China-basher. His administration has tried to crush Huawei, a telecoms giant, ban TikTok and WeChat, two popular Chinese-owned apps, and expel Chinese companies listed on American stock exchanges. No wonder that some have steered clear of late. Ant Group, a fintech star that may once have followed Alibaba, the tech titan with which it is affiliated, onto the New York Stock Exchange (NYSE), is about to float in Hong Kong and Shanghai instead. Last month Sina, the Nasdaq-listed owner of Weibo, China's answer to Twitter, said it would go private in a \$2.6bn deal. A day later Tencent, another Chinese online colossus, said it would buy out Sogou, a NYSE-traded search company, for \$3.5bn.

Many Chinese firms that might once have flocked to New York are eyeing their home stockmarkets. According to consultants at Deloitte, from January to September new listings in Hong Kong raised some \$28bn, two-thirds more than in the same period last year. The money raised by newcomers to the biggest mainland exchanges, in Shanghai and Shenzhen, has reached 355bn yuan (\$53bn), 2.5 times the comparable figure in 2019.

Look closer, though, and plenty of Chinese startups continue to covet American listings. In August KE Holdings, an online property firm backed by Japan's SoftBank Group, raised \$2.1bn; XPeng, an electric-car maker, picked up \$1.5bn. Lufax, a fintech firm which this month filed to go public on the NYSE, may raise \$3bn. All told, Chinese firms have raised nearly \$9bn in American initial public offerings (IPOs) since January, and another \$8bn in secondary share sales. Goldman Sachs, an investment bank,

reckons that the money raised from Chinese IPOs on the NYSE and Nasdaq has held up during Mr Trump's presidency (see chart). The market value of Chinese listings in America now exceeds \$1.6trn, of which American investors hold nearly a third. Goldman Sachs forecasts a record number of Chinese listings in New York this year.

Why would Chinese companies flock to America given the apparently toxic environment? For one thing, as Adam Lysenko of Rhodium Group, a research firm, points out, it is often easier to list on American exchanges than in China, with its more restrictive regulatory regime. Ant's blockbuster stockmarket debut hit a last-minute snag in mid-October when China's top securities regulator unexpectedly delayed approval for the Hong Kong leg of its dual listing.

An overseas listing also allows mainland companies to get round China's strict currency controls. Gary Rieschel of Qiming Ventures, a venture-capital firm, says that going public in New York, the world's pre-eminent financial centre, makes sense for Chinese firms like Lufax keen on global expansion. For rising technology startups in particular Wall Street also represents an imprimatur from the world's most sophisticated investors, and access to its deepest and most liquid capital markets.

Shareholders, for their part, get a slice of its perkier stocks. Total returns for an index of Chinese firms listed in America tracked by BNY Mellon, a bank, have risen by nearly half in the past 12 months, twice the rate for the S&P 500 index of big American firms. Mr Lysenko calculates that from 2017 to 2019 Chinese firms listed on American exchanges traded at higher valuations relative to earnings than companies in the S&P 500, on the Nasdaq, or indeed those whose shares changed hands on the Shenzhen and Hong Kong stockmarkets. These "red" stocks are simply too tasty for American investors, red as they already are in tooth and claw, to forgo. ■



中国企业在美IPO 红色资本主义

为什么中国公司仍然涌向华尔街

中国企业如今在美国受到冷遇。特朗普持续无情地打压中国。他的政府试图压垮电信巨头华为，禁用TikTok和微信这两个流行的中资应用，还试图驱逐在美国证券交易所上市的中国公司。难怪近期有些企业已经选择避开美国。金融科技明星蚂蚁集团原本可能追随自己原来的母公司、科技巨头阿里巴巴在纽交所上市，但现在已转而准备在香港和上海上市。上个月，在纳斯达克上市的微博（中国版推特）母公司新浪表示将通过一笔26亿美元的交易实现私有化。一天之后，另一家中国网络巨头腾讯表示将以35亿美元收购在纽交所上市的搜索公司搜狗。

许多本来可能蜂拥至纽约的中国公司正盯着中国国内的股票市场。德勤的顾问称，今年1月至9月，在香港新上市的公司融资约280亿美元，较去年同期增长了三分之二。在上海和深圳这两个中国大陆最大的交易所新上市的公司融资额达3550亿元，是2019年相关数字的2.5倍。

不过，仔细观察就会发现，许多中国的创业公司仍渴望到美国上市。8月，日本软银集团参与投资的在线房地产服务公司贝壳找房赴美上市，融资21亿美元；电动汽车制造商小鹏汽车融资15亿美元。本月申请在纽交所上市的金融科技公司陆金所可能会融资30亿美元。1月以来，中国公司通过在美IPO总共融资近90亿美元，另外通过增发融资80亿美元。投资银行高盛认为，特朗普任总统期间，在纽交所和纳斯达克上市的中国企业的融资势头未减（见图表）。目前，在美国上市的中国公司市值超过1.6万亿美元，美国投资者持股近三分之一。高盛预测，今年在纽约上市的中国公司数量将创历史新高。

目前美国的环境看似非常不利，为什么中国公司还会涌向那里？一方面，正如研究公司荣鼎集团（Rhodium Group）的亚当·利森科（Adam Lysenko）所指出的那样，在美国的证交所上市要比在中国更容易，因为

中国的监管体系限制更多。本月中旬，蚂蚁集团的盛大上市之旅在最后一刻曾一度遇阻，中国最高证券监管机构出人意料地推迟了对它的两地上市计划中香港部分的批准。

在海外上市还能让中国大陆企业绕开中国严格的货币管制。风投公司启明创投的加里·里切尔（Gary Rieschel）说，选择在全球最著名的金融中心纽约上市对于像陆金所这样渴望在全球扩张的中国公司来说是合理的。进入华尔街也代表着得到了世界各地最老练的投资者的认可，并且可以利用那里最深厚、最具流动性的资本市场，对于那些发展中的科技创业公司而言尤其如此。

至于股东，他们由此分得了一些那里最强劲的股票。纽约梅隆银行（BNY Mellon）追踪的在美上市中国公司指数的总回报在过去12个月中上涨了近一半，是追踪美国大公司的标普500指数涨幅的两倍。根据利森科的计算，从2017年到2019年，在美国的证券交易所上市的中国公司的市盈率要高于标普500公司或纳斯达克平均，甚至高于在深圳和香港交易所上市的公司。这些“红色”股票——它们在商业世界中已然红牙血爪——在美国投资者中非常吃香，叫人欲罢不能。 ■



China's economy

The real deal

China's reported growth has long been far too smooth. Can figures showing a strong rebound be trusted?

NO SOPHISTICATED ANALYSIS is needed to show that China is in better economic shape than most other countries these days. Just look at its bustling shopping malls, its jammed roads in rush hour and its mobbed tourist sites during holidays. But if the crowd scenes suffice to affirm that China is doing well, a little more work is needed to address the question: exactly how well? As is often the case with Chinese data, the answer is controversial.

The national statistics bureau on October 19th reported third-quarter GDP growth of 4.9% compared with a year earlier, a strong recovery from the depths of the coronavirus slowdown, and all the more stunning when much of the world is mired in recession. Yet some believe the official growth data have been too rosy this year, not least because China's pandemic lockdown in the first quarter was among the world's most restrictive.

Thankfully, the mysteries are not unfathomable. Research published in recent weeks sheds some light on what is really going on. Doubts about China's data are not new: it is probably fair to say that few serious economists trust its exact growth figures. Instead, there are two broad camps. One thinks that official data are overly smooth, but that the general picture is not all that misleading, because the government sometimes exaggerates GDP and at other times lowballs it. The second camp sees one-sided manipulation, with China's boffins consistently inflating the size of the economy. The new research comes from both camps.

Start with the more sceptical of the two, best demonstrated in a note in September by Capital Economics, a consultancy. Julian Evans-Pritchard and Mark Williams, its analysts, argued that Chinese data have looked particularly fishy since 2012. Before that, growth regularly exceeded targets by a wide margin. Since then, reported GDP has been smack in line with targets set early in the year. And statisticians have stopped making big revisions to their initial estimates. It all seems a little too perfect.

Other data look more credible. Whereas real growth (ie, adjusted for inflation) has been improbably smooth, nominal growth has been volatile. Moreover, certain elements of the real-growth calculations appear to have been lifted upwards. For years the construction component of GDP moved in tandem with cement production. But from 2014 until 2018 a big gap opened up as construction raced ahead. In the first quarter of this year, when China was in partial lockdown, the transportation component of GDP was resilient—despite a collapse in freight and passenger traffic.

So Capital Economics has developed a “China activity proxy” to gauge growth. There is a long tradition of analysts using alternative sources to measure the Chinese economy. No less an authority than Li Keqiang, now prime minister, famously did so when he ran a north-eastern province. In their latest proxy Messrs Evans-Pritchard and Williams include eight indicators, from property sales to seaport cargo. The results are stark. Whereas official GDP grew by 48% in cumulative terms from 2014 to 2019, they put the true expansion at 33%.

China’s boffins can turn to an unlikely corner for a partial defence: America’s Federal Reserve. John Fernald, Eric Hsu and Mark Spiegel, economists at the Fed’s San Francisco arm, have also constructed a proxy for Chinese growth, laid out in a forthcoming paper, using indicators such as consumer expectations and fixed-asset investment. They, too, conclude that official growth has been implausibly smooth since 2013. But they find

that true growth was faster about half the time and slower the other half (see chart).

The crucial test for these proxies is whether they offer insights about China's trajectory that are missing in the official GDP data. Both pass the test. The ups and downs of their measures better explain China's periodic shifts in fiscal and monetary policies than the uncannily steady path of official real GDP does. The Fed economists subject their proxy to another test, constructing it to be in line with Chinese imports, as measured by the reported exports of trading partners—in other words, a data source entirely free from potential Chinese fiddling. In countries with reliable statistics, import growth typically moves closely with that of GDP. That is the case for their proxy—but not for official GDP.

Does this mean that Chinese data are, put bluntly, garbage? No. The Fed economists find that Chinese statistics, with the notable exception of real GDP, have become more reliable over time. The analysts with Capital Economics conclude that the main problem occurs in the transformation of nominal figures into real ones; statisticians appear to use excessively low inflation rates when calculating real growth so that the government can hit its targets. Nominal measurements are more trustworthy, and that matters when trying to assess, say, China's debt burden or the size of its economy relative to America's.

The proxies, alas, offer slightly different narratives about China's economy this year. Capital believes that the slowdown in the first quarter was much sharper than reported, whereas the Fed's calculations suggest that it was milder. Both, however, agree on the most salient point: the rebound since then has been big. The crowded streets and buzzing shops do not lie. ■



中国经济

真凭实据

长期以来中国公布的经济增速一直过于平稳。显示强劲反弹的数字是否可信？

无需复杂的分析就可说明目前中国的经济状况要好于大多数其他国家。看看它熙熙攘攘的购物中心、高峰时段拥挤的道路以及假期里人满为患的旅游景点就知道了。但是，如果说这些人头攒动的场景足以证实中国经济状况良好，那么还需要更多一些证据来回答一个问题：到底多好？中国公布的数据常常有争议，这个问题的答案也一样。

中国国家统计局于10月19日公布第三季度GDP同比增速为4.9%。在经历了新冠疫情导致的经济低谷后，这样的复苏堪称强劲；在世界许多地区仍深陷衰退之时，这样的表现更令人惊叹。不过，有些人认为今年的官方增长数字过于靓丽，尤其因为中国在第一季度实施的疫情封锁措施属于全球最严苛之列。

所幸这些谜团并非深不可测。最近几周发表的研究有助于人们了解真实情形。对中国数据的怀疑不是新鲜事，或许可以说，很少有严肃的经济学家完全相信中国的官方增长数字。实际上他们可分为两大阵营。一个认为官方数据过分平稳，但总体情况并没有那么具有误导性，因为政府有时会夸大GDP数据，有时又会压低。另一个阵营认为只存在单一方向的数据操控，也就是中国的统计人员始终都在夸大经济规模。两个阵营都开展了新的研究。

先来看质疑声更大的一方，咨询公司凯投宏观（Capital Economics）9月发布的一份报告最好地体现了这一方的观点。该公司的分析师朱利安·埃文斯-普里查德（Julian Evans-Pritchard）和马克·威廉姆斯（Mark Williams）认为，中国自2012年以来的数据看起来尤其不可信。在那之前，经济增长经常大幅超出预定目标。2012年之后公布的GDP数据总是刚好与年初设定的目标相一致。而且统计人员也不再对一开始的预估做大幅修正。这一切似乎有点太过完美了。

其他一些数据看起来更可信些。虽然实际增长（即经通胀调整后）平稳得离奇，但名义增长不断波动。此外，计算实际增长的某些要素似乎被拉高了。多年来，GDP中的建筑业增速与水泥生产同步。但在2014年至2018年之间，两者间拉开了很大的差距，建筑业数字冲到了前头。今年第一季度中国处于部分封城状态时，尽管货运和客运量暴跌，GDP中的交通运输业却很有韧性。

因此，凯投宏观创建了一个“中国活动替代指数”（China activity proxy）来衡量增长。分析师使用替代性数据源衡量中国经济的做法由来已久。中国现任总理李克强就是这方面的一个权威，他在东北某省任职时衡量经济的方法非常出名。埃文斯-普里查德和威廉姆斯的这一最新指数包含了从房地产销售到港口货运量的八个指标。结果有明显差距。从2014年到2019年，官方GDP累计增长48%，而他们计算得出真实增长在33%。

中国的统计人员可以从一个意想不到的地方获得一些支持——美联储。旧金山联储的经济学家约翰·费纳尔德（John Fernald）、埃里克·许（Eric Hsu）和马克·斯皮格尔（Mark Spiegel）在即将发表的论文中也构建了一个衡量中国增长的替代指数，使用了消费者预期和固定资产投资等指标。他们得出的结论同样认为2013年以来的官方增长数据平稳得令人难以置信。但他们发现，真实增速在约一半的时间里要更快一些，另一半时间里要更慢一些（见图表）。

这些替代指标是否经得起考验，关键要看它们有否提供官方GDP数据未能展现的对中国发展轨迹的洞察。两个指数都做到了这一点。相比官方异常平稳的实际GDP变化轨迹，它们得出的曲线中的起伏更好地解释了中国财政和货币政策的周期性变化。美联储的经济学家又让自己的指数接受了另一项检验，让它和中国的进口数据相对照，这是从中国的贸易伙伴公布的出口数据得来的——也就是说，这个数据源完全没有可能被中国动手脚。在有可靠统计数据的国家中，进口增长通常与GDP增长紧密联动。他们的代理指数就呈现出这种关联，而官方GDP没有。

那么直白地说，这是否意味着中国的数据就是垃圾？并不是。美联储的经

济学家发现，除了实际GDP这个显著的例外，中国的统计数据已变得越来越可靠。凯投宏观的分析师得出的结论是，主要问题发生在将名义数字转换为实际数字的过程中：统计人员在计算实际增长时似乎使用了过低的通胀率，好让政府能够实现目标。名义数据更值得信赖，而如果是评估中国的债务水平，或中国相对于美国的经济规模等情况时，名义数据就很重要。

不过，这两个指数对今年中国经济的描述略有不同。凯投宏观认为第一季度的放缓幅度比官方公布的情况严重得多，而美联储的计算表明放缓幅度要更和缓。不过双方在最突出的一点上意见一致，那就是一季度之后的反弹力度很大。拥挤的街道和喧闹的商店是不会说谎的。■



Tech investing and the Vision Fund

A vision in hindsight

The lessons from Son Masayoshi's super-sized tech experiment

“IF I’M GOING to do a fund it has to be big enough to disrupt the whole technology world.” So declared Son Masayoshi four years ago, on a trip to the Middle East to drum up cash for a new investment vehicle to take on Silicon Valley’s venture capitalists (VCs). His Vision Fund eventually raised \$98.6bn and bought stakes in some of the world’s most exciting companies, including ByteDance and Uber. Yet Mr Son’s mission has so far had mixed results. Performance has been soggy, despite a boom in tech stocks, as the strategy of pouring money into private firms has at times become rather like spoiling perpetual adolescents. Instead, the Vision Fund’s most striking legacy may be that it has marked the start of a new era in which American capital and startups no longer call all the shots.

For decades an elite of VC funds in San Francisco have spotted promising startups and nurtured them to adulthood, in the form of a stockmarket listing or a takeover. The Vision Fund played by different rules. It dragged VC out of its Californian cul-de-sac. Its anchor investor was a Saudi Arabian sovereign-wealth fund, it was controlled from Tokyo and it paid as much attention to Asia’s tech scene as to America’s. It viewed capital as a weapon in a winner-takes-all struggle. By channelling vast sums to startups you could speed up time and help them reach critical mass more quickly while intimidating their rivals. The Vision Fund also tried to reinvent governance. It let firms stay in private hands for longer, as part of its global family of startups which could share ideas and co-operate or fight it out—the fund has bought stakes in 92 firms, some of which compete with each other.

How has the experiment fared? Having invested \$82.6bn, the Vision Fund

has so far made net gains of \$8bn. Mr Son's optimism about tech was spot-on but his fund has lagged far behind the NASDAQ tech index, which has risen by 99% since May 2017, when the fund was officially launched. That underperformance reflects flaws in its strategy. Throwing cash at firms raised valuations and encouraged entrepreneurs to fight damaging price wars, from ride-sharing to food-delivery. Mr Son's freewheeling view of governance was a mistake. Without the scrutiny of public markets, egotistical founders went astray, most obviously at WeWork, a property firm. Bad bets had cost the Vision Fund \$14.5bn by June this year. It proved hard to get the portfolio of firms to co-operate, or merge, especially given geopolitical tensions.

The tech industry is now rushing in a different direction, taking firms public so they can raise capital from diverse sources and face the discipline of institutional investors. Of the top 30 "unicorns"—private tech firms worth over \$1bn—in 2018, over half have listed or are about to, including Ant Group and Airbnb. Many have used alternative techniques to go public, such as direct listings, which avoid the clunky initial-public-offering process. Mr Son's fund will benefit as its firms leap into the public market at high valuations. But his second fund, Vision Fund 2, reflects a chastened reality, with only \$3bn of assets and 13 investments so far, many of them small.

Although it has failed to turn tech investing into alchemy, the Vision Fund has shown that the VC establishment does not have a monopoly in dealmaking—so far this year 82% of VC deals in America have involved non-traditional investors, including sovereign-wealth funds and companies. And most important, by taking a global view and placing giant bets in India, South-East Asia and China, it has underlined that the future of technology lies as much in Asia as on America's west coast. Like many startups, the Vision Fund has helped change the world—just not in the way it originally expected to. ■



【首文】科技投资和愿景基金

回望愿景

孙正义超大规模科技实验的经验教训

“如果我要做一个基金，那它一定要够大，足以颠覆整个科技界。”四年前，孙正义在一次中东之行中如此说道。他去那里是为了给一个新投资工具筹集资金，以挑战硅谷的风险投资家。他的愿景基金最终筹得986亿美元，并购入了包括字节跳动和优步在内的一些全球最令人兴奋的公司的股份。不过到目前为止，孙正义这一目标取得的结果喜忧参半。尽管科技股大涨，该基金却业绩低迷，因为有的时候，向私营公司注资这一策略已变得很像在娇惯永远长不大的半大小子。愿景基金最引人注目的成就倒可能是开启了一个新时代：美国的资本和创业公司不再操控全局。

几十年来，旧金山一批优质风投基金发掘有前途的创业公司，将它们培养成熟，让它们去上市或被收购。愿景基金的玩法不同。它把风投从加州的死胡同里拉了出来。它的主要投资方是沙特主权财富基金；它本身由东京办事处控制，对亚洲和美国的科技界报以同样多的关注。它将资本视为赢家通吃的争斗中的一种武器。向创业公司输送大量资金可以加快时间，帮助它们更快达到关键规模，并令竞争对手生畏。愿景基金也曾试图重塑公司治理。它让公司留在私人手中更久，作为愿景全球创业公司家族的一份子，这些公司可以分享创意、合作或一较高下。该基金已购买了92家公司的股份，其中一些公司彼此竞争。

这场实验进展如何？愿景基金已投资826亿美元，迄今获得80亿美元的净收益。孙正义对科技股的乐观情绪完全正确，但他的基金却远远落后于纳斯达克科技股指数，该指数自2017年5月愿景基金正式推出以来已上涨99%。这种欠佳的表现反映了战略上的缺陷。向企业砸钱推高了它们的估值，并促使从拼车到外卖领域的创业者大打价格战，造成破坏性的后果。孙正义无为而治的治理观是个错误。没有公共市场的审视，妄自尊大的创始人误入歧途，最明显的例子就是房地产公司WeWork。截至6月，失算的押注已使愿景基金损失145亿美元。事实证明，让它投资的众多企业相互

合作或合并很难，尤其是在地缘政治紧张的情况下。

科技行业如今正急冲冲地朝另一个方向前进：将公司上市，这样就可以从多种渠道筹集资金，并接受机构投资者的约束。2018年的前30家“独角兽”（估值超过10亿美元的私营科技公司）中，超过一半已经上市或即将上市，包括蚂蚁集团和爱彼迎。许多公司已另寻他法上市，比如可避免繁琐的IPO程序的直接上市。随着孙正义的基金所投资的公司以高估值进入公开市场，该基金将获益。但从他的第二只基金愿景基金2期来看，现实已经受到不佳业绩表现的影响。迄今为止，该基金的资产只有30亿美元，投资13笔，其中许多规模很小。

尽管愿景基金未能将科技投资转化为炼金术，但它显示出促成交易并非风投机构的专利——今年以来，包括主权财富基金和企业在内的非传统投资者参与了美国82%的风投交易。最重要的是，愿景基金放眼全球，在印度、东南亚和中国押下重注，突显了技术的未来不仅在美国西海岸，也在亚洲。和许多创业公司一样，愿景基金帮助改变了世界——只不过不是以它最初预想的方式。■



Free exchange

Winning bids

The Nobel prize for economics rewards advances in auction theory

IN 1991 ALVIN ROTH, who in 2012 would share the Nobel prize for economics, was asked how the discipline might change over the century to come. “In the long term”, he wrote, “the real test of our success will be not merely how well we understand the general principles which govern economic interactions, but how well we can bring this knowledge to bear on practical questions of microeconomic engineering.” Sweden’s Royal Academy of Science seems to agree. On October 12th it gave this year’s Nobel prize to Paul Milgrom and Robert Wilson, both of Stanford University, for their work on auction theory and design. Their work epitomises economics as engineering.

Auctions are an ancient mechanism for selling valuable commodities, from fine art to a fisherman’s catch. A few, simple forms of auction have been dominant over time. In an English auction, ascending bids are made until a winner remains; in the Dutch variety, a high opening price is set and is reduced until a bidder is found. Yet as their use has expanded, auctions have become more complex, and economists have taken a keener interest. In the 1960s William Vickrey, who shared the Nobel in 1996, developed what became known as auction theory. He assessed bidders’ optimal strategies and studied the revenue and efficiency properties of different auction formats. But Vickrey concentrated on a relatively narrow set of cases, in which each bidder’s valuation of the good being sold is unrelated to those of the other bidders. In practice, however, what one person believes an auctioned item to be worth often depends on the valuations of other bidders or the seller. Each may have private information about its value, clues to which are revealed in the course of the auction.

Mr Wilson began analysing such cases in the 1960s. He first tackled scenarios where the item for sale has a “common value”—a value that is uncertain beforehand but, in the end, is the same for everyone. An example might be a plot of land with oil beneath it, where participants may have different estimations of its value, perhaps because each has varying estimates of the quantity of oil. In such cases, the winner often discovers that the information others had about the common value led them to make lower bids. This may mean that the winner overestimated the worth of the item and paid too much, a phenomenon known as the winner’s curse.

Mr Wilson’s work in this vein laid the groundwork for the analysis of yet more complex scenarios, which take both bidders’ unique private valuations and estimates of an item’s common value into consideration. The value of an oilfield, for instance, might depend on both the quantity of oil in the ground and how cheaply each bidder can extract it. Mr Milgrom (whose doctoral thesis was supervised by Mr Wilson) derived a number of important lessons from his analyses. Auction structures that elicit more private information from bidders—such as English auctions, where every participant observes who bids what and who drops out—reduce the winner’s curse problem compared with formats where very little private information is divulged. In some cases, it may be in the seller’s interest to provide bidders with more information about the item under the hammer.

Much like Mr Roth, who helped design market mechanisms to match sick patients with kidney donors, Messrs Milgrom and Wilson put the knowledge gained from their theoretical work to practical use. Before the early 1990s, America’s government used unwieldy methods to allocate portions of the radio spectrum to interested telecoms companies. Bidders either explained why they deserved a slice of spectrum more than others (and spent vast sums of money on lobbying), or were allocated slices through lotteries. Neither led to an efficient allocation. In 1993 Congress allowed the Federal Communications Commission to use auctions instead.

Yet it was not clear how these might work. Bidders had wildly varying assessments of how slices of spectrum might be used, and the value of one piece of spectrum often depended critically on what other parts an owner also controlled. The laureates worked with another economist, Preston McAfee, now at Google, to invent a new format, known as the “simultaneous multiple-round auction” (SMRA). Participants may bid on all items in a number of rounds, after each of which some information about bids and prices is revealed to the bidders. When first used in 1994, SMRA raised \$617m for an American government that had previously earned almost nothing from its distributions of spectrum rights.

SMRA-style auctions are now used routinely in many countries and in contexts other than spectrum sales—in selling electricity, for instance. Questions of distribution have continued to motivate the prizewinners’ research and led to the development of other specialised auction formats. Messrs Milgrom and Wilson became the embodiment of the economist as engineer, using theory to devise a solution to a practical problem. It is an approach Sweden’s Royal Academy of Science seems to admire. This year’s award is the third since 2007 to honour “mechanism design”, or the use of economic principles to design markets to solve real-world problems.

| *The economist’s lot*

The pursuit of economics as a form of engineering means that Messrs Milgrom and Wilson are more enmeshed in the real world than the typical academic. Both have consulted for regulators and firms. Mr Milgrom advised Time Warner and Comcast on their participation in radio-spectrum auctions in 2006; his efforts helped save his clients more than \$1bn. In 2009 he co-founded a firm, Auctionomics, that provides consulting services to those looking to operate and to bid in auctions (many of the sort designed by the prizewinners).

It is a different sort of work from that which many aspiring scholars

imagine themselves to be pursuing. But the rewards the laureates have reaped in academia and beyond certainly advertise the power wielded by economic engineers. ■



自由交流

中标

诺贝尔经济学奖颁给了拍卖理论的新发展

一九九一年，阿尔文·罗斯（Alvin Roth，2012年诺贝尔经济学奖得主之一）被问起未来一个世纪经济学将如何变化。“长远看来，”他写道，“对成功的真正考验不仅在于我们能在多大程度上理解支配经济相互作用的一般性原则，还在于我们能在多大程度上把这些知识运用到微观经济工程的实际问题上。”瑞典皇家科学院似乎认同这一点。10月12日，它把今年的诺贝尔经济学奖颁给了斯坦福大学的保罗·米尔格罗姆（Paul Milgrom）和罗伯特·威尔逊（Robert Wilson），以表彰他们在拍卖理论和设计上的研究。这一研究成果代表了经济学的工程学视角。

拍卖是出售艺术品乃至渔获等珍贵商品的一种古老机制。少数简单的拍卖形式逐渐成为主流。在英式拍卖中，竞拍者逐步提高出价，直至剩下一个出价最高的；荷兰式拍卖设定较高的起拍价，然后逐轮递减，直到有一个竞拍者应价。但随着运用范围扩大，拍卖已变得更加复杂，引发了经济学家更浓厚的兴趣。上世纪60年代，威廉·维克里（William Vickrey，1996年诺贝尔经济学奖得主之一）发展出了一套后来被称为拍卖理论的学说。他评估了竞拍者的最优策略，研究了不同拍卖形式的收益和效率。但维克里研究的拍卖案例范围比较狭窄，其中的每个竞拍者对拍卖品的估价互不相关。而实际上，人们对于拍卖品的估价往往取决于其他竞拍者或卖家的估价。各方都可能拥有关于拍卖品价值的私人信息，这些信息的线索会在拍卖过程中显现。

威尔逊从60年代开始分析这些案例。他首先研究拍卖品具有“共同价值”的情形：这一价值事先不确定，但最终对每个人都一样。例如拍卖蕴藏石油的地块：参与各方对该地块的估价可能各不相同，也许是因为对石油储量的估计不同。在这类情况下，中标者往往最后会发现，其他竞拍者出价较低是因为他们掌握了关于拍卖品共同价值的信息。这可能意味着中标者因为高估了拍卖品而出价过高，这种现象被称为“赢家诅咒”。

威尔逊在这方面的研究为分析更复杂的情况奠定了基础，即同时考虑对拍卖品共同价值的估计和竞拍者各自的私人估价。比如，一块油田的价值可能既取决于其石油储量，也要看每个竞拍者能以多低的成本开采这些石油。米尔格罗姆（威尔逊是他的博士论文导师）通过分析得出了许多重要经验。比起在过程中极少体现出私人所掌握信息的拍卖形式，能从竞拍者中探得更多私人信息的拍卖结构（如英式拍卖，参与者能观察到谁出价多少，谁放弃竞拍）更能减少“赢家诅咒”的问题。在某些情况下，为竞拍者提供更多有关拍卖品的信息也可能有利于卖方。

和罗斯帮助设计匹配肾脏捐赠者和患者的市场机制一样，米尔格罗姆和威尔逊也把理论研究成果应用于实践。在90年代初以前，美国政府用笨拙的方法把无线电频段分配给有意经营的电信公司：要么要求竞标方解释为何自己比对手更值得获得频段（并花费大量金钱游说），要么通过抽签分配。这都没有带来高效的配置。1993年，美国国会允许联邦通信委员会（FCC）改用拍卖形式分配。但当时大家都不清楚该怎么操作。竞拍者对频段用途的评估千差万别，而且一个被拍卖频段的价值往往取决于买家还控制着哪些频段。这两位诺奖得主与另一位经济学家普雷斯顿·迈克菲（Preston McAfee，现任职于谷歌）合作发明了一种新的拍卖形式——“同步多轮拍卖”（以下简称SMRA）。竞拍者可以在多轮竞拍中对所有标的出价，每轮竞拍后，有关竞拍和出价的部分信息会向所有竞拍者公开。美国政府在1994年首次采用SMRA拍卖频段，获得6.17亿美元，而此前它几乎没有从分配频段使用权上获得任何收益。

现在，许多国家都经常采用SMRA式拍卖，而且扩展到了分配无线电频段之外的更多领域，比如销售电力。米尔格罗姆和威尔逊继续致力于分配问题的研究，并发展出其他专门化的拍卖形式。他们成为工程师式经济学家的典型，利用理论为某个实际问题设计解决方案。瑞典皇家科学院似乎很欣赏这种做法。今年的诺贝尔经济学奖是自2007年以来第三次表彰“机制设计”，即运用经济学原理来设计市场以解决现实问题。

| 经济学家的境遇

把经济学当作一种工程学来研究使得米尔格罗姆和威尔逊比一般学者更投

入现实世界。两人都为监管机构和企业提供过咨询。2006年时代华纳和康卡斯特参与无线电频段竞拍时，米尔格罗姆做过它们的顾问，帮助它们节省了超过10亿美元。2009年，他联合创办了一家名为Auctionomics的公司，为有意组织或参与拍卖（其中许多拍卖形式就是他和威尔逊设计的）的企业提供咨询服务。

这有别于许多抱负远大的经济学者对自己学术研究的设想。但两位诺奖得主在学术界及其他领域获得的奖励无疑彰显了经济学工程师所掌握的力量。 ■



Global housing

The house party returns

Booming residential-property prices spell trouble for the social contract after the pandemic

STOCKMARKETS HAVE not had a good September, but their strength for the year as a whole remains a source of wonderment. Less noticed has been the equally remarkable buoyancy of another asset class: housing. Many rich countries are seeing house prices surge even as their rate of infections is rising for a second time. In the second quarter, although economies were under lockdown, house prices rose in eight out of ten high- and middle-income countries. According to unofficial series—which are timelier though less accurate than government data—America's house prices are up 5% on a year ago. Germany's are 11% higher. Britain's hit an all-time high, in nominal terms, in August. The boom shares some causes with the strength of stockmarkets, but reveals more about the pandemic's effect on economies. It is also more consequential.

Like stocks, house prices are being supported by loose monetary policy. In the past year the rate at which Americans can obtain 30-year fixed-rate mortgages has fallen by roughly a quarter, to about 2.9%. As well as making monthly mortgage payments more affordable, low rates make houses more attractive, because they depress the returns on alternative safe investments. Other economic policies are also helping. Mass government support for household incomes, as well as mortgage-repayment holidays, have saved jobless workers from having to sell their homes, as they otherwise might. Britain has temporarily suspended stamp duty, a tax on buying houses.

The house-price boom is not just a result of policy, however. Structural forces are at work, too. Job losses this year have been concentrated among

low-paid service-sector workers, who are more likely to rent than buy. Professionals who have carried on working from home but cut back on their spending have accumulated cash to splash—and, with time spent at home rising, what better moment to buy a bigger pad? The unequal effects of the pandemic have allowed prices to surge even as banks have curtailed their riskiest loans. In America the share of lending going to the most creditworthy borrowers has been growing. In Britain the boom seems to be being driven by a bidding war among existing homeowners, rather than by first-time buyers who, because they are younger, are more exposed to the economic downturn.

Housing is a bigger asset class than equities and its ownership is more dispersed. Booming stockmarkets lead to grumbles about the growing riches of billionaires. Pricey houses make life tangibly harder for swathes of would-be homebuyers who struggle to raise the minimum down-payment necessary to get a mortgage and join the club that can benefit from low rates. The problem is most acute in countries that see home ownership as a rite of passage. In such places high prices drive young people towards leftist populists and threaten the social contract. It is reasonable to hope that the trend towards working from home will help ease the housing shortages around the most vibrant cities, which have been most economically damaging. Yet so far this is not apparent in prices.

Perhaps the boom will cool as government support for the economy falls. However, the effect of the pandemic on long-term interest rates is unlikely to change; nor is the desire for roomier homes. Higher house prices could turn out to be an enduring legacy of covid-19. If so, in the 2020s they will deepen the intergenerational tensions that were already emerging in the 2010s. The fact that the economic costs of fighting the disease are mostly being borne by the young mostly to protect the lives of the elderly makes the problem knottier still.

In the 2010s politicians failed to get to grips with high house prices. They often responded to them by further subsidising home-buying. They should indeed cut stamp duty, which distorts the market, as much as possible. But it is futile to fight long-term price rises caused by low rates and shifts in households' preferences. Rather, governments should cease to indulge national obsessions with owning property.

That means creating a well-regulated rental sector which offers security of tenancy, removing subsidies for owner-occupation and easing planning restrictions to the point where housing no longer looks like a magic money tree accessible only to those fortunate enough to start out with pots of cash. Taxes on property values—and ideally on land values—should also rise. Such levies are an efficient way of plugging budget shortfalls. They would also recoup some of the windfall gains that lucky homeowners have enjoyed.

To the extent that robust house-price growth represents confidence in the prospects for an economic recovery, it is welcome. But in no other context would the contrast between asset prices and the present condition of labour markets cause as much discomfort for those who are missing the party. ■



【首文】全球房市

再开新居派对

房价上涨可能给疫情后的社会契约带来麻烦

股市在9月的表现不太好，但今年的整体势头仍令人惊叹。另一类资产同样表现出众，却不那么引人注目，那就是房产。许多富裕国家的新冠病毒感染率再次回升之际，房价也在飙升。第二季度尽管各个经济体陷入封城状态，但十个高收入和中等收入国家中有八个的房价在涨。根据非官方数据（虽然没有政府数据准确，但更及时），美国的房价较上一年上涨了5%。德国上涨了11%。以名义价值计算，英国房价在8月创下历史新高。房市繁荣与股市强劲有一些相同的原因，但房价上涨更能揭示疫情对经济的影响。它的后果也更重大。

和股票一样，房价也受到宽松的货币政策支撑。去年，美国人能申请到的30年期固定利率抵押贷款的利率下降了约四分之一，至2.9%。低利率不仅让月供更易负担，也让房产更具吸引力，因为它们压低了其他安全投资的回报。其他经济政策也起了作用。政府大手笔补助家庭收入，又允许延期偿付贷款，让失业者免于被迫卖房。英国已经暂停征收购房印花税。

不过，房价飙升不仅仅是政策的结果。结构性力量也在起作用。今年的失业主要集中在低收入的服务业劳动者，他们更有可能是租房子住而不是买房。那些改换成在家中继续工作但减少了开支的专业人士则积攒了可大笔支出的现金——而且既然在家的时间增多了，现在不买个更大的住所，更待何时？尽管银行已经缩减了风险最高的贷款，疫情带来的不均衡影响还是令房价飙升。在美国，流向信誉最好的借款人的贷款份额一直在增长。在英国，推动房地产市场的繁荣似乎是有房人士而非首次购房者之间的竞价战，因为后者更年轻，更容易受到经济低迷的影响。

住房这个资产类别比股票更大，所有权也更分散。股票市场的繁荣引来人们抱怨亿万富翁财富增长。对于大量想买房的人来说，高房价让他们的生活切实地变得更难了，他们难以凑齐最低首付以获得房贷，加入能享受低

利率的房主俱乐部。这个问题在把拥有住房视为人生大事的国家最为尖锐。高房价将那里的年轻人推向左翼民粹主义者，危及社会契约。有些人希望居家办公的趋势有助于缓解最具活力的城市里住房短缺的问题——这个问题带来了最严重的经济损害。这种期望合乎情理，不过到目前为止，它在房价上体现得还不明显。

随着政府对经济支持力度的下降，房市繁荣可能会降温。然而，疫情对长期利率的影响不太可能改变，人们对更宽敞的住房的渴望也不会。高房价可能会成为新冠肺炎的一个长期后遗症。如果是这样，2020年代的高房价会加剧在2010年代就已出现的代际矛盾。而让问题变得更加棘手的是这样一个事实：抗击新冠的经济成本主要由年轻人承担，却主要是为了保护老年人的生命。

在2010年代，政客们没能控制住高房价。他们对高房价的应对方法往往是继续发放购房补贴。他们其实应该尽可能地降低扭曲市场的印花税。但是，对抗由低利率和家庭偏好变化引起的长期房价上涨是徒劳的。相反，政府应该停止纵容国民对拥有房产的执迷。

这意味着要创建一个提供租赁保障的监管良好的租房部门，取消对业主自住的补贴，放宽规划限制，让住房不再像一棵神奇的摇钱树，只有那些一开始就拥有大笔现金的幸运儿才能得到。房产税，最好还有土地税，也应该提高。这些税收是填补预算不足的有效方法，也可以收回幸运的房主所享受的部分意外之财。

如果强劲的房价增长反映了对经济复苏前景的信心，倒还算是好事。但在其他任何情况下，资产价格与劳动力市场现状之间的反差都不会像现在这样，让那些错过了这场派对的人如此不适。■



The future of finance

The digital surge

Thanks to covid-19 more people than ever are banking and paying online. The bonanza will reshape finance

IN 2012 DAVID VÉLEZ tried to open a bank account in Brazil. “It was like going to prison,” he says. He was ordered to leave his belongings in a locker before walking through bulletproof doors. After waiting an hour, he faced a barrage of questions from a hostile manager. It took five months for him to be offered a bare-bones account costing him hundreds of dollars a year and a credit card charging an annualised interest rate of 400%. The next year, in the hope of eroding Brazil’s crusty banking oligopoly, he founded Nubank, a digital lender. By early 2020 the bank was valued at \$10bn.

Then the pandemic came—and business really took off. This year alone the number of accounts at Nubank has risen by 50%, taking the total to 30m. In June it partnered with WhatsApp, which has 120m users in Brazil, to offer payments through the messaging service. In September it bought Easynvest, a digital broker, and launched operations in Colombia. In November Brazil will implement Open Banking, a reform that will give fintechs access to data held by banks, fund managers and insurers. All this, says Mr Vélez, is just the beginning of the digital revolution: “it is only the first second of the first half of the game.”

Just as a digital surge brought on by the pandemic is speeding up a transformation in retail and e-commerce, finance too is being reshaped. The shift from physical to digital payments this year has been dramatic. Pundits canvassed by *The Economist* reckon that the share of cashless transactions worldwide has risen to levels they had expected it to reach in two to five years’ time. In America mobile-banking traffic rose by 85% and online-banking registrations by 200% in the month of April.

Some firms will cash in on the digital rush, while others will be left behind. Capital markets think a new era is dawning: conventional banks now account for only 72% of the total market value of the global banking and payments industry, down from 81% at the start of the year and 96% a decade ago (see chart 1). Fintech firms such as Ant Group and PayPal make up 11%: their market value has almost doubled this year to nearly \$900bn. Conventional non-bank payments firms such as Visa are booming, too, and make up the other 17% of the industry total.

Digitisation may spell the end of the dinosaurs in some industries, such as entertainment or retail. But in finance they seem likely to live on. Banks are well entrenched, albeit to different degrees in different places. Regulators, the gods of their ecosystem, are unwilling to let them die off. So the new and old will coexist, with the precise features of the hybrid system varying from place to place.

The acceleration in digitisation is most visible in payments. Although the crisis has led to an increase in physical cash held by the public, its pace of circulation has fallen, suggesting people are hoarding rather than spending banknotes. Card payments, by contrast, have kept growing. That is partly thanks to the boom in online shopping, which has itself leapt forward by several years. But it also reflects the efforts of brick-and-mortar shops to reach customers online. In the spring Stripe, a firm that powers payments, helped the centuries-old farmers' market in Paris set up virtual checkouts in place of physical ones, says John Collison, its president. Food-order volumes processed by Marqeta, a payments firm that works with many of America's restaurant-delivery firms, tripled between March and mid-April.

Shops have reopened, but people are sticking to plastic. Governments in 31 countries have helped by raising limits on contactless payments (and card firms are lobbying for even higher ceilings). Those at Visa and Mastercard, two card networks that account for 94% of transactions processed outside

of China, surged by over 40% in the first quarter of 2020, compared with the same period in 2019. Square, which helps small businesses accept credit-card payments, saw its share of fully cashless clients in America jump from 5% in February to 23% in April; it has since stabilised at 14%. In Britain the share now stands at 37% (see chart 3).

| *All change*

The shift goes beyond cards. Hiroki Takeuchi of GoCardless, which helps companies collect payments from bank accounts, says many membership businesses like gyms took the opportunity of shutdowns to upgrade from cash registers to direct debits. Consumers are using peer-to-peer (P2P) services to send money to relatives or buy fitness classes online. Payments processed in America by Venmo, a P2P firm, grew by 50% year-on-year in the second quarter.

Outside the West, mobile wallets, with which you can pay after loading money on to your phone, were becoming commonplace even before the pandemic. The virus has given them a leg up. A third of Singapore's 18,000 street hawkers let consumers pay by scanning a QR code in July, a boost of over 50% in just two months. Many governments in Africa declared these wallets essential services and banned transfer fees. Amounts held in M-PESA, a mobile-money service ubiquitous in Kenya, rose by a fifth in the month of May alone.

Digitisation is also racing ahead in other areas of finance. As millions of households received stimulus cheques and furlough payments, many took to betting on stocks from their sofas using zero-fee e-brokers. Keith Denerstein of TD Ameritrade, one such broker, says customers worldwide have opened 50% more accounts in 2020 than in its best full year. Meanwhile insurers that relied on agents to sell policies have learnt to do without. Sachin Shah, who runs the Asian unit of Manulife, says 97% of its products can now be bought online.

Banking—the core of retail finance—has not been immune to change. Western lenders report surging connections to their apps and digital sales. Adoption is even faster in emerging markets, reflecting a lower starting point. José Antonio Álvarez, chief executive of Santander, a Spanish banking group that spans three continents, says the use of its digital channels rose by 20% in Europe, 30% in South America and 50% in Mexico in the first half of the year, compared with the first half of 2019.

Digital finance, already a force for inclusion, has brought yet more people into the banking system in recent months. In April DBS, Singapore's biggest lender, opened 40,000 accounts for migrants in a weekend so that they could send money home digitally. Brazil's government, which has extended aid to 60m people, is increasingly using the mobile route to reach citizens in the Amazon. Joshua Oigara, the boss of KCB, Kenya's largest bank, says the number of customers using its app has doubled since covid-19 struck. These moved 35bn shillings (\$329m) from their mobile wallets to bank accounts in June—six times more than in January.

These changes in behaviour seem likely to stick. Many customers were unfamiliar with the technology before the pandemic—and surveys suggest they like it. In April nearly a fifth of American adults used digital payments for the first time, reckons Forrester, a research firm. Since February Nubank has gained 30,000 users over the age of 60 every month. In a global survey Bain, a consultancy, found that 95% of consumers plan to use digital banking post-pandemic. And banks, which had already been planning to shrink their physical footprint, are closing branches more quickly than they had envisaged. Brazilian lenders have shut down 1,500 this year, 7% of the total stock. Those in Europe are planning to slash 2,500 branches. Banks will strive to keep the everyday business online, with branches that stay open often being revamped to provide “high-value” services such as advice, says Allison Beer of JPMorgan Chase, America's biggest lender.

| *The law of the bundle*

In the middle of the digital rush, a new business model is emerging—and new entrants are being drawn in. Banks, e-commerce sites, fintechs, social networks, taxi apps and telecoms firms are all vying to become “platforms”—marketplaces through which users can buy a range of financial products made in-house or by third parties. “Everybody is trying to become the home page,” says Tara Reeves of Omers Ventures, the venture-capital arm of Canada’s municipal-pension fund. Grab, a ride-hailing app in Singapore that has grown into the country’s most popular mobile wallet, has over 60 tie-ups with banks, insurers and other financial firms. Reuben Lai, who runs its finance arm, says it wants “to be a one-stop platform” that fulfils South-East Asians’ financial needs.

Investors reckon that “embedded finance”—the integration of credit, insurance and investment into non-financial apps or websites—could in time become as valuable as payment services are today. Both banks and fintechs are therefore racing to integrate the services they offer. In September Yandex, Russia’s leading web-search and ride-hailing app, said it would buy the country’s largest digital bank. A week later Sberbank, Russia’s top lender, dropped “bank” from its name in order to rebrand itself as a tech firm dabbling in food delivery and telemedicine. Peter Ndegwa, who runs Safaricom, a Kenyan telecoms firm and M-PESA’s main owner, wants the service to become a “lifestyle brand” offering overdrafts, loans, wealth management and insurance.

The main attraction of the new model is money. As rising competition and, in the rich world, low and falling interest rates reduce lending margins, banks need to diversify. Tech-based challengers, for their part, want to increase the stickiness of their apps so they can sell more of their core products, or take a cut of the financial wares they distribute for others. As physical branches become irrelevant, finance is exposed to the same network economics that have upended other sectors. Huw van Steenis of

UBS, a bank, thinks the pandemic is accelerating a “winner-takes-most” dynamic, where popular platforms attract exponentially more traffic.

Much of the gains could come from the ability to merge and exploit data long siloed within different financial services. Armed with a full picture of users’ behaviour, firms hope to use algorithms that spit out tips on, say, how to save for a dream house. That will make the platforms even stickier and allow them, in turn, to recommend yet more products. Backbase, a fintech that designs digital-banking software for incumbents, is also working on such wizardry. “The more people share their daily lives with you, the more you can give them these additional benefits,” says Jouk Pleiter, its boss.

| *Many zeros, and many ones*

Though it has obliterated incumbents in other industries, Big Tech has contented itself with skirting around the margins of finance. Apple has launched a credit card with Goldman Sachs, and a payment tool. Facebook’s payments efforts have made little headway. The number of American e-commerce sites that use Amazon’s checkout button is rising only slowly, says Lisa Ellis of MoffettNathanson, a research firm. Google has teamed up with banks to offer current and saving accounts; in India, where its payment app is dominant, it doles out instant loans to shoppers. But Diana Layfield, a payments executive at Google, is adamant that it does not want to become “a grand unifying platform”. (That may be because it is eyeing a juicier market. The financial industry, at first slow to move data to the cloud, is becoming keener to do so. That will most benefit: Alibaba, Ant’s former parent group; Amazon; Google; and Microsoft.)

Where does all this leave banks? Many fintechs, with their shinier apps and better risk analytics, certainly have an edge over them. But these firms are not trying to usurp lenders. This is because banking is made of two parts, says Miklós Dietz of McKinsey, a consultancy. “Core banking”—heavily

regulated, capital-intensive activities such as running a balance-sheet—makes \$3trn in revenue worldwide, and returns on equity (ROE) of 5-6%. By contrast, freer-wheeling lines of business, such as payments or product distribution, yield \$2.5trn in sales but ROEs of 20%. Fintechs are after the tasty bits. But for this, they need banks to stay alive.

To see how coexistence might work, look to China. The duopoly of Tencent and Ant use powerful algorithms to price and distribute a fast-growing portion of the loans made to consumers and small firms in the country. Yet the products they sell are held on banks' balance-sheets. Despite the hefty cut they take—gobbling up a big chunk of the lenders' profit—banks still accept the deal, because they crave access.

But coexistence will take varied forms across the world. Some banks may be better suited to the new world of tech than others, itself a function of the state of banks today. Dirk Vater of Bain sees a strong link between a bank's digital performance and how badly it was hit by the financial crisis of 2007-09. European banks, burdened by dud loans and low interest rates, spent the 2010s cutting costs rather than investing in transformation. Their apps can do little. By contrast the Commonwealth Bank of Australia, based in a country unscathed by the financial crisis, has built an app that has won plaudits for offering Netflix-like personalised service. It notifies users when bills are due and advises them on their tax returns. Piyush Gupta, DBS's boss, says it spent the past few months plugging "last-mile" gaps so that complex products, such as mortgages, can be sold online.

| *Cheques and balances*

Regulation will also determine how much tech firms can prise away from the banks. China long let them roam free (though it has recently clawed back some of that liberty to protect the banks). At the other extreme, America has shielded banks and credit-card firms the most, by being slow to build fast-payment pipes and making it hard to gain digital-banking

licences. It has left it to the market to decide when data should be shared, and at what price. Europe and many emerging markets are somewhere in the middle. These have tried to instil competition by allowing data to flow. Some version of Open Banking will soon be in force in 51 countries, ranging from Malaysia to Mexico.

Bring these initial conditions together, and you start to see why certain financial systems are where they are today, and where they might end up. America is at stage zero. Customers are locked into sticky credit-card schemes funded by extortionate levies on merchants. Tech firms must rely on creaky financial plumbing run by well-protected incumbent banks.

At the next stage, banks would still run the infrastructure, but payments and other non-core tasks would be open to new entrants. European fintechs, for example, can initiate transfers but they still move money between bank accounts. In Sweden they originate 60% of consumer loans.

At stage two, payments would routinely cut out the incumbents—like, for instance, the flows between Africa’s mobile wallets, which do not transit through banks. But most other financial services would still involve them. Stage three is the realm of “super-apps” like Grab and Gojek in South-East Asia, which started as ride-hailing services, or Mercado Pago, the financial arm of MercadoLibre, Latin America’s largest e-commerce site. These want to become financial supermarkets that offer a range of products mostly manufactured by others. The most advanced incarnations of these are the super-apps in China.

For as long as regulators are determined to keep banks alive, stage four, where non-banks dominate both the production and distribution of financial services, will probably never come to be. With so many countries so far off the frontier, though, this hardly rules out dramatic change over the years ahead. ■



金融业的未来

数字巨浪

疫情推动空前人流使用线上银行业务和支付。这一热潮将重塑金融业

二〇一二年，大卫·贝莱斯（David Vélez）想在巴西开个银行账户。“就像进监狱一样。”他说。工作人员要求他在通过防弹门之前把随身物品放进储物柜。等了一个小时后，一名凶巴巴的经理连珠炮似地向他提了一堆问题。他花了五个月的时间才获得一个年费好几百美元的最基本账户和一张年化利率为400%的信用卡。第二年，他创建了数字银行Nubank，希望借此削弱巴西银行业顽固的寡头垄断。2020年初，这家银行的估值达到了100亿美元。

之后，新冠疫情爆发，它的业务大受欢迎。仅今年，Nubank的账户数量就增长了50%，总数达到3000万。6月，它与在巴西拥有1.2亿用户的WhatsApp合作，通过这款通信服务提供支付服务。9月，它收购了数字经纪平台Easynvest，并在哥伦比亚启动业务。11月，巴西将实施“开放银行业”改革，届时金融科技企业可以获得银行、基金管理公司和保险公司掌握的数据。贝莱斯表示，所有这些仅仅是这场数字革命的开始：“比赛上半场才刚刚开始。”

正如疫情带来的数字浪潮加速了零售业和电子商务的转型，金融业也在被重塑。今年，由现金支付到数字支付的转变非常急剧。接受本刊调查的专家们认为，如今全球无现金交易的份额已经增长到他们先前预计在二至五年后才会达到的水平。美国在4月间移动银行业务量增长了85%，网上银行注册量增长了200%。

一些公司会从这场数字洪流中获利，另一些则会被甩在后面。资本市场认为一个新时代正在开启：传统银行如今只占全球银行和支付业总市值的72%，而今年年初这一比例还在81%，10年前为96%（见图表1）。蚂蚁集团和PayPal等金融科技公司目前占11%：今年它们的市值几乎翻了一番，接近9000亿美元。Visa等传统的非银行支付公司也在迅猛发展，它们占了

行业总市值另外17%的份额。

在娱乐或零售等行业，数字化可能会让“恐龙”们寿终正寝。但在金融业，它们似乎可以继续活下去。银行的地位很稳固，尽管其程度因地而异。堪称银行生态系统的上帝的监管机构不愿意让它们灭绝。因此，新旧势力会共存，而这一混合系统在不同地方会呈现出不同的特征。

数字化的加速在支付领域最为明显。尽管新冠危机让民众持有的现金增加了，但它的流通速度却下降了，这表明人们都把现金收着，不花出去。与之相比，银行卡支付在持续增长。这在一定程度上要归功于几年前就已发展迅猛的网购的激增。但它同时也反映了实体店在努力扩展线上顾客。支付服务公司Stripe的总裁约翰·科里森（John Collison）表示，今年春天，公司帮助巴黎一个几百年历史的农贸市场建立了虚拟收银台，取代了实体收银台。3月到4月中旬，与许多美国送餐公司合作的支付公司Marqeta处理的餐饮订单量增加了两倍。

商店已经重新开业，但人们还在使用银行卡。31个国家的政府提高了非接触式支付的限额，这起到了促进作用（支付卡公司正在游说进一步抬高上限）。中国以外的交易有多达94%是由Visa和万事达这两个支付卡网络处理的。2020年第一季度，它们的交易额比2019年同期大增超过40%。Square帮助小企业接受信用卡支付，它在美国的完全不使用现金的客户比例从2月的5%跃升至4月的23%，此后稳定在14%，它在英国的这一比例目前为37%（见图表3）。

| 万物皆变

这种转变不限于银行卡。帮助企业从银行账户收款的GoCardless公司的竹内裕木表示，健身房等很多会员制企业都趁着歇业把自己的现金收银机升级到直接借记。消费者正在使用点对点（P2P）服务向亲属汇款或者购买在线健身课程。在美国，P2P公司Venmo处理的支付业务在第二季度同比增长了50%。

在西方国家以外的地方，向手机充钱用于支付的移动钱包早在疫情爆发之

前就已司空见惯。新冠病毒更是助了它们一臂之力。在新加坡1.8万名街头小贩中，接受消费者扫二维码付款的比例在7月达到三分之一，短短两个月增长了50%以上。许多非洲国家的政府宣称移动钱包是必不可少的服务，禁止收取转账费。M-PESA是肯尼亚广泛使用的移动支付服务，其中存有的资金仅在5月一个月里就增长了五分之一。

数字化还在金融的其他领域快速发展。在千百万家庭收到经济刺激支票和停职补贴后，很多人开始躺在沙发上通过免佣金的电子经纪商押注股票。TD Ameritrade就是这样一家经纪商，该公司的基思·德纳斯坦（Keith Denerstein）表示，2020年公司全球客户开设的账户比业绩最好的年份的一整年还要多50%。与此同时，过去依赖代理人销售保单的保险公司也学会了绕过他们。宏利保险（Manulife）亚洲区的负责人萨钦·沙阿（Sachin Shah）表示，现在公司97%的产品都可以在网上购买。

作为零售金融核心的银行业也未能免于改变。西方多家银行都报告自己的应用的注册数和数字销售额激增。在新兴市场，人们接纳的速度还要更快，反映出更低的起点。业务横跨三大洲的西班牙银行集团桑坦德银行（Santander）的总裁何塞·安东尼奥·阿尔瓦雷斯（José Antonio Álvarez）表示，今年上半年，该银行数字渠道的业务量在欧洲、南美洲和墨西哥分别比2019年同期增长了20%、30%和50%。

本就已扩大了金融覆盖人群的数字金融近几个月来又把更多人纳入了银行系统。新加坡最大的银行星展银行（DBS）在4月的一个周末就为客工开设了四万个账户，让他们可以通过数字方式向家里汇款。已向六千万人提供了援助的巴西政府现在正越来越多地使用移动支付的方式继续向亚马逊地区的居民提供援助。肯尼亚最大的银行肯尼亚商业银行（KCB）的行长约书亚·沃加拉（Joshua Oigara）表示，自新冠肺炎爆发以来，它的应用的用户数翻了一番。6月，这些用户将350亿先令（3.29亿美元）从移动钱包转移到了银行账户，比1月时多六倍。

这些行为上的变化似乎会成为常态。疫情爆发前很多客户并不熟悉数字支付技术，而调查显示他们喜欢这种方式。据研究公司Forrester估计，4

月，近五分之一的美国成年人首次使用了数字支付。自2月以来，Nubank每月新增三万名60岁以上用户。咨询公司贝恩的一项全球调查发现，95%的消费者计划在疫情之后使用数字银行业务。而早就在计划缩减网点的银行现在正以比自己预想更快的速度关闭分支机构。巴西的银行今年关闭了1500家分行，占其总数的7%。欧洲的银行正计划削减2500家分行。美国最大的银行摩根大通的艾莉森·比尔（Allison Beer）表示，银行将努力在线上维持日常业务，而那些继续线下营业的分行往往会转型以提供咨询等“高价值”服务。

| 捆绑定律

在这场数字化洪流中，一种新的商业模式正在兴起，新进入者也正被吸引进来。银行、电子商务网站、金融科技公司、社交网络、网约车应用以及电信公司都在争相成为“平台”——用户可以从这里购买它们自己或第三方开发的一系列金融产品。“人人都想成为主页。”加拿大市级养老基金Omers的风险投资部门Omers Ventures的塔拉·里夫斯（Tara Reeves）说。新加坡的网约车应用Grab已发展成该国用户最多的移动钱包，与60多家银行、保险公司以及其他金融机构建立了合作。该公司金融部门的负责人鲁本·赖（Reuben Lai）表示，它希望“成为一站式平台”，满足东南亚人的各种金融需求。

投资者认为，“嵌入式金融”——把信贷、保险和投资整合到非金融应用或网站中——迟早会像今天的支付服务一样有价值。银行和金融科技公司为此都在竞相整合自己提供的服务。9月，俄罗斯的网页搜索和网约车主导应用Yandex表示将收购该国最大的数字银行。一周后，俄罗斯最大的银行联邦储蓄银行（Sberbank）去掉了名字中的“银行”一词，希望把自己重塑为一家涉足外卖和远程医疗的科技公司。控股M-PESA的肯尼亚电信公司Safaricom的老板彼得·恩代格瓦（Peter Ndegwa）想把M-PESA发展成一个提供透支、贷款、理财和保险的“生活方式品牌”。

这种新模式的主要吸引力是钱。竞争加剧和富裕国家不断走低的利率导致贷款利润下降，银行因而需要多样化经营。而对立足科技的银行挑战者来说，它们希望增加自家应用的黏性，从而可以销售更多的核心产品，或者

从为他人分销的金融产品中分得一杯羹。随着实体分支变得不再重要，金融业也和其他行业一样面临着被网络经济颠覆的命运。瑞银集团（UBS）的休·范斯蒂尼斯（Huw van Steenis）认为，新冠疫情正在加快“赢家吃最多”的态势，受欢迎的平台吸引的流量会呈指数级增长。

新模式的不少收益可能来自把长期孤立存在于各类金融服务中的数据整合和利用起来的能力。有了对用户行为的全面了解，企业希望能够利用算法给出一些建议，比如如何存钱买一套梦想中的房子。这又会进一步增加平台的黏性，继而也能让它们推荐更多的产品。为传统银行设计数字银行业务软件的金融科技公司Backbase也在追求这样的神奇伟业。“人们和你分享的日常生活越多，你能给他们的这些额外好处就越多。”其老板约科·普莱特（Jouk Pleiter）说。

| 许多还是0，许多已是1

在其他行业，科技巨头已经断了许多老企业的活路，但在金融业里它们却满足于在边缘游走。苹果与高盛合作推出了一款信用卡，还推出了自己的支付工具。Facebook在支付上的努力无甚进展。研究公司MoffettNathanson的丽莎·埃利斯（Lisa Ellis）表示，使用亚马逊支付按钮的美国电子商务网站的数量增长缓慢。谷歌已与多家银行合作提供活期存款和储蓄账户；在印度，谷歌的支付应用一家独大，可向购物者发放即时贷款。但谷歌支付部门的高管黛安娜·莱菲尔德（Diana Layfield）坚称谷歌不想成为“一体化的大平台”。（这可能是因为它盯上了一个更有利可图的市场。金融业最初迟迟不愿把数据转移到云端，现在越来越热衷于此。这一块最大的受益者将是蚂蚁集团的前母公司阿里巴巴、亚马逊、谷歌和微软。）

这一切会给银行造成什么后果呢？许多金融科技公司拥有更酷炫的应用和更胜一筹的风险分析，无疑比银行更有优势。但这些公司并不想篡夺银行的地位。咨询公司麦肯锡的米克洛什·迪茨（Miklós Dietz）表示，这是因为银行业务由两部分组成。“银行核心业务”是受严格监管的资本密集型活动，比如管理资产负债表，在全球范围内创造了3万亿美元的收入，股本回报率（ROE）为5%至6%。相比而言，支付或产品分销等监管相对宽

松的业务的销售额为2.5万亿美元，ROE却高达20%。金融科技公司瞄准的是后者这块肥肉。然而要得偿所愿，它们需要银行活下去。

要了解它们如何可能共存，不妨看看中国。腾讯和蚂蚁集团的双头垄断运用强大的算法来定价和分销对该国消费者和小企业的贷款中迅速扩大的一块。然而，它们销售的产品都记在银行的资产负债表上。尽管它们从中抽取了可观的收益——吞掉了银行的一大块利润——银行还是接受了这一交易，因为它们渴望进入这一领域。

但世界各地的共存方式会形态各异。一些银行可能比另一些更适合这个科技新世界，而这个新世界本身又取决于银行的现状。贝恩公司的德克·法特（Dirk Vater）发现，一家银行的数字业务的表现与它在2007至2009年金融危机中受冲击的程度具有强关联性。受不良贷款和低利率的影响，过去十年里欧洲银行都在想法设法削减成本，而不是把资金投入转型上。它们的应用乏善可陈。相比之下，总部位于避过金融危机重创的澳大利亚的澳洲联邦银行（Commonwealth Bank of Australia）开发的一款应用提供类似奈飞（Netflix）的个性化服务，赢得了赞誉。它会在账单快到期时通知用户，并向用户提供纳税申报方面的建议。星展银行的老板皮尤什·古普塔（Piyush Gupta）表示，过去几个月该行一直在填补“最后一英里”的缺口，以实现在网上销售抵押贷款等复杂产品。

| 金融制衡

科技公司能从银行手里撬走多少利润还取决于监管。长期以来，中国对科技公司放任自流（尽管近来为了保护银行而对它们有所约束）。美国是另一个极端，它对银行和信用卡公司的保护最多，迟迟不愿创建快速支付渠道，也不轻易发放数字银行业务牌照。它留给市场去决定何时以及以什么价格分享数据。欧洲和许多新兴市场的做法介于两者中间。它们已经开始尝试通过允许数据流动来逐步引入竞争。巴西“开放银行业”的各种版本将很快在从马来西亚到墨西哥等51个国家实施。

把这些初始条件综合在一起，就会明白为什么有些金融体系会是今天这个样子，以及它们可能的结局。美国还处在未起步的阶段。消费者被高粘度

的信用卡计划套牢，这些计划的资金来自向商家收取的高昂费用。科技公司必须依赖由受特别保护的银行运营的传统金融管道。

到下一阶段，银行仍将负责基础设施的运营，但支付和其他非核心业务将会向新进入者开放。例如，欧洲的金融科技公司可以发起转账，但仍是在各银行账户之间转移资金。在瑞典，60%的消费贷款都由金融科技公司发放。

在第二阶段，支付通常会绕过传统银行。比如，像非洲的移动钱包之间的资金流动就不通过银行中转。但大多数其他的金融服务仍会有银行的参与。第三阶段则是“超级应用”的天下，比如东南亚以网约车服务起家的Grab和Gojek，或者拉丁美洲最大的电子商务网站MercadoLibre的金融部门Mercado Pago。它们希望成为提供多种产品的金融超市，这些产品大多由其他公司开发。其中最先进的典型是中国的超级应用。

只要监管机构决心让银行存活下去，第四阶段，也就是非银行机构同时主导金融服务的产品开发 and 分销的局面，就可能永远不会出现。不过，鉴于太多国家距离这一前沿阶段还遥不可及，因此很难说未来几年不会出现重大变化。■



The economy after covid-19

Winners and losers

The pandemic has created big performance disparities between the world's economies. They could get even larger

IN FEBRUARY THE coronavirus pandemic struck the world economy with the biggest shock since the second world war. Lockdowns and a slump in consumer spending led to a labour-market implosion in which the equivalent of nearly 500m full-time jobs disappeared almost overnight. World trade shuddered as factories shut down and countries closed their borders. An even deeper economic catastrophe was avoided thanks only to unprecedented interventions in financial markets by central banks, government aid to workers and failing firms, and the expansion of budget deficits to near-wartime levels.

The crash was synchronised. As a recovery takes place, however, huge gaps between the performance of countries are opening up—which could yet recast the world's economic order. By the end of next year, according to forecasts by the OECD, America's economy will be the same size as it was in 2019 but China's will be 10% larger. Europe will still languish beneath its pre-pandemic level of output and could do so for several years—a fate it may share with Japan, which is suffering a demographic squeeze. It is not just the biggest economic blocs that are growing at different speeds. In the second quarter of this year, according to UBS, a bank, the distribution of growth rates across 50 economies was at its widest for at least 40 years.

The variation is the result of differences between countries. Most important is the spread of the disease. China has all but stopped it while Europe, and perhaps soon America, is battling a costly second wave. Over the past week Paris has closed its bars and Madrid has gone into partial lockdown. In China, meanwhile, you can now down sambuca shots in

nightclubs. Another difference is the pre-existing structure of economies. It is far easier to operate factories under social distancing than it is to run service-sector businesses that rely on face-to-face contact. Manufacturing makes up a bigger share of the economy in China than in any other big country. A third factor is the policy response. This is partly about size: America has injected more stimulus than Europe, including spending worth 12% of GDP and a 1.5 percentage point cut in short-term interest rates. But policy also includes how governments respond to the structural changes and creative destruction the pandemic is causing.

These adjustments will be immense. The pandemic will leave economies less globalised, more digitised and less equal. As they cut risks in their supply chains and harness automation, manufacturers will bring production closer to home. As office workers continue to work in their kitchens and bedrooms for at least part of the week, lower-paid workers who previously toiled as waiters, cleaners and sales assistants will need to find new jobs in the suburbs. Until they do, they could face long spells of unemployment. In America permanent job losses are mounting even as the headline unemployment rate falls.

As more activity moves online, business will become more dominated by firms with the most advanced intellectual property and the biggest repositories of data; this year's boom in technology stocks gives a sense of what is coming, as does the digital surge in the banking industry. And low real interest rates will keep asset prices high even if economies remain weak. This will widen the gulf between Wall Street and Main Street that emerged after the global financial crisis and which has worsened this year. The challenge for democratic governments will be to adapt to all these changes while maintaining popular consent for their policies and for free markets.

That is not a concern for China, which so far seems to be emerging from the

pandemic strongest—at least in the short run. Its economy has bounced back quickly. Later this month its leaders will agree on a new five-year plan which emphasises Xi Jinping's model of high-tech state capitalism and increasing self-sufficiency. Yet the virus has exposed longer-term flaws in China's economic apparatus. It has no safety-net worth the name and this year had to focus its stimulus on firms and infrastructure investment rather than shoring up household incomes. And in the long run its system of surveillance and state control, which made brutal lockdowns possible, is likely to impede the diffuse decision-making and free movement of people and ideas that sustain innovation and raise living standards.

Europe is the laggard. Its response to the pandemic risks ossifying economies there, rather than letting them adjust. In its five biggest economies, 5% of the labour force remains on short-work schemes in which the government pays them to await the return of jobs or hours that may never come back. In Britain the proportion is twice as high. Across the continent, suspended bankruptcy rules, tacit forbearance by banks and a flood of discretionary state aid risk prolonging the life of zombie firms that should be allowed to fail. This is all the more worrying given that, before the crisis, France and Germany were already embracing an industrial policy that promoted national champions. If Europe sees the pandemic as a further reason to nurture a cosy relationship between government and incumbent businesses, its long-term relative decline could accelerate.

The question-mark is America. For much of the year it got the policy balance roughly right. It provided a more generous safety-net for the jobless and a larger stimulus than might have been expected in the home of capitalism. Wisely, it also allowed the labour market to adjust and has shown less inclination than Europe to bail out firms that are in danger of becoming obsolete as the economy adjusts. Partly as a result, unlike Europe, America is already seeing the creation of many new jobs.

Instead America's weakness is toxic and divided politics. Earlier this month President Donald Trump seemed to ditch talks over renewing its stimulus, meaning that the economy could fall over a fiscal cliff. Critical reforms, whether to redesign the safety-net for a tech-driven economy or to put deficits on a sustainable course, are all but impossible while two warring tribes define compromise as weakness. Covid-19 is imposing a new economic reality. Every country will be called on to adapt, but America faces a daunting task. If it is to lead the post-pandemic world, it will have to reset its politics. ■



【首文】后疫情经济

赢家与输家

疫情使得全球经济体的表现呈现大差距。这种差异可能还会扩大

今年2月，新冠疫情对世界经济造成了二战以来最严重的冲击。封锁措施和消费骤减导致劳动力市场崩溃，相当于近五亿份全职工作几乎在一夜间消失。随着工厂停产和各国关闭边境，世界贸易也剧烈震动。多亏了各国央行以空前力度干预金融市场、政府资助工人和濒临倒闭的企业，以及将预算赤字扩大到接近战时水平，才得以避免了更深重的经济灾难。

经济崩盘在各地同步发生。然而，随着经济开始复苏，各国表现开始拉开巨大的差距，甚至可能会重塑世界经济秩序。据经合组织（OECD）预测，到明年年底，美国经济规模将恢复到2019年的水平，而中国会增长10%。欧洲仍将滞留在低于疫情前的产出水平，而且可能会持续好几年；背负着人口结构压力的日本可能也面临类似的命运。不仅是这些最大的经济体的增速存在差异。瑞银（UBS）的数据显示，今年第二季度，50个经济体的经济增速分布达到了至少40年来的最大宽度。

这种增速差异源自各国在多方面的差别。最重要的就是疫情蔓延的情况。中国几乎已经控制住了疫情，而欧洲却仍在应对代价高昂的第二波疫情，美国恐怕很快也会陷入这种境地。过去一周里，巴黎关闭了酒吧，马德里进入了部分封城状态。与此同时，在中国人们却已经可以去夜店畅饮桑布卡了。另一个差别是原有的经济结构。在保持社交距离的情况下，比起依赖面对面接触的服务业，运营工厂要容易得多。制造业在中国经济所占的比重高于任何其他大国。第三个因素是政策应对。这在一定程度上关乎规模：美国比欧洲推出了更多经济刺激措施，包括相当于GDP 12%的支出以及将短期利率下调了1.5个百分点。但政策还包括政府如何应对疫情带来的结构性变化和创造性破坏。

这些调整将是极广泛的。疫情将导致各个经济体的全球化程度降低、数字化程度提高、不平等程度加大。在降低供应链风险和利用自动化技术的过

程中，制造商会将生产搬迁到距离本土更近的地方。由于上班族每周仍至少会有一部分时间在厨房和卧室里工作，那些以前从事服务员、清洁工和售货员等工作的低收入劳动者将需要去郊区另谋生计。在找到新工作之前，他们可能会面临长时间的失业。在美国，整体失业率降低之时，永久流失的工作岗位仍在增加。

随着越来越多活动转移到网上，拥有最先进的知识产权和最庞大的数据库的公司将日益主宰商业世界，今年科技股的繁荣以及银行业的数字化浪潮都预示着未来的趋势。同时，即使经济依然疲软，实际利率低迷仍使资产价格居高不下。这将进一步拉大华尔街和普罗大众之间的鸿沟，这种鸿沟在全球金融危机后出现，在今年进一步恶化。民主政府面临的挑战就是如何适应所有这些变化，同时能保持公众对其政策和自由市场的认同。

中国则没有这方面的顾虑，它从这场疫情中的复苏势头目前看来最为强劲——至少在短期内是如此。中国经济已经迅速反弹。本月底，中国领导人将通过新的五年计划，其重点是加强习近平提出的高科技国家资本主义模式并提高自给自足的程度。然而，新冠病毒也暴露了中国的经济机制中存在的更长期的缺陷。中国并没有名副其实的安全网，今年不得不将刺激措施集中在支持企业和基础设施投资上，而不是支持居民收入。而且从长远来看，它的监视和国家控制体系——使其得以实施严格的封锁——很可能会阻碍分散化决策以及人员和思想的自由流动，这些又是保持创新和提高生活水平所需。

欧洲落在了后头。它应对疫情的措施有可能使本地经济陷入僵化，而不是让经济顺应变化做出调整。在欧洲五大经济体中，5%的劳动力仍然通过短时工作计划由政府支付薪资，等待着那些可能永远无法恢复的工作岗位或工作时间。在英国，这个比例还要再高一倍。在整个欧洲大陆，暂停执行的破产规则、银行心照不宣的容忍，以及大量自由裁量支配的国家援助，都有可能让本应任其倒闭的僵尸企业继续苟延残喘。更令人担忧的是，法国和德国在危机爆发之前就已经在推行促进本国龙头企业发展的产业政策。如果欧洲视本次疫情为又一个理由来进一步巩固政府与既有企业的密切关系，那么它相对衰落的长期趋势可能还会加剧。

美国的情况要打个问号。在今年大部分时间里，美国大致做到了政策平衡。它为失业者提供了更慷慨的安全网，推出的经济刺激规模超过了人们对这个资本主义大本营原本会有的预期。它很明智的做法是同时任由劳动力市场自行调整，而不像欧洲那么倾向于救助那些在经济调整中濒临淘汰的公司。这在一定程度上已经令美国涌现出许多新的工作岗位，与欧洲形成反差。

美国的软肋是有害和分裂的政治局面。本月稍早时，总统特朗普似乎放弃了对新一轮经济刺激方案的谈判，这意味着美国经济可能会跌落财政悬崖。关键的改革——无论是为科技型经济重新设计社会安全网，还是让赤字走上可持续的道路——几乎都不可能实现，因为在针锋相对的两个政党眼里，任何妥协都是软弱的表现。新冠疫情带来了新的经济现实。所有国家都必须调整适应，但美国面临艰巨的任务。如果它要在后疫情时代领导世界，就必须要在政治上重新校准。 ■



Ant's jumbo IPO

Queen of the colony

Does the giant Chinese fintech upstart represent the future of finance?

IN THE STAID world of Chinese banking, it is rare for executives to voice public criticism. So Jack Ma, the founder of e-commerce giant Alibaba, made headlines in 2008 when he bemoaned how hard it was for small businesses to get loans: “If the banks don’t change, we’ll change the banks.” He has not repeated his warning since then. He has not needed to.

Through Ant Group, which began life as a payments service on Alibaba, Mr Ma’s impact on the Chinese financial system has been profound. Ant has helped establish China as the world leader in digital transactions, given entrepreneurs and consumers far greater access to loans, and changed the way that people manage their money. It is now a giant in its own right. Over the past year it counted more than 1bn active users. Last year it handled 110trn yuan (\$16trn) in payments, nearly 25 times more than PayPal, the biggest online payments platform outside China (see chart 1).

An initial public offering (IPO) in the coming weeks will bear testimony to Ant’s growth. It is expected to raise more than \$30bn, eclipsing Saudi Aramco’s debut last year as the biggest IPO—a symbol of the world’s transition from a century in which oil was the most valuable resource to an era that prizes data. With a forward price-to-earnings multiple of 40, in line with big global payments companies, Ant could fetch a market capitalisation in excess of \$300bn, more than any bank in the world.

| *A four-legged insect*

More important than its size is what Ant represents. It matters globally in a way that no other Chinese financial institution does. China’s banks are huge but inefficient, burdened by state ownership. By contrast foreign

financiers look at Ant with curiosity, envy and anxiety. Some hawks in the White House reportedly want to rein in the company or hobble its IPO. Ant is the most integrated fintech platform in the world: think of it as a combination of Apple Pay for offline pay, PayPal for online pay, Venmo for transfers, Mastercard for credit cards, JPMorgan Chase for consumer financing and iShares for investing, with an insurance brokerage thrown in for good measure, all in one mobile app.

Given the abundance of consumer data in China and the relatively lax safeguards around its use, Ant has more to work with than fintech peers elsewhere. More than 3,000 variables have gone into its credit-risk models, and its automated systems decide whether to grant loans within three minutes—a claim that may seem far-fetched but for Alibaba’s proven ability to handle 544,000 orders per second. Ant is, in short, the world’s purest example of the tremendous potential of digital finance. But as it advances further, it may also be an early warning of its limitations.

Start with a deceptively simple question: what is Ant? In its decade as an independent company it has changed names three times—from Alibaba E-Commerce to Ant Small and Micro Financial Services to Ant Group. The company once called itself a fintech leader. Then Mr Ma inverted the term to techfin, in order better to capture its priorities. Such are its efforts to distinguish itself from a purely financial firm that it has asked some brokerages to assign tech analysts to cover it. (Of course, it does not hurt that the valuations for tech stocks are much plumper than for bank stocks.)

Yet there is no doubt that Ant, at its heart, is about finance. The clearest way of understanding its business model is to look at the four sections into which it divides its revenues. The first is payments—how it started and still the foundation of the company. Ant began in 2004 as a solution to a problem. Shoppers and merchants were flocking to Alibaba but lacked a trusted payment option. Alipay was created as an escrow account,

transferring money to sellers after buyers had received their products. With the launch of a mobile Alipay app, it moved into the offline world, supercharging its growth in 2011 with the introduction of QR codes for payments. A shop owner needed to show only a QR code print-out to accept money, a big advance for a country previously reliant on cash.

For China as a whole, digital transactions reached 201trn yuan in 2019, up from less than 1trn in 2010. Alipay's market share has been whittled down by Tencent, which added a payments function to WeChat, China's dominant messaging app. Both companies earn as little as 0.1% per transaction, less than banks do from debit-card swipes. Given the sheer volume, this still adds up to a lot. Ant generated nearly 52bn yuan of revenues from its payments business last year. But growth is slowing, dropping from 55% of Ant's revenue in 2017 to 36% in the first half of this year. Instead, the crucial point is that payments are a gateway: how Ant attracts users, understands them and ultimately monitors them.

The biggest beneficiary of all this data is Ant's lending arm, the second part of the company (which Ant, never one to shy away from jargon, calls CreditTech). Ant began consumer lending as recently as 2014, with the launch of Huabei, a revolving unsecured credit line for purchases—basically a virtual credit card. Alipay users can tap into Huabei to defer payments by a month or to break them into instalments. Credit cards had never taken off in China, so Huabei was lapped up. That led to Jiebei, an Alipay feature which allows users to borrow larger sums. Ant also offers loans, with a focus on very small businesses. Annualised interest rates hover between 7% and 14%, lower than the alternatives from small-loan companies.

Like many Ant clients, Zhu Yifan, owner of Rabbits Go Home, a convenience store in Dongyang, an eastern city, started small. Four years ago she and her husband wanted to open their store. With no property as

collateral, they could not get a bank loan. Instead, they pulled together money from friends and relatives, and, on a whim, borrowed 10,000 yuan from Ant, the most they could obtain then. By repaying that initial loan and getting customers to use Alipay—giving Ant a look at her cash flow—Ms Zhu’s credit score improved. Now, she has a 100,000 yuan credit line from Ant, which lets her stock up before busy holidays.

In barely half a decade Ant has reached 1.7trn yuan in outstanding consumer loans, or roughly a 15% share of China’s consumer-lending market. Its loans to small businesses total about 400bn yuan, about 5% of the micro-enterprise loan market. From a financial perspective, Ant’s biggest innovation is the way that it funds the credit. Initially, it made the loans and then packaged them as securities, sold to other financial institutions. But regulators feared parallels with the securitisation boom that preceded the financial crisis of 2007-09. They required that the originators of securities hold capital much like any bank—a rule that cut into Ant’s margins.

So Ant devised a new approach. It now identifies and assesses borrowers, but passes them on to banks which extend the loans. Ant collects a “technology service fee”. For borrowers it is seamless. With a few taps on their smartphones, their credit requests are approved or rejected. Ant ends up with a cash-rich, asset-light lending model. Fully 98% of the loans are held as assets by other firms. Credit has become Ant’s biggest single business segment, accounting for 39% of its revenues in the first half of this year (see chart 2).

The strength of Ant’s platform is what enables its third and fourth business segments: asset management and insurance (InvestmentTech and InsureTech, to use Ant’s nomenclature). Ant got started on asset management in 2013 with the launch of Yu’eobao, or “leftover treasure”. The idea was that merchants or shoppers with cash in Alipay could get a small

return by parking it in a money-market fund. That attracted people interested in Yu'ebao purely for storing cash, since its yields (now roughly 1.7%) were higher than those available on current accounts at banks. By 2017 Yu'ebao had given rise to the world's biggest money-market fund by size.

Ant broadened its offerings to become one of China's most powerful distribution channels for investments. Today 170 companies sell more than 6,000 products such as stock and bond funds on Ant. Altogether these firms have roughly 4.1trn yuan in assets under management enabled by the app. As with its lending business, Ant screens prospective clients and directs them to products. It then collects a service fee. "Our growth on Ant has been faster than on any other digital platform," says Li Li, deputy CEO of Invesco Great Wall Fund Management. Her group's two money-market funds soared from 665m yuan in assets under management in early 2018, when it started selling them on Ant, to 114bn yuan in June.

Ant's push into insurance happened more recently. For a decade it offered shipping insurance for purchases on Alibaba, letting dissatisfied customers return goods for no charge. But it is only in the past two years that it has applied its asset-management template to insurance. In partnership with big insurance firms, it has unveiled life, car and medical insurance—again collecting fees as a distribution platform. Asset management and insurance now make up nearly a quarter of revenues.

| *All the ants are marching*

Simply looking at the numbers, Ant can appear unstoppable. It has chalked up dizzying growth rates in every market that it has targeted. It benefits from the network effects so familiar in the tech world: the more people use it, the stronger its attraction for yet more borrowers, lenders and investors. It is a virtuous cycle, especially for Ant's shareholders. Nevertheless, there exist three kinds of risks that could slow it down: regulatory, competitive

and those that are intrinsic to its own model.

The regulatory landscape in China is treacherous. Officials endlessly tweak rules for banks and investors, patching up holes as they emerge in the fast-growing but debt-laden economy. Many have long assumed that the government will give Ant, a private-sector firm, only so much leeway in the state-controlled system.

Indeed, regulators have already put numerous hurdles in Ant's path. Its first attempt at launching a virtual credit card was blocked. The securitisation crackdown upended its lending model. A government plan to standardise QR codes could weaken it in payments, potentially reducing Ant's market dominance. Another new rule, taking effect in November, will force Ant to hold more capital.

But if all these hurdles were meant to stop Ant, they have not succeeded. So there exists an alternative explanation. Regulators, wary of the pitfalls in financial innovation, continue to erect guardrails around Ant. In general, though, they like it. Not only has it steered credit towards small consumers and businesses, it has also given the government more information about money flows. Duncan Clark, author of a biography of Jack Ma, notes that regulators have long struggled to monitor all corners of China, referencing the old saying that the mountains are high and the emperor far away. "Ant has basically let Beijing tunnel through the mountains and fly drones over their summits," he says.

Another threat to Ant is its competitors. Until 2013 mobile pay was, more or less, Ant's exclusive domain. But Tencent has used its ubiquitous WeChat app to muscle in, taking nearly a 40% market share. Other firms also have financial ambitions. Meituan, an app known for food delivery, now also offers credit. The financial arm of JD.com, an e-commerce firm, and Lufax, an online wealth-management platform, are on track for IPOs this year.

So far these competitors have a much smaller financial footprint than Ant's. Partly this is because they do not have the same breadth. Shawn Yang of Blue Lotus, a boutique Chinese investment bank, says that Tencent, for instance, has high-frequency but low-value consumption data, less rich than the trove that Ant has thanks to Alibaba, which accounts for more than half of Chinese online retail sales.

But it is also a matter of business culture. The most controversial episode in Ant's history came in 2011 when Mr Ma spun it out from Alibaba, without notifying SoftBank and Yahoo, which together held about 70% of Alibaba's shares back then. Mr Ma explained that Chinese regulations forbade foreigners from owning domestic payments firms, though there may have been work-arounds. Some suspected that he wanted to bring in powerful investors closer to home. Ant's earliest rounds of fundraising as an independent firm did indeed attract major state-owned enterprises. A stake was also sold to a private equity firm managed by the grandson of Jiang Zemin, China's paramount leader during Alibaba's early years.

Yet in retrospect the spin-off has a clear strategic rationale. As a standalone company Ant has had the motivation to explore distant corners of the banking system and act aggressively. An executive with another e-commerce company says that its financial unit worries about making mistakes that might taint the group's core retail business. Ant, by contrast, has diversified, with less than 10% of its revenues now from Alibaba. For China's other e-commerce dynamos, its success offers a template. They may be several years behind but the fintech race is far from over.

The final danger for Ant has the most global resonance: the nature of its model. Unsecured lending to small borrowers is risky, whichever way it is done. Indeed the coronavirus pandemic has offered a sharp test for Ant. Delinquent loans (more than 30 days past due) issued via its app nearly doubled from 1.5% of its outstanding total in 2019 to 2.9% in July. Yet that is

better than most other banks in China. Is that because of Ant's prowess? Some critics say that it reflects its market power. Given the centrality of Alipay and Alibaba to their operations, few dare to default on Ant loans, worried that a downgraded credit rating may damage other parts of their business.

Still, many bankers are persuaded that Ant truly does have an advantage in its analytics. "They don't need quarterly statements. They see your daily flow of funds. They know who your customer is. They know who your customer's customer is," says one. Based on the address for e-commerce deliveries, Ant has more up-to-date information about where someone lives and works than a bank. Based on what that person buys, Ant can work out their income bracket and their habits, preferences and way of life.

But according to Hui Chen, a finance professor at Massachusetts Institute of Technology who has worked on research projects with Ant, individual and systemic risks are different. The machine learning that underpins Ant's algorithms observes individual behaviour again and again, and is then able to detect patterns and anomalies. But if risks do not appear in the historical data—say, a big economic shock—the same machine learning may stumble.

There are also some limitations hard-wired into Ant's strategy. By design, it aims for high-volume, small-scale borrowers and investors. "Their analytical advantage is most significant with this mass market, where traditional banking models are most inaccessible," says Mr Chen. Most corporate lending—about 60% of all credit in China—will remain off limits. Ant also has an awkward relationship with banks. It relies on them to fund the loans on its platform, but as it grows it may become a competitor in their eyes. For now that is not much of a concern, given that it focuses on borrowers ignored by banks. But it means that Ant must befriend the very institutions that it once set out to disrupt.

Doubts exist about its investment and insurance platforms, too. Ant has excelled in selling money-market funds to a plethora of retail investors. Moving up the value chain could be harder. “They are great at selling penny products. But that’s not where you make the money in insurance,” says Sam Radwan of Enhance, a consultancy. To close a deal on a valuable, complex policy like a variable annuity, brokers typically speak with consumers several times. “No ordinary customer is going to trust an online broker for something that complicated,” says Mr Radwan.

| *Doing the jitterbug*

Ant’s global ambitions are also running into problems beyond its control. It has stakes in around ten different fintech companies in Asia, such as Paytm in India. Boosters once imagined a world connected by Ant, its credit-to-investment architecture straddling borders. The first blow to that vision came in 2018 when America blocked Ant’s acquisition of MoneyGram, a money-transfer firm, which would have established Ant as a force in global remittances. Security concerns over Ant have increased as China’s foreign policy has become more aggressive. Little wonder that Ant plans to devote just a tenth of its IPO proceeds to cross-border expansion.

Despite all these limitations, one lesson from Ant’s decade in existence is that future possibilities remain vast. Ms Li of Invesco gushes about her fund-management firm’s mini-site within the Alipay app, one of the tens of thousands of separate sections that constitute the Ant ecosystem. In September Invesco hosted a live-stream on the mini-site to discuss its market outlook. More than 700,000 tuned in—just one example of how Ant has become the main doorway into the financial system for tens of millions of people. And for all those who have walked through it, many more have not. Ant will soon know where they live, how much they earn and what they want. It is coming for them. ■



蚂蚁集团的巨型IPO

蚁后

中国的金融科技巨头新贵是否代表了金融的未来？【深度报道】

在沉闷传统的中国银行业，很少会有高管公开发表批评言论。因此，电子商务巨头阿里巴巴的创始人马云在2008年抱怨中小企业贷款难时，就登上了新闻头条。他说：“如果银行不改变，我们就改变银行。”从那以后，他没有再发出这样的警示。他不需要了。

马云已经通过蚂蚁集团对中国的金融体系产生了深远的影响。蚂蚁最初是阿里巴巴的一项支付服务，它帮助中国晋升为数字交易领域里的全球领导者，让企业家和消费者获得贷款的机会大增，并改变了人们的理财方式。现在它自身已长成一个巨头。在过去一年中，它的活跃用户超过10亿。去年，它处理了110万亿元的支付交易，是中国以外最大的在线支付平台PayPal的近25倍（见图表1）。

过几周蚂蚁就要上市，见证它的成长。预计它将融资超过300亿美元，让沙特阿美（Saudi Aramco）去年的史上最大规模IPO相形见绌。这象征着世界从一个以石油为最具价值资源的世纪进入数据至上的时代。蚂蚁的远期市盈率为40倍，与全球大型支付公司相当，因此其市值可能超过3000亿美元，超过世界上任何一家银行。

| 四足昆虫

比其规模更重要的是蚂蚁代表什么。它在全球的重要性超过其他任何中国金融机构。中国的银行受国企身份的拖累，规模庞大但效率低下。相比之下，外国的金融家对蚂蚁充满好奇、艳羡和焦虑。据说白宫的一些鹰派人士想约束蚂蚁或阻碍它的IPO。蚂蚁是世界上最全面的金融科技平台：可以把它想象成Apple Pay（离线支付）、PayPal（在线支付）、Venmo（转账）、万事达卡（信用卡）、摩根大通（消费金融）和iShares（投资）的结合体，外加保险经纪业务，全都整合在一款移动应用里。

鉴于中国有海量消费者数据，并且对数据使用的管理措施相对宽松，与其他地方的金融科技同行相比，蚂蚁有更多数据资源。它的信用风险模型包含了3000多个变量，其自动化系统可在三分钟内决定是否发放贷款——要不是阿里巴巴已展示出每秒处理54.4万笔订单的能力，这个说法可能让人难以置信。简言之，蚂蚁完完全全就是世界上一个证明数字金融的巨大潜力的例子。但随着它进一步发展，它也可能为数字金融的局限性做出警示。

从一个看似简单的问题开始：蚂蚁是什么？在作为一家独立公司的十年里，它曾三度更名：先是阿里巴巴电子商务有限公司，然后是蚂蚁小微金融服务集团，再到蚂蚁集团。它曾经自称金融科技领导者。后来，为更能体现它的重点，马云把金融科技这个表述改成了科技金融。蚂蚁极力想让自己区别于纯粹的金融公司，已经让一些经纪公司指派科技板块分析师来研究它。（当然了，科技股的估值要比银行股高很多，这一点也是有利的。）

但毫无疑问，蚂蚁的核心是金融。最能清楚理解其商业模式的方法是看它的四个收入来源。首先是支付，这是蚂蚁靠之起家的业务，现在仍然是它的根基。2004年创立蚂蚁是为了解决一个问题。当时顾客和商家大量涌向阿里巴巴，但缺乏可信赖的付款方式。支付宝由此诞生，它作为第三方托管帐户，在买家收到商品后再把钱转给卖家。随着移动版支付宝的推出，它进入了线下世界，2011年推出的支付二维码更是加速了它的成长。店铺老板只需要打印二维码摆出来即可收款，这对以前一直依赖现金的中国来说是一大进步。

在整个中国，数字交易额从2010年的不到一万亿元增长到2019年的201万亿元。支付宝的市场份额被腾讯削弱，后者在微信这款中国的主导即时通信应用中添加了支付功能。两家公司在每笔交易上赚取0.1%，低于银行通过借记卡刷卡的收费。但由于交易数量庞大，这笔收入加起来依然可观。去年蚂蚁的支付业务创造了近520亿元的收入。但这一块的增速正在放缓，占蚂蚁总收入的比重从2017年的55%下降到今年上半年的36%。其实，关键在于支付是一个入口，蚂蚁通过它来吸引、了解用户，并最终监

控他们。

从所有这些数据中收益最大的是蚂蚁的贷款部门，这是该公司第二个收入来源（从来不吝于使用术语的蚂蚁称之为信贷科技）。蚂蚁从2014年开始提供消费信贷，推出了花呗，为网购提供循环无担保信用额度，基本上就是一种虚拟信用卡。支付宝用户可以接入花呗，延迟一个月付款或分期付款。信用卡在中国从未普及，因此花呗很受欢迎。在此基础上支付宝又推出了借呗，允许用户借更多的钱。蚂蚁还提供贷款，主要面向小微企业。年化利率徘徊在7%至14%之间，低于小额贷款公司的利率。

和蚂蚁的许多客户一样，东部城市东阳的朱一凡从小本生意做起，开了一家兔兔到家便利店。四年前，她和丈夫想自己开家店。因为没什么财产可用作抵押，他们没法从银行贷到款，只能从亲戚朋友那里七拼八凑地借钱。期间他们很偶然地从蚂蚁借了一万块，这是当时他们能借到的最高额度。后来他们还了这第一笔贷款，并在店里让顾客用支付宝付款（让蚂蚁得以了解其现金流状况），朱一帆的信用评分上升了。现在，她在蚂蚁有10万元信用额度，让她可以在客流量大的节假日来临前多上些货。

在不到五年的时间里，蚂蚁的未偿消费贷款就达到了1.7万亿元，约占中国消费贷款市场的15%。蚂蚁对小微企业的贷款总额约达4000亿元，占整个小微企业贷款市场的5%左右。从金融的角度来看，蚂蚁最大的创新就是它为信贷融资的方式。最初，它发放贷款，然后把贷款打包成证券出售给其他金融机构。但监管机构担心这与2007年至2009年金融危机之前的证券化热潮有相似之处，要求证券的原始权益人和银行一样持有资本，这项规定削弱了蚂蚁的利润。

蚂蚁于是想出了一个新办法。现在它会识别和评估借款人，但接下来会把他们推荐给银行，由银行发放贷款。蚂蚁收取“技术服务费”。对于借款人而言，整个过程是无缝衔接的。他们只需在智能手机上点几下，就可以看到贷款申请是被批准还是拒绝了。蚂蚁最终形成了一个现金充裕又轻资产的贷款模式。全部贷款的98%是由其他公司作为资产持有的。贷款已成为蚂蚁最大的单一业务部门，占今年上半年收入的39%（见图表2）。

蚂蚁平台的优势赋能了它的第三和第四个业务部门：资产管理和保险（用蚂蚁的术语叫投资科技和保险科技）。蚂蚁在2013年推出余额宝，启动了资产管理业务。它的想法是，支付宝账户中有现金的商家或顾客可以购入货币市场基金以获得少量回报。这吸引了人们把余额宝单纯用于存储现金之用，因为它的收益率（现在约为1.7%）高于银行活期账户的利率。到2017年，余额宝已成长为全球规模最大的货币市场基金。

蚂蚁扩大了服务范围，成为中国最强大的投资分销渠道之一。如今有170家公司在蚂蚁的平台上销售6000多种产品，比如股票和债券基金。这些公司通过蚂蚁的应用总共管理着约4.1万亿元的资产。与贷款业务一样，蚂蚁会筛选潜在客户并将他们导流到产品，然后收取服务费。“我们在蚂蚁上的增长比在任何其他数字平台都要快。”景顺长城基金管理公司的副总经理李黎说。她的公司有两只货币市场基金从2018年初开始在蚂蚁上销售，管理的资产规模已经从当时的6.65亿元飙升到今年6月的1140亿元。

蚂蚁进军保险业要更晚一些。过去十年里，它为在阿里巴巴上的网购提供运费险，不满意的客户可以免费退货。但它直到最近两年才将自己的资产管理模式用到保险上。它与大型保险公司合作，推出了寿险、车险和医疗保险，同样是作为分销平台收取服务费。资产管理和保险这两块现在构成了它总收入的近四分之一。

| 蚂蚁大军行进

单看数字，蚂蚁似乎势不可挡。它在每个目标市场上都有令人眼花的增长速度。它得益于科技业常见的网络效应：人们用它越多，它对更多借款人、放贷人和投资者的吸引力就越大。这是一个良性循环，对蚂蚁的股东而言更是如此。然而，仍有三方面的风险可能使蚂蚁的发展放缓：监管、竞争，以及它自身的商业模式所固有的风险。

中国的监管环境变化莫测。官员不停歇地调整针对银行和投资者的规则，修补快速增长但负债累累的经济中出现的漏洞。许多人从很久以前就认为，在国家控制的系统中，政府能给蚂蚁这家民营企业的自由空间也就这么多了。

确实，监管机构已经在蚂蚁的发展道路上设置过诸多障碍。它首次尝试推出虚拟信用卡被叫停。严控信贷证券化打乱了它的贷款模式。政府标准化二维码的计划可能会削弱它的支付业务，进而削弱其市场主导地位。另一项将于11月生效的新规将迫使蚂蚁持有更多资本。

但是，如果所有这些障碍都是为了阻止蚂蚁前行，那么它们并未成功。因此还有另一种解释。监管部门对金融创新的隐患保持警惕，因而不断在蚂蚁周围设置安全护栏。不过总的来说，它们还是喜欢蚂蚁的。它不仅将信贷导向小用户和小微企业，还向政府提供了更多有关资金流动的信息。写过一本马云传记的邓肯·克拉克（Duncan Clark）引用一句老话“山高皇帝远”来形容监管部门长期以来难以监视中国全部的角角落落。“蚂蚁基本上已经让北京在山上打通了隧道，在山顶上放飞无人机。”他说。

蚂蚁的另一个威胁来自竞争对手。2013年之前，移动支付基本上是蚂蚁的专属地盘。但腾讯利用其无孔不入的应用微信挤进了这个市场，分去了近40%的市场份额。其他公司也有金融方面的抱负。以外卖递送知名的应用美团现在也提供贷款了。电子商务公司京东的金融部门和在线理财平台陆金所都有望在今年上市。

到目前为止，这些竞争对手在金融领域里的足迹远小于蚂蚁。部分原因是它们的业务没有那么广。中国精品投行蓝莲花的杨子潇说，以腾讯为例，它拥有高频但低价值的消费数据，不如蚂蚁的数据那么丰富，后者背靠占据了中国在线零售半壁江山不止的阿里巴巴。

但这同时也与企业文化有关。蚂蚁历史上最具争议的事件发生在2011年，当时马云将蚂蚁从阿里巴巴剥离出来，却没有通知共持有阿里约70%股份的软银和雅虎。马云解释说这是因为中国的法规禁止外资控股国内支付公司。但原本或许是有一些变通办法的。有些人怀疑他是想引入有影响力的国内投资者。成为独立公司的蚂蚁在早期的几轮融资中确实吸引了大型国有企业。它还向江泽民的孙子管理的一家私募股权公司出售了股份。在阿里巴巴发展的头几年，江泽民是中国的最高领导人。

不过，回过头来看，剥离蚂蚁是有明确的战略依据的。作为一家独立公司，蚂蚁有动力去探索银行系统的非核心领域并激进地采取行动。另一家电子商务公司的一位高管表示，自己公司的金融部门担心犯错，有可能损害集团的核心零售业务。相比之下，蚂蚁已经多元化，现在它的收入只有不到10%来自阿里巴巴。对于中国其他电商巨头来说，蚂蚁的成功提供了一个模板。现在它们可能落后了几年，但金融科技的比赛还远未结束。

蚂蚁面临的最后一个威胁最具全球普遍性，那就是它商业模式的特性。无论采用什么方式，向小微借款人提供无担保贷款都有风险。事实上，新冠疫情对蚂蚁造成了严峻的考验。通过其应用发放的拖欠贷款（逾期30天以上的贷款）在2019年占未偿贷款总额的1.5%，到今年7月这一比例几乎翻了一番，达到2.9%。不过这比中国其他大多数银行的情况都要好。这是因为蚂蚁有高超技能吗？一些评论人士说，这反映了蚂蚁的市场影响力。鉴于支付宝和阿里巴巴在很多企业业务中的核心地位，没什么人敢拖欠蚂蚁的贷款，因为担心信用评级被降可能会损害自己的其他业务。

不过，许多银行人士相信蚂蚁在分析方面确有优势。“他们不需要看季报。他们看到你每天的资金流向。他们知道你的客户是谁。他们知道你客户的客户是谁。”一位银行人士说。根据电商的送货地址，蚂蚁掌握的有某个人在哪里生活和工作的最新信息比银行要多。根据这个人购买的商品，它可以计算出其收入等级，以及习惯、偏好和生活方式。

但根据麻省理工学院与蚂蚁一起开展研究项目的金融学教授陈辉的说法，个人风险和系统性风险是两回事。支持蚂蚁算法的机器学习一次又一次地观察个体行为，进而能够检测出模式和异常。但是，如果历史数据中没出现过某些风险（例如巨大的经济冲击），同一套机器学习系统可能就会挫败。

蚂蚁的策略还存在一些固有的局限性。其模式设计是以大量的小额借款人和投资者为目标。“他们的分析优势在这个大众市场上最为显著，传统银行模式最难进入这样的市场。”陈辉说。大多数的企业贷款（约占中国贷款总额的60%）仍将是蚂蚁无法获得的业务。蚂蚁与银行之间的关系也很

尴尬。它依靠银行在其平台上为贷款提供资金，但随着它的发展，银行可能会视它为竞争对手。目前这还不是什么大问题，因为蚂蚁关注的是那些被银行忽视的借款人。但这意味着蚂蚁必须与它最初打算颠覆的机构交朋友。

人们对蚂蚁的投资和保险平台的前景也存在疑虑。蚂蚁擅长将货币市场基金销售给众多散户投资者。往价值链上游发展的路途可能会更艰辛。“他们擅长销售便宜的产品，但保险业不是靠这个赚钱的。”咨询公司Enhance的山姆·拉德万（Sam Radwan）说。为达成一项高价值的复杂的保单（如可变年金）交易，保险经纪通常会与消费者多次交流。“一般客户买这么复杂的保险时不会信任在线经纪。”拉德万说。

| 令人不安的舞步

蚂蚁的全球野心也遇到了超出它自身掌控的问题。它持有印度的Paytm等约十家亚洲不同的金融科技公司的股份。蚂蚁的支持者曾想象过一个由蚂蚁连接起来的世界，它从信贷到投资的架构跨越国界。这一愿景在2018年受到了第一次打击，当时美国阻止了蚂蚁对汇款公司速汇金（MoneyGram）的收购，本来这项交易会让蚂蚁成为全球汇款领域里不可忽视的力量。随着中国的外交政策变得越发激进，对蚂蚁安全问题的担忧也增加了。蚂蚁计划仅将其IPO融资的十分之一用于跨境扩张也就不足为奇了。

尽管存在所有这些局限性，但从蚂蚁的十年历史中可以得出的一个经验就是未来仍有无限可能。景顺长城的李黎对自己的基金管理公司在支付宝应用中的财富号大加赞赏，这是构成蚂蚁生态系统的数以万计的独立部分之一。9月，景顺长城在这个财富号上做了一场讨论市场展望的直播。70多万人观看了这场直播——这只是蚂蚁成为千百万人进入金融体系的一个主要入口的例子之一。而相比已经通过这个入口的人流，还有多得更多的人尚在门外。蚂蚁很快就会知道他们住在哪里、赚多少钱、想要什么。它正向他们行进。■



The Economist film

Meat Makers: the artificial beef revolution

We've relied on animals for meat for 2 million years, how do you take the animal out of the meat production process?



经济学人视频

人造肉工厂：新型肉食革命

人类依赖动物肉为食已有200万年了，未来我们如何能在不宰杀更多动物的前提下获取肉产品？



Free exchange

The mop that never stops

How China revived and recast its economy at the same time

FORECASTS CAN haunt their authors, especially when they appear in headlines or book titles. Most pundits play it safe, giving “a number or a date, but not both”, as an old sage once advised. Thomas Orlik of Bloomberg is more courageous. His latest book, “China: The Bubble That Never Pops”, provides an unusually even-handed account of China’s economic resilience that is both closely observed and analytically interesting. But its title offers up quite a hostage to fortune. “Never”, after all, spans a lot of dates.

Fortunately for Mr Orlik, his definition of China’s bubble leaves him some wiggle room. He is not referring to any particular market or mania (such as the frenzy for tech stocks this year, bike-sharing in 2017 or caterpillar fungus in 2012). The title refers instead to China’s crisis-proof economic momentum, which has survived countless predictions of collapse. Even now, this unpopable force is bouncing back with impressive speed from the covid-19 pandemic (which arrived after this book was written). Will Mr Orlik ever wish he’d never said never?

Although Mr Orlik does not draw heavily on economic theory to justify his confidence, he can take some comfort from it. A bubble that never pops sounds like the sort of thing that the laws of economics should rule out, like a free lunch or an unpocketed dollar bill. In fact, theorists have long entertained the possibility of sustainable bubbles, inspired by the work of two Nobel prizewinners, Paul Samuelson in 1958 and Jean Tirole in 1985.

They showed that bubbles can persist when an economy’s growth rate consistently exceeds its interest rate. In these circumstances, a bubble can remain both attractive and affordable, enticing the buyers it needs to

sustain itself without dwarfing the economy. Suppose, for example, that workers in every generation plough a portion of their income into an intrinsically useless asset, such as an empty flat, which they plan to sell when they retire. Because every cohort has the same plan, each will find buyers among their descendants for the asset they bought from their forefathers. Since another generation is “always coming along”, as Samuelson put it, this chain need never break.

If the economy is growing, each generation will have more income to spend on the asset than the one preceding it. That will allow the seller to earn a positive return. And if the economy’s growth rate exceeds the interest rate, this return will be higher than what other saving vehicles, such as bank deposits, can offer. This condition, known as “dynamic inefficiency”, was once thought to be rare. But in an era of near-zero interest rates, it has come to seem almost familiar. China’s dynamic inefficiency was documented in 2006 by economists at the Hong Kong Monetary Authority and has been confirmed by subsequent studies.

It may be that China’s interest rate understates the true return on capital in the country, thanks to lingering financial repression. But even so, a long-lasting bubble could arise, according to a 2014 paper by Kaiji Chen of Emory University and Yi Wen of the Federal Reserve Bank of St Louis. In their model, private capital earns impressive returns for as long as it can profit from cheap labour migrating from fields to factories and from state-owned enterprises to private firms. That gives entrepreneurs the financial means to venture large sums in the property market. At the same time, they know that the profitability of their businesses will eventually decline as labour becomes scarce. That gives them the motive to diversify their wealth into other stores of value, such as property.

In this scenario, property prices will keep pace with the rate of return to entrepreneurial capital, which is even higher than the growth rate of the

economy as a whole. Then, as workers become harder to find, the returns to capital and to property steadily diminish in tandem. The later chapters of Mr Orlik's book explain how China managed this slowdown. It entered 2016 in a shaky state. Real-estate developers held daunting inventories of unsold flats and owed similarly daunting sums to shadow lenders. China also suffered from overcapacity in allied industries, such as steel, which threatened to plunge the economy into deflation.

How did China cope? The answer is what you might call the five r's: reflating and remixing the economy, as well as refinancing, rotating and writing off assets and liabilities. China remixed the composition of activity without reducing its pace, spending less on new mines and steel plants, and more on infrastructure. Projects financed with short-term high-interest bank loans were refinanced with low-yielding bonds issued by provincial governments. Some debt rotated from overstretched developers onto the cleaner balance-sheets of households who were given easier access to mortgages.

| *Clean-up operation*

China also wrote off bad loans (including shadow loans) and many physical assets. Old mines were closed. Slums were cleared. Displaced households were given money to help buy newer flats. These efforts were often financed by targeted loans from the central bank. The clearances, closures and write-offs reduced the economy's stock of wealth, but did not interrupt the flow of fresh activity. Indeed, the combination of new money injected into the economy and old capacity removed from it lifted prices and quickened the growth of nominal GDP. That restored the gap between growth and interest rates, making debt levels easier to sustain.

This clean-up took advantage of some of China's unusual strengths, including the reach of its regulators and the flexibility of its labour force. When the mix of activity changed, workers followed suit. But it also

conformed to some economic principles that could apply anywhere. The deflationary pressure China faced in this dangerous period showed that there was room to stimulate the economy. And because interest rates were lower than growth rates, it could afford to roll over any liabilities it dared not write off.

Will China never pop? Safer to say there is little it cannot mop. ■



自由交流

永不停歇的清扫

中国是如何同时重振和重塑经济的

预测者日后可能会因为自己的预言而被打脸，尤其是当它们出现在标题或书名中的时候。大多数专家都言语谨慎，就像一位年长智者曾经建议的那样，“给出一个数字或一个日期，但不要两个都给”。彭博的托马斯·奥里克（Thomas Orlik）却胆量过人。他的新书《中国：永不破裂的泡沫》（China: The Bubble That Never Pops）对中国经济的韧性做了难得公允的描述，不仅观察细致，所做分析也引人入胜。不过书名很可能会授人以柄。毕竟，“永不”的跨度太长了。

幸好，奥里克对中国泡沫的定义给自己留了一些回旋余地。书名并不具体指某个市场或某次狂热（比如今年的科技股、2017年的共享单车，或者2012年的冬虫夏草热），而是中国总能克服危机的经济发展势头，已经让无数“经济崩溃论”落空。就算是现在，这一不会破灭的力量正以惊人的速度从新冠疫情（发生在本书完成之后）中重整旗鼓。奥里克会希望自己从没说过“永不”吗？

虽然奥里克没有大量动用经济理论来证明自己这种确信的合理性，但他仍可以从理论中得到一些支持。永不破裂的泡沫听上去就像免费的午餐或从未落入口袋的一元美钞一样，属于那种该被经济规律排除的东西。事实上，受两位诺贝尔奖得主——1958年的保罗·萨缪尔森（Paul Samuelson）和1985年的让·梯若尔（Jean Tirole）——研究成果的启发，长期以来，理论家们都在琢磨泡沫持续存在的可能性。

他们论证道，当一个经济体的增长率始终超过其利率，泡沫是可以持续的。在这种情况下，泡沫可以维持既有吸引力又承受得起的状况，从而吸引到它所需要的买家，在不阻碍经济发展的情况下让自己持续下去。例如，假设每一代劳动者都把自己收入的一部分投入到某项没什么实质用途的资产上，比如一套计划在退休时卖掉的空置公寓。因为每一代人都有同

样的计划，所以每个人都能从下一代中找到买主，来接手自己从上一辈人那里购得的资产。正如萨缪尔森所言，由于新一代“总会到来”，这个链条永不会断裂。

如果经济不断增长，每代人就会比上一代人有更多的收入可花在这项资产上。这会给卖方带来正回报。而且，如果经济增长率超过了利率，这一回报会高于银行存款等其他储蓄工具所能提供的回报。这种被称作“动态无效率”的情况曾经被认为非常罕见。但在一个利率接近于零的时代，它已变得近乎常见了。2006年，香港金融管理局的经济学家记录了中国的动态无效率，随后的研究也证实了它的存在。

由于持续的金融管制，中国的利率可能没有充分反映这个国家真实的资本回报率。但即便如此，仍可能出现一个长期的泡沫，埃默里大学（Emory University）的陈凯迹和圣路易斯联储（Federal Reserve Bank of St Louis）的文一在2014年的一篇论文中这样指出。在他们的模型中，只要私人资本能从廉价劳动力的转移（从农田到工厂，从国有企业到私营企业）中获利，它就一直能获得可观的回报。这为企业家提供了财力，可以在房地产市场冒险投入巨资。与此同时，他们知道，随着劳动力变得稀缺，企业的盈利能力最终会下降。这促使他们把自己的财富多元化，投资房地产等其他价值存储手段。

在这种情况下，房地产价格会和企业资本的回报率保持同步，而后者比经济总体的增长率还要高。此后，随着招工变难，资本和房地产的回报率同时稳步下降。奥里克在他书的后几章里解释了中国如何成功应对了这种放缓。迈入2016年时，中国经济前景岌岌可危。房地产开发商卖不掉的库存房屋数量惊人，影子贷款机构的钱同样多得惊人。中国还在钢铁等相关行业面对产能过剩，可能会把中国经济拽入通货紧缩。

中国是如何应对的？答案可以总结为以下几点：通货再膨胀、经济重组、再融资、轮转，以及注销资产和负债。中国在不放慢发展速度的前提下对经济活动展开重组，减少了对新矿山和钢铁厂的投资，增加了对基础设施的投资。省级政府发行低收益债券，对由银行提供短期高息贷款的项目进

行再融资。通过让家庭更容易获得抵押贷款，一些债务从不堪重负的开发商头上转移给了资产负债表更干净的家庭。

| 清理行动

中国还注销了不良贷款（包括影子贷款）和许多实物资产。老矿山被关闭。棚户区被拆除。拆迁户获得了购买改善型住房的补偿金。这些举措的资金通常来自央行的定向贷款。清算、关闭和注销减少了中国的财富存量，却没有中断新的经济活动的流动。事实上，向经济注入新资金并从中淘汰旧产能的组合拳提高了价格，加快了名义GDP的增长。此举恢复了经济增长率和利率之间的差距，使得债务水平更容易维持。

这种整顿利用了中國一些独特的优势，包括监管机构的影响面和劳动力的灵活性。当经济活动重组时，劳动者也跟着转向。但它也符合一些放之四海而皆准的经济原则。中国在这一危险期面临的通缩压力表明它还有刺激经济的空间。而且由于利率低于增长率，中国承担得起展延所有它不敢注销的债务。

中国的泡沫永不破裂吗？更保险的说法是，它几乎没什么清理不了的。■



China's fintech champion

On the march

The blockbuster listing of Ant Group shows how fintech is revolutionising finance

IN 1300 OR so Marco Polo, a Venetian merchant, introduced Europeans to a monetary marvel witnessed in China. The emperor, he wrote, “causes the bark of trees, made into something like paper, to pass for money all over his country”. Eventually the West also adopted paper money, some six centuries after China invented it. More recent foreign travellers to China have come back agog at the next big step for money: the total disappearance of paper, replaced by pixels on phone screens.

China's pre-eminence in digital money is likely to be on display in the next few weeks with the monster listing of Ant Group, its largest fintech firm, in Hong Kong and Shanghai. Measured by cash raised, it will probably be the biggest initial public offering in history, beating Saudi Aramco's last year. Once listed, Ant, which was formed in 2004, could have a similar value to JPMorgan Chase, the world's biggest bank, which traces its roots to 1799. Ant's rise worries hawks in the White House and enthralls global investors. It portends a bigger transformation of how the financial system works—not just in China but around the world.

Jamie Dimon, JPMorgan's boss, and others have kept a wary and admiring eye on Ant for years. Spun off from Alibaba, an e-commerce firm, it has over 1bn users, mostly in China, and its payments network carried \$16trn of transactions last year, connecting 80m merchants. Payments are just the appetiser. Users can borrow money, choose from 6,000 investment products, and buy health insurance. Imagine if main-street banks, Wall Street's brokers, Boston's asset managers and Connecticut's insurers were all shrunk to fit into a single app designed in Silicon Valley that almost everyone used. Other Chinese firms, notably Tencent, which owns the

WeChat app, also operate cutting-edge fintech arms.

China is not alone. The pandemic has supercharged activity elsewhere. Alongside the surge in global e-commerce and remote working there has been an accompanying boom in digital payments, which have jumped by 52% at Venmo, an American network, compared with last year, and by 142% at Mercado Pago, a Latin American fintech. Parisian farmers' markets, pizza firms and Singaporean hawkers have upgraded their systems so they can be paid instantly without physical contact or cash. Investors sense a tectonic shift, like the one that shook retailing. Conventional banks now account for only 72% of the stockmarket value of the global banking and payments industry, down from 96% in 2010.

If the surge in digital finance is universal, the business models behind it are not. In Latin America look out for digital banks and e-commerce pioneers such as Nubank and MercadoLibre, owner of Mercado Pago. In South-East Asia Grab and Gojek, two ride-hailing services, are becoming "super-apps" with financial arms. Fintech firms now provide the majority of consumer loans in Sweden. In America credit-card firms such as Visa (the world's most valuable financial firm), digital-finance giants such as PayPal (the sixth) and the big banks both co-operate and compete. Tech giants such as Apple and Alphabet are dipping their toes in, tempted by the financial industry's \$1.5trn global pool of profits.

There is much to be excited about. At its best, fintech offers big gains in efficiency. If the world's listed banks cut expenses by a third, the saving would be worth \$80 a year for every person on Earth. Ant makes razor-thin margins on payments and takes minutes to grant a loan. Gone are the days of getting gouged by money-changers in airports. Firms such as TransferWise and Airwallex offer exchange services that are cheaper and faster.

Digitisation also promises to broaden the spread of finance. Reaching customers will be easier and data will make loan underwriting more accurate. Firms like Square and Stripe help small businesses connect to the digital economy. In India and Africa digital finance can free people from dodgy moneylenders and decrepit banks. By creating their own digital currencies, governments may be able to bypass the conventional banking system and tax, take deposits from, and make payments to citizens at the touch of a button. Compare that with the palaver of Uncle Sam posting stimulus cheques this year.

Yet the fintech conquest also brings two risks. The first is that it could destabilise the financial system. Fintech firms swarm to the most profitable parts of the industry, often leaving less profit and most of the risk with traditional lenders. Fully 98% of loans issued through Ant in China ultimately sit on the books of banks, which pay it a fee. Ant is eventually expected to capture a tenth or more of Chinese banking's profits. Lumbering lenders in the rich world are already crushed by low interest rates, legacy IT systems and huge compliance costs. If they are destabilised it could spell trouble, because banks still perform crucial economic functions, including holding people's deposits and transforming these short-term liabilities into long-term loans for others.

The second danger is that the state and fintech "platform" firms could grab more power from individuals. Network effects are integral to the fintech model—the more people use a platform the more useful it is and likely that others feel drawn to it. So the industry is prone towards monopoly. And if fintech gives even more data to governments and platforms, the potential for surveillance, manipulation and cyber-hacks will rise. In China Ant is a cog in the Communist Party's apparatus of control—one reason it is often unwelcome abroad. When Facebook, a firm not known for its ethical conduct, launched a digital currency, Libra, last year, it caused a global backlash.

As the fintech surge continues, governments should take a holistic view of financial risk that includes banks and fintech firms—Chinese regulators rightly snuffed out Ant’s booming business in loan securitisation, which had echoes of the subprime fiasco. Governments should also lower barriers to entry so as to boost competition. Singapore and India have cheap, open, bank-to-bank payment systems which America could learn from. Europe has flexible banking that lets customers switch accounts easily. Last, the rise of fintech must be tied to a renewed effort to protect people’s privacy from giant companies and the state. So long as fintech can be made safer, open and respectful of individual rights, then a monetary innovation led by China will once again change the world for the better. ■



【首文】中国的金融科技领军者

在行进中

蚂蚁集团上市大片将展示金融科技正如何重塑金融业

大约在1300年，威尼斯商人马可·波罗向欧洲人介绍了他在中国看到的货币奇迹。他写道，皇帝“让人把树皮做成纸一样的东西，充当货币，通行全国”。差不多在中国发明纸币600年后，西方最终也用上了纸币。近些年，访华的外国游客在回国后兴奋地描述他们看到的又一次货币巨变：这次连纸也不用了，改用手机屏幕上的像素了。

中国最大的金融科技公司蚂蚁集团预期将于几周内 在香港和上海重磅上市，中国在数字货币领域的突出地位也可能随之显现。按融资额计算，这可能超过去年沙特阿美的上市，成为有史以来最大规模的IPO。成立于2004年的蚂蚁上市后的市值可能与全球最大的银行、历史可追溯至1799年的摩根大通相当。蚂蚁的崛起令白宫的鹰派人士担忧，也令全球投资者着迷。它预示着金融体系的运作方式将出现更大的转型，不只在中国，而是遍及全球。

多年来，摩根大通的老板杰米·戴蒙（Jamie Dimon）等人对蚂蚁一直既警惕又艳羡。蚂蚁剥离自电子商务公司阿里巴巴，目前用户超过10亿，主要在中国国内。它的支付网络去年的交易额达16万亿美元，覆盖8000万商户。支付业务只是它的开胃菜。其用户还可申请贷款、投资理财（有6000种投资产品供选择）和购买医疗保险。想象一下，这等同于把美国各家零售银行、华尔街的券商、波士顿的资产管理公司和康涅狄格州的保险公司糅合到一款由硅谷设计、几乎所有人都在用的应用里。其他中国公司，尤其是微信的母公司腾讯，也拥有走在最前沿的金融科技业务。

这种势头不只出现在中国。新冠疫情推动了金融科技在其他地区的发展。电商交易和远程办公激增，数字支付也随之飙升。与去年相比，美国支付平台Venmo处理的支付额增长了52%，拉美金融科技平台Mercado Pago增长了142%。巴黎的农贸市场、披萨公司、新加坡的小贩都升级了自己的

系统，以便能零接触、免现金地即时收款。投资者感受到了一种类似于当初撼动了零售业的结构性的转变。如今，传统银行仅占全球银行及支付业市值的72%，而2010年时为96%。

如果说数字金融热潮是全球共通的，其背后的商业模式则不然。在拉美，最值得注意的是数字银行和电商先锋，如Nubank和拥有Mercado Pago的MercadoLibre。在东南亚，Grab和Gojek这两家网约车公司已壮大成为拥有金融业务的“超级应用”。在瑞典，金融科技公司如今提供了大部分消费贷款。在美国，信用卡公司（如全球市值最高的金融公司Visa）、数字金融巨头（如市值排名第六的PayPal）和大型银行彼此既合作又竞争。在金融业1.5万亿美元的全局利润池的吸引下，苹果和Alphabet等科技巨头也开始试水。

其中有很多东西值得期待。最理想的情况下，金融科技可大大提高效率。全球的上市银行若能削减三分之一的开支，节省下来的钱多达全球每人一年80美元。蚂蚁向支付交易收取极低的费用，而发放贷款只需几分钟。人们再也不用在机场被货币兑换店宰割了。TransferWise和Airwallex等公司提供更便宜快捷的货币兑换服务。

数字化也有望助力金融业进一步开疆拓土。开发新客户将变得更容易，数据也会使贷款审批更准确。Square和Stripe这类公司帮助小企业接入数字经济。在印度和非洲，数字金融可以让人们摆脱奸诈的放债人和老旧过时的银行。通过创建自己的数字货币，各国政府或许可以绕开传统的银行，点点按键就能从民众那里收税、吸收存款，或向他们支付款项。相比之下，今年美国政府给国民发放经济刺激款项还得靠邮寄支票。

不过，金融科技的这场出征也带来了两个风险。首先是它会让金融系统不稳。金融科技公司涌向金融业最有利可图的部分，往往导致传统贷款机构的利润减少，还把大部分风险留给了它们。在中国，通过蚂蚁发放的全部贷款中最终有98%记入银行账簿，银行还要向蚂蚁支付一笔费用。预计蚂蚁最终会赚得中国银行业至少十分之一的利润。富裕国家那些行动迟缓的贷款机构已被低利率、老旧的IT系统和巨额合规成本压弯了腰。它们一旦

被撼动可能引发麻烦，因为银行依然在经济中发挥着至关重要的作用，包括持有国民存款并将这些短期债务转化为提供给他人的长期贷款。

第二个风险是政府和金融科技“平台”公司可能进一步从个人手里夺取权力。网络效应是金融科技模型不可或缺的组成部分——使用平台的人越多，平台就越有用，越能吸引其他人加入。所以金融科技行业容易走向垄断。而如果金融科技再向政府和平台提供更多数据，监视、操纵和网络入侵的可能性都会上升。在中国，蚂蚁是共产党管控机器上的一颗齿轮，这是它在外国常常不受欢迎的原因之一。去年Facebook这家并不以道德操守著称的公司推出数字货币Libra时，也在全球各地引发了反对声浪。

金融科技热潮持续之时，各国政府应该从整体上审视金融风险，既要包括银行也要包括金融科技公司。中国监管机构限制蚂蚁飞速发展的贷款证券化业务是对的，因为它让人想到了次贷危机。各国政府还应降低准入门槛，促进竞争。新加坡和印度拥有费用低廉、公开透明的银行间支付系统，值得美国学习。欧洲拥有灵活的银行服务，客户可轻松切换帐户。最后，在金融科技兴起之际，必须再一次努力保护人们的隐私权免受巨头公司和政府的侵害。只要金融科技能变得更安全、开放和尊重个人权利，那么一场由中国引领的货币创新将再次让世界变得更美好。 ■



Quantum computing

From cloisters to the cloud

Investors are pouring money into quantum computing. Its development offers lessons about innovation

IT IS HARD to choose one moment as marking the birth of a technology. But by one common reckoning, quantum computing will be 40 next year. In 1981 Richard Feynman, an American physicist, spoke at a computing conference, observing that “Nature isn’t classical, dammit, and if you want to make a simulation of nature, you’d better make it quantum mechanical, and by golly it’s a wonderful problem, because it doesn’t look so easy.”

Entering middle age, quantum computing is at last becoming a commercial proposition. Until recently the consensus was that practical applications would have to wait for large, stable machines, probably at least a decade away. Not everyone agrees. Venture capital is beginning to flow into companies built around quantum computers, as investors make a bold—possibly foolhardy—bet that even the limited, error-prone, unstable machines that make up the state-of-the-art today may prove commercially useful.

If those bets pay off, it would be good news, and not just for investors. Quantum computers can perform some sorts of mathematics far faster than any classical machine. Building them could open up entirely new vistas. They may, for instance, revolutionise chemistry. Most reactions are too complex for existing computers to simulate exactly, blunting researchers’ precision. Quantum machines could cut through the mathematical tangle, with applications in materials science, drugmaking, batteries and more. Their facility with optimisation problems, which are likewise a struggle for non-quantum machines, could be a boon for logistics, finance and artificial intelligence.

The field's progress is interesting for another reason. Quantum computing offers a worked example of how complicated technologies develop in industrial societies. The chief lesson is to attend to every part of the process. The frenzy of innovation around classical computing, concentrated in Silicon Valley, has focused attention on the world of startups, venture capital and IPOs. But these are things that happen late in a technology's development, when swift commercial returns are, if not certain, then at least plausible. As Mariana Mazzucato, an Italian-American economist, has argued, the biggest risks are taken earlier, when it is unclear whether a technology will work at all.

The state can be one such risk-taker. The first step in building a quantum computer was to conduct plenty of abstruse mathematics on university blackboards. Collectively, governments, including those of America, Britain, China and Germany, have thrown billions of dollars at funding quantum research.

Other early work was done in the sorts of big, boring companies in which no self-respecting disrupter would be seen dead. The first useful quantum algorithm was discovered in 1994 at Bell Labs, which began life as the research division of America's telephone monopoly. Another early pioneer was IBM, which also has a buttoned-up reputation—but whose researchers have, over the years, earned six Nobel prizes. Today Google and Microsoft are playing a big role in developing quantum technologies.

The trick for such super-early-stage investors is to know when to stick with a risky prospect and when to call it quits. Good venture capitalists are ruthless about culling underperforming bets and focusing on those that seem to be paying off. Their proximity to markets makes such judgments easier. But governments—which are, after all, spending public money—should strive for the same outlook. If the state is to back technologies that are too risky for other investors, then a high rate of failure

is both inevitable and desirable.

There are other lessons, too. Quantum computing has come as far as it has on the backs of thousands of mathematicians, experimental physicists and engineers. That is a reminder of the limits of “great man” theories of innovation, exemplified by the cult of Steve Jobs, a founder of Apple. The popular image of innovation as a “pipeline”, with a stream of individual technologies proceeding smoothly from ideas to products, is likewise too neat. Progress in quantum computing depends on progress in dozens of other fields, from lasers to cryogenics.

None of that is to deny the importance of the people who run the last few miles, taking nascent technologies and trying to spin out profitable businesses. But those who want to see more of that success should keep in mind that a great deal of less celebrated, less glamorous work must come first. ■



【首文】量子计算

从学院回廊到云端

投资者大举押注量子计算。这项技术的发展为创新提供了经验

要确定一项技术是在哪一刻诞生的很难。但根据一种普遍的认知，明年将是量子计算的40岁诞辰。1981年，美国物理学家理查德·费曼在一次计算机学会议上发言说，“真见鬼，自然界并不像经典物理学描述的那样。你要想模拟自然，最好用量子力学。哎呀这道题很精彩，因为一看就不容易。”

在步入中年之际，量子计算终于成为了一个商业命题。直到近期，人们的共识还是它的实际应用需等到大型而稳定的机器出现，而这可能要等至少十年。但不是所有人都这么想。风险资本已经开始流入围绕量子计算机建立的公司，因为投资者下了一个大胆的（也可能是鲁莽的）赌注。他们认为，即使是代表当今尖端水平的规模有限、易出错、不稳定的机器，也可能被证明具备商业用途。

如果这些赌注收获了回报，那会是个好消息，且不仅仅是对投资者而言。量子计算机执行某些数学运算的速度远远快过任何经典计算机。打造它们能够开辟全新的前景。例如，它们可能会彻底变革化学。化学反应大多太过复杂，现有的计算机无法精确模拟，令研究人员难以追求精确度。量子计算机可以破解繁杂的数学难题，可应用于材料科学、制药、电池等领域。它们在解决优化问题上的能力——非量子计算机对这类问题也很吃力——可能会给物流、金融和人工智能带来福音。

这个领域的进展之所以值得关注，还有另一个原因。量子计算为复杂技术在工业社会中的发展提供了一个按步骤演绎的样例。它带来的最重要经验是关注进程中的每一个环节。在硅谷集中发生的围绕经典计算的创新热潮聚焦于创业公司、风险资本和IPO这类事情。但它们都发生在技术发展的后期，在这个阶段，快速获得商业回报的前景即便不是确定无疑，至少也是很可能的。正如意裔美国经济学家马利亚纳·马祖卡托（Mariana

Mazzucato) 指出的，在尚不能确定一项技术能否成功时，所冒的风险是最大的。

国家可能会是这样一个冒险者。研制量子计算机迈出的第一步是在大学黑板上进行大量深奥的数学运算。包括美国、英国、中国和德国在内的各国政府合计已投入数十亿美元资助量子研究。

其他早期工作是在那些又大又无聊的公司中完成的，也就是自尊心很强的颠覆者死也不愿意去的那类地方。第一个有用的量子算法是1994年在贝尔实验室发现的，这个实验室最初是这家美国电话业务垄断企业的研究部门。另一个早期先驱是IBM，它同样也不事张扬，但多年来它的研究人员获得了六项诺贝尔奖。今天，谷歌和微软在研发量子技术方面发挥着重要作用。

对于这些超早阶段的投资者来说，诀窍在于面对有风险的前景知道何时该坚持，何时该放弃。好的风险资本家会干脆决绝地放弃表现不佳的赌注，专注于那些有望带来回报的项目。他们靠近市场，因而更容易做出这类判断。但政府也应该争取实现同样的前景，毕竟它们花的是公共资金。如果说政府应当支持对其他投资者来说风险太大的技术，那么高失败率就不可避免，却也是值得一试的。

还有其他经验可供借鉴。量子计算走到今天，有赖于成千上万数学家、实验物理学家和工程师的努力。这提醒人们注意“伟人”创新理论的局限性——对苹果联合创始人史蒂夫·乔布斯的崇拜就是这种理论的体现。而把创新普遍视为一种“管道”——一个又一个单个技术顺利从创意变成产品——同样太过简单化了。量子计算的进步倚赖从激光到低温学的其他几十个领域的进步。

所有这些并不是要否认那些跑最后几英里的人的重要性——他们把新兴技术拿来，试图创立长久有利可图的业务。但若我们想要看到更多这类成功，就应当记住，大量不大被歌颂、没那么光鲜的工作必须首先发生。■



Energy's new world order

Petrostate v electrostate

What it means to dominate the world of energy is changing—to China's advantage

“THE UNITED STATES OF AMERICA is now the number-one energy superpower anywhere in the world,” President Donald Trump told oilmen in Midland, Texas this summer, from a stage decorated with gleaming black barrels. The sheer volume of hydrocarbons that such American oilmen have released from the shale beneath Midland and previously unforthcoming geology elsewhere gives substance to his boast (see chart 1). Over the past decade America's oil output has more than doubled and its gas production increased by over 50%. America is now the world's top producer of both fuels.

Had they heard Mr Trump say that “We will never again be reliant on hostile foreign suppliers,” presidents from Franklin Roosevelt on might have nodded in envious approval. After the second world war America's unmatched ability to consume oil outstripped its unmatched ability to produce it. Ensuring supplies from elsewhere became an overriding priority. The oil shock of the 1970s had a profound effect both on the economy and on geopolitics, driving much of America's subsequent involvement in the Middle East. The surge in domestic supply in the 2010s both boosted the economy and opened up new geopolitical opportunities. America can apply sanctions to petrostates such as Iran, Venezuela and Russia with relative impunity.

But what it might mean to be an energy superpower is changing, thanks to three linked global shifts. First, fears about fossil-fuel scarcity have given way to an acknowledgment of their abundance. Not least because of what has been achieved in America, the energy industry now knows that it will be lack of demand, not lack of supply, which will cause production of oil,

coal and, later, gas to dwindle. In its latest “World Energy Outlook”, published on September 14th, BP, an oil company which has recently said it plans to go carbon neutral, argues that demand for oil may already have peaked, and could go into steep decline (see chart 2).

This is because of the second shift: an acknowledgment by most countries that, for the sake of the climate, reliance on fossil fuels needs to come to an end. And that leads to the third shift: electrification. Fossil fuels provide heat that is mostly used to move things, be they vehicles or electric generators. Solar panels and wind turbines provide energy as electricity straight off. Maximising their emissions-free benefits means processes and devices that now rely on combustion must in future use currents and batteries instead. The BP analysis argues that in a world going all out for decarbonisation the share of energy used in the form of electricity would rise from about a fifth in 2018 to just over half in 2050.

Falling demand for fossil fuels will tilt the balance of power away from producers and towards consumers—though there will doubtless be reversals now and then along the way. And in a world which needs to generate much more fossil-free electricity, mass production of the means whereby to do so will become crucial, as will government backing and know-how in deployment. Being a mighty pumper of oil will do a lot less for America under such conditions than once it might have done. But China, the world’s biggest fossil-fuel importer as well as its leading exponent of renewable energy at gigawatt scales, will have the wind, as it were, at its back.

The covid-19 pandemic has provided a dramatic preview of a world in which demand for oil falls instead of rising. When the globe stopped spinning in March, its thirst for oil suddenly subsided. Petrostates dependent on pricey oil for their spending now face gaping deficits. Investors have fallen out of love with oil companies. For all Mr Trump’s

grateful boosterism, the value of America's shale sector has fallen by more than 50% since January. ExxonMobil, an oil company included in the Dow Jones Industrial Average since 1928, has been kicked off it. With a market capitalisation of \$155bn it is worth considerably less than Nike, a shoemaker with a swoosh.

In the face of this turmoil China's demand for oil imports, already the largest in the world, continues to grow—providing some welcome stability. The country's independent refiners—the “teapots”—have become large enough that they help set oil's price floor. “They are essentially the vacuum cleaner of the crude market,” says Per Magnus Nysveen of Rystad Energy, a consultancy. Michal Meidan, who leads China energy studies at Oxford University, points out that the trading arms of state-owned oil giants SINOPEC and China National Petroleum Corporation are now two of the three largest traders of crude cargoes priced on the Platts Dubai futures contract, which means they influence the price of crude bound for Asia. Low prices also allow China to build up its strategic reserves.

Big finds off the coasts of Brazil and Guyana and the development of Australia's liquefied natural gas (LNG) capacity, along with America's shale boom, add to China's opportunities; a buyers' market is a good place to be the biggest buyer, notes Kevin Tu of Columbia and Beijing Normal Universities. There are plenty of bullish oilmen who think that, BP to the contrary, peak demand has yet to be reached. But even they recognise that the supply of oil below ground outstrips the thirst above it, and that competition for customers is likely to heat up.

In some instances competition for Chinese demand may be straightforward. When it embarked on a price war with Russia this spring, Saudi Arabia slashed prices on shipments bound for China. The country's biggest refiners are mulling a plan for a buying consortium to strengthen their negotiating power with the Organisation of the Petroleum Exporting

Countries. China will probably also flex its financial muscle as petrostates buckle under debt. It has issued oil-backed loans to crude-rich countries such as Angola and Brazil for more than a decade.

China's position as a buyer also allows it to undercut America's attempts to squeeze oil exporters. Chinese buyers long continued to import Iranian and Venezuelan crude. Its energy alliance with Russia is particularly important.

| *A different strength*

As energy expert Daniel Yergin points out in "The New Map" Vladimir Putin realised the significance of energy relations with China early on; but the pivot to China became more urgent after the financial crisis of 2007-09. In 2009 the China Development Bank lent two state-controlled Russian companies, Rosneft, an oil producer, and Transneft, a pipeline builder and operator, \$25bn in exchange for developing new fields and building a pipeline which would supply China with 300,000 barrels of oil a day.

In 2014 Western sanctions over Crimea inspired Gazprom, another Russian energy giant, to commit to a long-haggled-over gas pipeline, the Power of Siberia, which opened last December. Tying in Chinese custom gives Russia a large market unmoved by calls for sanctions at a time when European demand is faltering. But as Erica Downs of Columbia University points out, "As soon as a pipeline is built, the balance of power shifts from supplier to buyer." After the first oil pipeline was built, China refused to pay the agreed price.

All this power in the market, though, cannot mask the geopolitical downside of relying on imports. Being a large importer may give you more power than being a smaller one; but it still leaves you vulnerable. China is acutely aware that much of its oil comes through the straits of Hormuz and Malacca, which could be closed by third-party conflicts or, *in extremis*, the US Navy. In recent months China's concern about energy security has risen

as relations with America have declined, notes Ms Meidan—for all the current talk of decoupling, China has been buying lots of LNG from America, as well as crude for its stockpiles. Communist Party documents for China's new five-year plan emphasise the need for a more flexible, reliable energy system.

What China lacks in oil and gas supplies it makes up for with industrial policy, which it has long been using to support domestic coal production and nuclear power as well as what is now by far the world's largest renewables sector. Chinese companies have invested in mines from the Democratic Republic of Congo (DRC) to Chile and Australia, securing access to the minerals needed for solar panels, electric vehicles and the like. Unable to be a petrostate, it is becoming what one might call an electrostate, investing strategically all along the chain from mine to meter.

This is not in itself anything like a triumph for climate action. China has more than 1,000 gigawatts (GW) of coal-fired generating capacity. This installed base, with which it generates 49% of the world's coal-fired electricity, makes it the world's biggest carbon-dioxide emitter. And its coal use is set to expand in the years to come.

Its wind and solar capacity of 445GW, vast though it is by most standards, is less than half coal's total, and those renewables typically run at a much smaller fraction of their capacity than coal plants do. But China also has 356GW of hydropower capacity, more than the next four countries combined. It has been building nuclear power plants faster than any other country—the average age of the 48 reactors in its fleet is less than a decade—and intends to go on doing so; nuclear, which now produces less than 5% of the country's electricity, is set to produce more than 15% by 2050.

The evolution of China's nuclear, wind, solar and battery sectors varies

somewhat, but the basic formula remains the same: learn from foreigners and then use massive investment and authoritarian dictat to support deployment on a very large scale. Subsidies at home and abroad have helped. Support for renewables in Europe in the 2000s created a demand for solar panels only Chinese firms, liberally aided by the state, could meet. Chinese battery giants, led by CATL, benefited from a policy that subsidised electric vehicles only if they used batteries from domestic suppliers.

Fossil-fuel free as they are, these technologies still require raw materials. Wind and solar power need a lot more of some non-ferrous metals—notably, if unsurprisingly, copper—than systems which burn fossil fuels; batteries require niche materials in ways that fuel tanks do not. Generally, the world has plenty of these necessary commodities—but less capacity to get them to market than rapid decarbonisation requires. As Andy Leyland of Benchmark Minerals Intelligence, a research firm, puts it, “There’s no geological shortage. It’s a financing shortage.” Mines which frequently go over budget and are too often delayed, sited in countries prone to instability, are not overwhelmingly alluring to most Western investors.

Chinese companies have helped fill the gap. Some of this is through domestic investment. China produces 60% of the world’s “rare earths”, which have properties that make them useful in electric motors, among other things. They are not, generally, rare in a geological sense, but they can be in short supply. (They are also often mined in ways that do great damage to the local environment.)

For other metals China mostly has to look further afield. Tianqi, a private company, has a minority stake in SQM, Chile’s biggest miner of the lithium on which batteries depend. Tsingshan has invested in battery-grade-nickel projects in Indonesia. The DRC’s copper and cobalt have attracted Chinese investors for over a decade, and mines owned by others often send their

output to China anyway. China refines more than twice as much lithium and eight times as much cobalt as any other country, according to BloombergNEF, a research outfit (see chart 3).

Ivanhoe Mines, led by Robert Friedland, a veteran American miner, has had backing from two Chinese companies, CITIC and Zijin Mining, to build the world's largest new copper mine in the DRC. Mr Friedland argues that Chinese investors look further into the fewer-fossil-fuels future than Western ones. "What do the batteries look like? Where is the supply chain?" These are questions, Mr Friedland says, where the Chinese "are probably ten years ahead".

Politicians in America, Europe and Australia have expressed concern at Chinese control of minerals critical to not just energy but defence. A company backed by Bill Gates and other billionaires plans to search for cobalt in Quebec. America's Development Finance Corporation is, for the first time, taking equity stakes in mining companies. One beneficiary is TechMet, which is betting that some investors will prefer mines independent of Chinese control. "It's a very significant strategic issue for the United States and the West," says Admiral Mike Mullen, a former chairman of America's Joint Chiefs of Staff and now the head of TechMet's advisory board. "I almost liken it to Huawei. We wake up and they're in control of the world."

| *Here comes everyone*

China now produces more than 70% of the world's solar modules. It is home to nearly half its manufacturing capacity for wind turbines. It dominates the supply chain for lithium-ion batteries, according to BloombergNEF, controlling 77% of cell capacity and 60% of component manufacturing. With its industries at such a scale, and support costs ballooning, subsidies for them have been cut. Last year China eased restrictions on foreign battery-makers, too.

The rest of the world has benefited—the costs of solar panels and batteries have dropped by more than 85% in the past decade. “We will invest continuously in research to make sure we retain our leadership—in research and in mass production,” says Li Zhenguo, president of LONGi, a giant producer of solar modules. China is keen to set technical standards across a range of industries, hoping to shape the playing field for further innovation. For clean-energy technologies in particular, says Mr Tu, it has an edge.

Though it has successful and influential innovators such as Tesla (see Business section), in this part of the energy world Mr Trump’s superpower looks like an also-ran. His rival in this November’s election, Joe Biden, promises to get back in the race. Developed countries elsewhere are further along. Panasonic in Japan and LG Chem in South Korea are both making innovations in battery technology. Europe’s generous support has provided a big market for the world’s top wind turbine manufacturers, Siemens Gamesa, which has its headquarters in Spain, and Vestas of Denmark.

And Europe’s green ambitions are growing. In her state-of-the-EU address on September 16th, Ursula van der Leyen said that the European Commission, of which she is president, will be pressing for carbon emissions 55% below those of 1990 by 2030. This means European utilities are expected to provide both a large increase in capacity and a near-zero-emissions future. To do so they will have to buy yet more hardware from China. But Europe’s aggressive strategy gives them an opportunity to take the lead in developing the systems which put that kit to work, both at home and abroad, as well as in technologies China has yet to master.

Visit a wind farm in America’s heartland and you may well find an office of Electricité de France (EDF) nestled among the corn. Enel, a utility which has its headquarters in Italy, is the single largest investor in wind and solar projects in developing countries, according to BloombergNEF, with France’s

Engie and Spain's Iberdrola not far behind. Orsted, a Danish firm, is the world's top developer of offshore wind.

China's national champions have invested ambitiously in power projects abroad, too. Of the roughly \$575bn invested or promised under China's Belt and Road Initiative as of 2019, nearly half has gone to energy projects, according to the World Bank. But most of this has been on coal plants, nuclear reactors and dams. And nations wary of China's influence and motives treat its advances with suspicion. Efforts by State Grid, the world's biggest utility, to buy stakes in European electricity companies have been rebuffed. In Britain, state-owned China General Nuclear Power Group (CGN) has minority stakes in two nuclear plants being built by EDF, but a plant to be built by CGN itself is years away from approval which may not come at all.

Nevertheless Chinese companies are starting to invest more in wind and solar power abroad. China Three Gorges, a big power company, said in August that it would buy half a gigawatt of Spanish solar capacity from X-Elio, a developer based in Madrid. Last year CGN bought more than 1GW of wind and solar farms in Brazil.

To maximise its electrostate power China needs to combine its renewable, and possibly nuclear, manufacturing muscle with deals that let its companies supply electricity in a large number of countries. The International Renewable Energy Agency has suggested that such "infrastructure diplomacy" might prove as important to Chinese power in the 21st century as the protection of sea lanes was to American power in the 20th. If it uses it deftly, the energy transition could bring it advantages beyond any achievable with rigs, derricks and pipelines. ■



能源的新世界秩序

产油国对阵发电国

能源世界主导者的含义正发生变化——朝着有利于中国的方向

“美国现在是世界排名第一的能源超级大国。”今年夏天，在德克萨斯州米德兰（Midland）一个装点着锃亮的黑色油桶的舞台上，特朗普对石油商们这样说道。这些美国石油商从米德兰地下的页岩以及其他从前不出油的地质中开采出了大量碳氢化合物，证实他此言不虚（见图1）。过去十年中，美国的石油产量翻了一番不止，天然气产量增长超过50%。美国现在是这两种燃料的最大生产国。

罗斯福之后的总统如果听到特朗普说“我们再也不用依赖敌视我们的外国供应商了”，可能会羡慕而赞许地点头。第二次世界大战后，美国无可匹敌的石油消费能力超过了它无可匹敌的石油生产能力。确保来自其他地方的供应成为重中之重。1970年代的石油危机给经济和地缘政治都带来了深远影响，很大程度上导致了美国之后涉足中东。2010年代美国国内供应的激增不仅提振了经济，也开辟了新的地缘政治机遇。美国可以对伊朗、委内瑞拉和俄罗斯等产油国实施制裁而几乎毫发无伤。

但是，由于三种相互关联的全球转变，“能源超级大国”可能的含义正在发生变化。首先，人们认识到化石燃料储量丰富，不再担忧它稀缺。尤其是美国取得的成就令能源产业意识到，需求不足——而非供给不足——将导致石油、煤炭，以及再往后天然气的产量减少。在近期宣布了碳中和计划的石油公司BP在9月14日发布的最新一期《世界能源展望》（World Energy Outlook）中提出，对石油的需求可能已经达到顶峰，并可能急剧下降（见图2）。

这缘于第二个转变：大多数国家都承认，出于气候的考量，必须停止对化石燃料的依赖。而这导致了第三个转变：电气化。化石燃料提供的热量主要用于移动物体，不管是车辆或发电机。而太阳能板和风力涡轮机直接提供电作为能量。为了最大程度地实现它们的零排放益处，目前依赖燃烧的

工序和设备将来都必须改用电流和电池。BP的分析认为，在一个全力以赴脱碳的世界中，以电的形式使用的能源将从2018年的占比约五分之一，提高到2050年的略多过一半。

对化石燃料的需求减少将使得力量的天平从生产者向消费者倾斜，尽管这一过程无疑还会不时地有所逆转。而在一个需要大幅增加零碳发电的世界中，大规模制造相关发电系统将变得至关重要，政府的支持以及有关部署这些系统的专业知识也是如此。在这样的背景下，身为强大的产油国给美国带来的好处远不如这在过去可能达到的程度。而中国作为世界最大的化石燃料进口国，同时是吉瓦级可再生能源的领头羊，在某种程度上倒会顺风而行。

新冠疫情戏剧性地预演了一个石油需求下降而非上升的世界。当3月地球停止旋转时，它对石油的渴望突然消退了。那些指望昂贵的石油支撑政府支出的产油国如今面临巨大的赤字。投资者已经对石油公司丧失了热情。尽管特朗普做了那些充满感激的吹捧，美国页岩产业的市值自1月以来已跌去超过一半。自1928年起就被纳入道琼斯工业平均指数的石油公司埃克森美孚被踢出了该指数。它目前的市值为1550亿美元，显著低于“打勾”的耐克。

面对这场动荡，已经是世界最大石油进口国的中国的需求继续增长，这提供了一些可喜的稳定性。中国那些被称作“茶壶”的小型独立炼油厂的整体规模已经大到可以帮助为油价托底。咨询公司Rystad Energy的佩尔·马格努斯·尼斯文（Per Magnus Nysveen）说：“它们可以说是原油市场的吸尘器。”牛津大学领导中国能源研究的迈克尔·梅丹（Michal Meidan）指出，中国国有石油巨头中石化和中国石油天然气集团的交易部门现在是按普氏迪拜期货合约定价的三大原油贸易商中的两个。这意味着它们影响着运往亚洲的原油的价格。低油价也使中国得以建立战略储备。

巴西和圭亚那沿海新发现的大油田、澳大利亚的液化天然气（LNG）产能的发展，以及美国的页岩油气繁荣，加大了中国的机遇。哥伦比亚大学和北京师范大学的涂建军指出，在一个买家市场，做头号买家是件好事。和

BP的观点相反，很多看涨的石油生产商认为需求尚未触顶。但即便是他们也意识到，地下的石油供应超过了地面上的需求，争夺客户之战很可能愈演愈烈。

在某些情况下，对中国需求的竞争可能一目了然。今年春天，在与俄罗斯开打价格战时，沙特阿拉伯大幅削减了运往中国的石油价格。中国最大的一批炼油厂正在考虑组成收购财团，以加强它们与欧佩克的谈判能力。在产油国因债务问题承压之时，中国可能还会展示其财务实力。十多年来，它已向安哥拉和巴西等原油资源丰富的国家提供了用石油担保的贷款。

中国的买方地位也让它削弱了美国挤压石油出口国的企图。长期以来，中国买家持续进口伊朗和委内瑞拉原油。它和俄罗斯的能源联盟尤其重要。

| 不同的优势

正如能源专家丹尼尔·耶金（Daniel Yergin）在《新地图》（The New Map）一书中指出的那样，普京很早就意识到了与中国建立能源关系的重要性；但在2007至2009年金融危机之后，转向中国这件事变得更紧迫了。2009年，中国国家开发银行向俄罗斯两家国有控股公司——俄罗斯石油公司（Rosneft）和俄罗斯国家石油管道运输公司（Transneft）——提供了250亿美元贷款，以换取开发新油田并建设一条管道来每天向中国供应30万桶石油。

2014年，克里米亚引发的西方制裁促使俄罗斯另一家能源巨头俄罗斯天然气工业公司（Gazprom）下定决心建设一条争论了多年的天然气管道“西伯利亚力量”，在去年12月投入使用。在欧洲需求减退之际，绑定中国给俄罗斯提供了一个庞大的、不会因制裁呼吁而动摇的市场。但正如哥伦比亚大学的埃丽卡·唐斯（Erica Downs）指出的那样，“一旦管道建成，力量的天平就从供应方倒向了买方。”在第一条输油管道建成后，中国拒绝支付商定的价格。

但是，这种市场影响力无法掩盖依赖进口在地缘政治上的弊端。身为一个大进口国可能比小进口国更具影响力，但会造成软肋。中国清楚地意识

到，它大部分石油运经霍尔木兹海峡和马六甲海峡，这些通道可能因第三方冲突被封堵，或在极端情况下被美国海军封闭。梅丹指出，近几个月来，随着中美关系倒退，中国对能源安全的担忧上升了。毕竟，虽然目前有大量有关脱钩的讨论，中国一直都在从美国购买大量液化天然气，还购买原油作为储备。共产党有关中国新五年计划的文件强调了对更灵活、可靠的能源系统的需求。

中国用工业政策来弥补油气供应的不足。长期以来它用这些政策来支持国内的煤炭生产和核电，以及如今规模已在全球遥遥领先的可再生能源产业。中国公司已经投资了从刚果（金）到智利和澳大利亚的矿山，以确保获得太阳能板和电动汽车之类的系统所需的矿物。无法成为“产油国”的中国正在变成“发电国”，对从矿山到电表的整个供应链展开战略性投资。

这本身并不像是气候行动的一次胜利。中国拥有超过1000吉瓦的燃煤发电产能。这个装机量生产了全球49%的煤电，令它成为全球最大的二氧化碳排放国。而且它的煤炭用量在未来几年里肯定还会继续增加。

尽管按大多数标准看，中国445吉瓦的风能和太阳能装机容量很大，但这还不到煤炭总产能的一半，而且它们的实际运行产能相比装机容量的比例通常都要比燃煤电厂低得多。但中国还有356吉瓦的水电装机容量，超过排在它后面的四个国家的总和。它建设核电站的速度快过任何其他国家（总共48个反应堆平均建成时间不足十年），并且打算维持这种节奏。目前核电占中国总发电量的5%不到，到2050年应该会超过15%。

中国的核能、风能、太阳能和电池行业的发展演进有所不同，但基本模式都一样：向外国学习，然后利用大量投资和专制命令来支持大规模部署。国内外的补贴都曾有过帮助。2000年代欧洲对可再生能源的支持带来了太阳能板的需求，只有受国家慷慨补助的中国企业才能满足。以宁德时代新能源科技为首的中国电池巨头受益于一项补贴政策，即只有使用国内供应商的电池的电动汽车才能拿补贴。

这些技术虽不使用化石燃料，但仍需要原材料。与燃烧化石燃料的系统相

比，风能和太阳能对某些有色金属的需求要大得多，尤其是铜（这也不出奇）。电池需要油箱用不到的利基材料。总的来说，世界上此类必需的大宗商品十分丰富，但将它们推向市场的产能小于快速脱碳所需。正如研究公司基准矿物情报（Benchmark Minerals Intelligence）的安迪·莱兰（Andy Leyland）所说：“地质上的短缺并不存在。这是一种资金短缺。”那些常超出预算、经常延误且位于不稳定的国家的矿山对大多数西方投资者的吸引力不太大。

中国企业帮助填补了缺口。有一部分是通过国内投资。中国生产世界上60%的“稀土”，这些材料的特性让它们可被用于电动机等设备。它们一般在地质意义上并不稀有，但可能会供应不足。（它们的开采方式还经常会对本地环境造成巨大破坏。）

而在其他金属上，中国基本上不得不把目光投向离自己更远的地方。说到电池依赖的锂，民营企业天齐锂业拥有智利最大的锂矿商SQM的少数股权。青山控股集团已经在印尼投资了电池级镍项目。刚果（金）的铜和钴吸引中国投资者已有十多年，而矿山哪怕归其他人所有，总归也都经常将产品运往中国。据研究机构彭博新能源财经（BloombergNEF）的数据，中国提炼的锂和钴总量分别是任何其他国家的两倍和八倍以上（见图3）。

由美国资深矿商罗伯特·弗里德兰德（Robert Friedland）领导的艾芬豪矿业（Ivanhoe Mines）得到了中信和紫金矿业两家中国公司的支持，在刚果（金）建设世界最大的新铜矿。弗里德兰德认为，与西方投资者相比，中国投资者对淘汰化石燃料的前景看得更远。“电池是什么样的？供应链在哪里？”弗里德兰德说，在这些问题上，中国人的策划“可能领先了十年”。

对于中国掌控了不仅对能源而且对国防也至关重要的矿物，美国、欧洲和澳大利亚的政客纷纷表达了担忧。由比尔·盖茨和其他亿万富翁资助的一家公司计划在魁北克寻找钴。美国国际发展金融公司（DFC）首次购入了矿业公司的股权。TechMet是受益方之一，它押注一些投资者将更偏爱不

受中国控制的矿山。“这对美国和西方国家来说是一个非常重要的战略议题，”美国前参谋长联席会议主席、现任TechMet顾问委员会主席的迈克·马伦海军上将（Mike Mullen）说，“我几乎把它与华为问题相提并论。我们醒过来的时候，他们已经控制了世界。”

| 大家都来了

目前，中国生产了全球超过70%的太阳能组件。全球风力涡轮机制造产能的将近一半在中国。据彭博新能源财经报道，中国主导了锂离子电池的供应链，控制了77%的电池产能和60%的组件制造。由于产业规模如此庞大，提供支持的成本激增，因此对这些行业的补贴已经削减。去年中国也放宽了对外国电池制造商的限制。

世界其他地区已从中受益：过去十年里，太阳能板和电池的成本下跌超过85%。太阳能组件制造巨头隆基绿能的总裁李振国表示，“我们将持续投资于研发，以确保我们在研究和批量生产方面保持领先地位。”中国很想为诸多不同行业设定技术标准，希望能塑造进一步创新的竞争环境。涂建军说，尤其是在清洁能源技术方面，中国有优势。

尽管拥有特斯拉等成功且有影响力的创新者，但在清洁能源这一块，特朗普口中的超级大国看上去却是在陪跑。他在11月大选中的对手拜登承诺要重新赶上去。其他发达国家在更远处追赶。日本的松下和韩国LG化学都在创新电池技术。欧洲的慷慨支持为全球顶级风力涡轮机制造商——总部位于西班牙的西门子歌美飒（Siemens Gamesa）和丹麦的维斯塔斯（Vestas）——提供了庞大的市场。

而欧洲的绿色抱负正在增长。欧盟委员会主席乌尔苏拉·冯德莱恩（Ursula van der Leyen）在9月16日发表的“盟情咨文”中说，欧盟将促使碳排放量到2030年比1990年减少55%。这意味着欧洲公用事业预期将在大幅增加产能的同时实现接近零排放的未来。为此它们将不得不从中国购买更多硬件设备。但欧洲积极的战略使他们有机会率先开发出让这些设备能在国内外投用的系统，并引领中国尚未掌握的技术。

如果你去参观美国腹地的风电场，很可能在玉米地里发现法国电力公司（EDF）的办事处。据彭博新能源财经报道，意大利国家电力公司（Enel）是发展中国家风能和太阳能项目的最大投资方，法国燃气苏伊士集团（Engie）和西班牙的伊维尔德罗拉（Iberdrola）紧随其后。丹麦沃旭能源（Orsted）是全球最大的海上风电开发商。

中国的国家冠军队也雄心勃勃地投资国外的电力项目。根据世界银行的数据，截至2019年，中国在“一带一路”倡议下投资或承诺的约5750亿美元中有近半用于能源项目。但其中大部分投向了煤电厂、核反应堆和大坝。而那些警惕中国的影响力和动机的国家对中国进军海外持怀疑态度。全球最大的公用事业公司中国国家电网意欲收购欧洲电力公司的股份被拒。国企中国广核集团持有法国电力公司正在英国兴建的两座核电站的少数股权，但该集团自己在当地将要建造的一座核电站距获批还遥遥无期，可能根本不会有这一天。

尽管如此，中国企业已开始在海外投资更多风能和太阳能。大型电力公司中国长江三峡集团8月表示，将向总部位于马德里的西班牙可再生能源开发商X-Elio收购500兆瓦的太阳能装机容量。去年，中广核在巴西收购了超过1吉瓦的风能和太阳能发电场。

中国若想充分发挥发电国的影响力，除了它拥有的可再生能源——可能还有核能——的制造实力外，还需达成交易来让它的企业为许多国家供电。国际再生能源总署（International Renewable Energy Agency）提出，这种“基础设施外交”对21世纪中国实力的重要性，或可匹敌保护海上航线对20世纪美国实力的重要性。如果巧妙地运用它，这场能源转型为中国带来的优势可能将超越钻机、井架和管道所能实现的任何目标。■



The new energy order

Power in the 21st century

Efforts to rein in climate change will up-end the geopolitics of energy

OIL FUELLED the 20th century—its cars, its wars, its economy and its geopolitics. Now the world is in the midst of an energy shock that is speeding up the shift to a new order. As covid-19 struck the global economy earlier this year, demand for oil dropped by more than a fifth and prices collapsed. Since then there has been a jittery recovery, but a return to the old world is unlikely. Fossil-fuel producers are being forced to confront their vulnerabilities. ExxonMobil has been ejected from the Dow Jones Industrial Average, having been a member since 1928. Petrostates such as Saudi Arabia need an oil price of \$70-80 a barrel to balance their budgets. Today it is scraping along at just \$40.

There have been oil slumps before, but this one is different. As the public, governments and investors wake up to climate change, the clean-energy industry is gaining momentum. Capital markets have shifted: clean-power stocks are up by 45% this year. With interest rates near zero, politicians are backing green-infrastructure plans. America's Democratic presidential contender, Joe Biden, wants to spend \$2trn decarbonising America's economy. The European Union has earmarked 30% of its \$880bn covid-19 recovery plan for climate measures, and its president, Ursula von der Leyen, used her state-of-the-union address last month to confirm that she wants the EU to cut greenhouse-gas emissions by 55% over 1990 levels in the next decade.

The 21st-century energy system promises to be better than the oil age—better for human health, more politically stable and less economically volatile. The shift involves big risks. If disorderly, it could add to political and economic instability in petrostates and concentrate control of the

green-supply chain in China. Even more dangerous, it could happen too slowly.

Today fossil fuels are the ultimate source of 85% of energy. But this system is dirty. Energy accounts for two-thirds of greenhouse-gas emissions; the pollution from burning fossil fuels kills over 4m people a year, mostly in the emerging world's mega-cities. Oil has also created political instability. For decades petrostates such as Venezuela and Saudi Arabia, with little incentive to develop their economies, have been mired in the politics of handouts and cronyism. In an effort to ensure secure supplies, the world's big powers have vied to influence these states, not least in the Middle East, where America has roughly 60,000 troops. Fossil fuels cause economic volatility, too. Oil markets are buffeted by an erratic cartel. Concentration of the world's oil reserves makes supply vulnerable to geopolitical shocks. Little wonder that the price has swung by over 30% in a sixth-month period 62 times since 1970.

A picture of the new energy system is emerging. With bold action, renewable electricity such as solar and wind power could rise from 5% of supply today to 25% in 2035, and nearly 50% by 2050. Oil and coal use will drop, although cleaner natural gas will remain central. This architecture will ultimately bring huge benefits. Most important, decarbonising energy will avoid the chaos of unchecked climate change, including devastating droughts, famine, floods and mass dislocation. Once mature, it should be more politically stable, too, because supply will be diversified, geographically and technologically. Petrostates will have to attempt to reform themselves and, as their governments start to depend on taxing their own citizens, some will become more representative. Consuming countries, which once sought energy security by meddling in the politics of the oil producers, will instead look to sensible regulation of their own power industry. The 21st-century system should also be less economically volatile. Electricity prices will be determined not by a few big actors but by

competition and gradual efficiency gains.

Yet even as a better energy system emerges, the threat of a poorly managed transition looms. Two risks stand out. Autocratic China could temporarily gain clout over the global power system because of its dominance in making key components and developing new technologies. Today Chinese firms produce 72% of the world's solar modules, 69% of its lithium-ion batteries and 45% of its wind turbines. They also control much of the refining of minerals critical to clean energy, such as cobalt and lithium. Instead of a petrostate, the People's Republic may become an "electrostate". In the past six months it has announced investments in electric-car infrastructure and transmission, tested a nuclear plant in Pakistan and considered stockpiling cobalt.

China's leverage depends on how fast other economies move. Europe is home to giant developers of wind and solar farms—Orsted, Enel and Iberdrola are building such projects around the world. European firms are leading the race to cut their own emissions, too. America's trajectory has been affected by the rise of shale oil and gas, which has made it the world's largest oil producer, and by Republican resistance to decarbonisation measures. If America were to act on climate change—with, say, a carbon tax and new infrastructure—its capital markets, national energy laboratories and universities would make it a formidable green power.

The other big risk is the transition of petrostates, which account for 8% of world GDP and nearly 900m citizens. As oil demand dwindles, they will face a vicious fight for market share which will be won by the countries with the cheapest and cleanest crude. Even as they grapple with the growing urgency of economic and political reform, the public resources to pay for it may dwindle. This year Saudi Arabia's government revenue fell by 49% in the second quarter. A perilous few decades lie ahead.

Faced with these dangers, the temptation will be to ease the adjustment, by taking the transition more slowly. However, that would bring about a different, even more destabilising set of climate-related consequences. Instead, the investments being contemplated fall drastically short of what is needed to keep temperatures within 2°C of pre-industrial levels, let alone the 1.5°C required to limit the environmental, economic and political turmoil of climate change. For example, annual investment in wind and solar capacity needs to be about \$750bn, triple recent levels. And if the shift towards fossil-fuel-free renewable energy accelerates, as it must, it will cause even more geopolitical turbulence. The move to a new energy order is vital, but it will be messy. ■



【首文】能源新秩序

21世纪的能源势力

为遏制气候变化所做的努力将颠覆能源的地缘政治格局

石油推动了20世纪，包括这个时期的汽车、战争、经济和地缘政治。如今，世界正处于一场能源冲击中，向新秩序的转变也由此加速。今年年初，新冠肺炎冲击全球经济，石油需求下降超过五分之一，油价暴跌。自那之后，油价震荡回升，但不太可能恢复到过去的水平。化石燃料生产商正被迫正视自己的脆弱。自1928年以来一直都是道琼斯工业指数成分股的埃克森美孚已被移出了该指数。沙特阿拉伯等产油国需要油价维持在每桶70至80美元才能平衡预算。目前油价在40美元的低位徘徊。

油价过去也暴跌过，但这次不同于以往。随着公众、政府和投资者意识到气候变化的重要性，清洁能源产业势头正猛。资本市场已经发生了转变：今年，清洁能源股票上涨了45%。在利率接近于零之时，政客们开始支持绿色基建计划。美国民主党总统候选人拜登想花费2万亿美元让美国经济脱碳。欧盟已经在8800亿美元的新冠复苏计划中拨出30%的资金用于应对气候变化。欧盟委员会主席乌尔苏拉·冯德莱恩（Ursula von der Leyen）上月在发表“盟情咨文”时再度确认，她希望欧盟在接下来的10年里将温室气体排放量相比1990年减少55%。

本世纪的能源系统有望好于石油时代——更有益于人类健康，在政治上更稳定，在经济上也能少一些动荡。这场转型风险巨大。如果无序进行，它可能加剧产油国政治和经济上的不稳定，并把绿色供应链的控制权集中到中国。更危险的是，转型的步伐可能太慢。

目前，化石燃料是85%的能源的根本来源。但这一系统污染严重。世界三分之二的温室气体排放源自使用能源；燃烧化石燃料带来的污染每年导致400多万人死亡，大部分是在新兴国家的大城市。石油还造成政治不稳定。几十年来，缺乏动力发展经济的委内瑞拉和沙特阿拉伯等产油国一直深陷补贴和裙带政治的泥潭。为确保供应稳定，世界各大国竞相对这些产

油国施加影响，尤其是在有约六万美军驻守的中东。化石燃料也给经济带来不稳定。捉摸不定的卡特尔组织欧佩克不断冲击着石油市场。全球石油储量的集中让供给很容易受到地缘政治的影响。难怪自1970年以来，油价在半年内波动超过30%的情形多达62次。

一幅能源新系统的图景正在徐徐展开。如果采取大胆行动，太阳能和风能等可再生能源可能会从目前占供应量的5%上升到2035年的25%，再到2050年的接近50%。石油和煤炭用量会下降，尽管相对更清洁的天然气仍将是主要能源。这种结构最终会带来巨大好处。最重要的是，能源脱碳会避免肆虐的气候变化带来的混乱，包括毁灭性的干旱、饥荒、洪水以及大规模迁移等。这个系统一旦发展成熟，政治上的稳定性应该也会增强，因为能源供应在地理和技术上都会变得多元化。产油国将不得不尝试自我改革，而随着其政府开始依赖对本国公民征税，它们中的一些将向代议制转型。曾经通过干涉产油国内政来谋求能源安全的石油消费国则将转而寻求明智地监管本国能源产业。21世纪的系统在经济上应该也会更趋于稳定。电价将不再由几个垄断者说了算，而是由竞争和逐步的效率提升所决定。

不过，在一个更好的能源系统初露头角的同时，转型管理不善的威胁也在迫近。两个风险凸显出来。专制中国在关键零部件制造和新技术开发方面占据主导，因此可能会暂时赢得对全球能源系统的影响力。如今，中国企业生产了世界上72%的太阳能组件、69%的锂离子电池和45%的风力涡轮机。它们还控制着提炼钴和锂等对清洁能源至关重要的矿物的大部分。中国可能变成一个“电能国家”，而不是石油国家。过去六个月里，中国宣布了对电动汽车基础设施和输电设备的投资，测试了巴基斯坦的一座核电站，并考虑收储钴。

中国的影响力取决于其他经济体的行动速度。欧洲是风能和太阳能发电场开发巨头的大本营——丹麦的沃旭能源（Orsted）、意大利国家电力公司（Enel）和西班牙的伊维尔德罗拉公司（Iberdrola）正在世界各地建设此类项目。欧洲企业在减排方面也走在前头。美国的进程受到影响，原因是使美国成为全球最大产油国的页岩油气的兴起，以及共和党对脱碳措施的抵制。如果美国对气候变化采取行动，比如征收碳排放税、建设新的基础

设施等，那么它的资本市场、国家能源实验室和大学将会使它成为强大的绿色能源国。

另一个巨大风险是产油国的转型，它们占世界GDP总量的8%，拥有近九亿人口。随着石油需求减少，它们将面临一场争夺市场份额的恶战，而那些原油成本最低、最清洁的国家将会赢得这场战争。就在产油国奋力应对日益紧迫的经济和政治改革之时，支持改革的公共资源可能会减少。今年沙特政府第二季度收入减少了49%。未来几十年将会危机四伏。

面对这些危险，人们很容易会放慢转型的速度，以降低调整的难度。然而，这将引发另一系列气候相关后果，带来甚至更大的动荡。而目前计划的投资远远低于将温升控制在比工业化前水平高出2°C以内所需的水平，更别提将温升控制在1.5°C以内以求限制气候变化带来的环境、经济和政治动荡了。例如，每年在风能和太阳能发电产能上的投资需要达到7500亿美元左右，是近期水平的三倍。而如果加速向非化石燃料的可再生能源转变——这也是必然之举——将导致更多的地缘政治动荡。向能源新秩序的转变至关重要，但也很棘手。 ■



Climate change

A greener horizon

China says it will reduce its net emissions of carbon dioxide to zero by 2060. Achieving this will not be easy

IN A RECORDED video message to the UN General Assembly on September 22nd, China's leader, Xi Jinping, made a surprise announcement. He said that as well as aiming to halt the rise of its carbon emissions by 2030—much the same goal as five years ago—China would strive for “carbon neutrality” by 2060. In climate-change jargon, this means achieving a balance between carbon emissions and carbon reduction both technological and natural, such as planting trees. For China to succeed, it must descend from its emissions peak far more rapidly than any other major economy has either succeeded in doing, or has pledged to do. It will be a huge challenge.

Under the Paris agreement on climate change, reached in 2015, signatories were required to submit fresh plans for reducing their emissions by the end of this year. Covid-19 has put a spanner in the works. On September 2nd Patricia Espinosa, the UN's chief climate-change official, said she expected about 80 countries to meet the deadline. Before Mr Xi's speech, many analysts had predicted that China would not show its hand until after America's elections in November, when American climate-change policy for the next four years will become clearer. Stung by international criticism of its early handling of the pandemic, China may have decided to reveal its hand earlier to boost its image.

But are the targets realistic? China will certainly have no problem ensuring that its emissions reach a peak before 2030. Already in 2014—a year before Mr Xi first declared such a goal (“around 2030” was the wording then)—experts had concluded that the peak could arrive as early as 2025.

Indeed, some scientists believe that its emissions from fossil fuels—the biggest source of human-produced carbon—may have peaked already. The Brookings-Tsinghua Centre for Public Policy, a think-tank in Beijing, reckons they could begin declining in 2025. So Mr Xi's reference to a target of 2030 in his speech to the UN was distinctly underwhelming.

Aiming for carbon neutrality by 2060 is another matter. Mr Xi had already floated the idea that China might strive for such a goal on September 14th at a video summit with European Union leaders. Though during that call he did not commit to a deadline, his specifying of carbon neutrality as an ambition was “a political breakthrough”, says a European diplomat. Last year European leaders set a target for “climate neutrality” by 2050. America has kept silent on the topic.

In his UN speech, Mr Xi chose his words carefully. He referred to carbon neutrality by 2060, not climate neutrality. In climate-speak, this suggests the target will apply only to emissions of carbon dioxide (CO₂), not other greenhouse gases such as methane, a big contributor to global warming. The EU's goal for climate neutrality covers all emissions.

But China is the source of 27% of global emissions of CO₂. Were it to commit formally to the 2060 target, previous forecasts of global warming trends by 2100 would need to be revised. Climate Action Tracker, a research group, had calculated that if all governments were to adhere to their Paris-accord pledges, the planet would warm, on average, by 2.7°C by 2100 compared with pre-industrial temperatures—still a long way off the Paris target of 1.5-2°C. Mr Xi's announcement, they now say, could knock between 0.2°C and 0.3°C off this estimate.

That would still mean more warming than agreed in Paris, but China is not acting alone. Like China, the EU has not committed formally to its mid-century target. But doing so would have a big impact: the union's CO₂

emissions alone account for 10% of the world's. All eyes are now on American voters. Victory for Joe Biden in the presidential election would mean the world's top three emitters—China, America and the EU, which account for about 45% of global emissions—would all have similar time-frames for achieving net-zero goals. This would place the warming limit agreed in Paris “firmly in reach” says Bill Hare of Climate Action Tracker.

Mr Xi did not say how China would attain its 2060 goal. American CO₂ emissions peaked sometime between 2005 and 2007, then dropped by about 14% in the subsequent decade. The EU's total emissions peaked in 1990 and have since fallen by 21%. The aim is to reduce them by 45% by 2030. That would amount to a near-halving of emissions in four decades. China is implying that it will plunge from peak to near-nothing in just 30 years.

Crucially, China has not spelled out whether its new target will cover domestic emissions only, or include the emissions caused by China's generous investments in coal outside its borders, including through the Belt and Road Initiative, a global infrastructure-building scheme. A new five-year economic plan, to be adopted next year, may provide clues to China's plans for ending fossil-fuel dependency.

Achieving the 2060 target will require a complete decarbonisation of China's electricity supply, more than 60% of which still comes from burning coal. Yet China is still building coal-fired power plants faster than any country. In the first six months of 2020 it built more than 60% of the world's new installations of them. Carbon-heavy infrastructure being planned and built today could remain usable for decades. China's efforts to revive its covid-struck economy include making it easier to secure permits to build such stuff.

But China worries about the impact of climate change—it is already

plagued by floods and droughts. It can implement changes in ways that some democracies may find hard to replicate. For example, it can increase nuclear-power production without fear of public opposition—grassroots activism of any kind is suppressed. Its nuclear generating capacity more than doubled in 2014-19 to 48.7GW, according to Bloomberg NEF, an energy think-tank.

Even with a big expansion of nuclear energy, it is extremely unlikely that China could meet its target without finding ways of capturing CO₂—either before it is emitted by power stations or directly from ambient air—and storing it underground. No method has yet been found for achieving this at scale. It will also be difficult to make substantial cuts in emissions from industrial processes and heavy transport without yet-to-be-invented technologies. Planting new forests would help absorb carbon, but it would need to be on a colossal scale to make the difference needed.

The lack of an obvious road-map makes Mr Xi's commitment all the more remarkable. His ambitions will require a new approach to economic development that will need to become obvious soon. ■



气候变化

更绿色的地平线

中国表示要在2060年前将二氧化碳净排放量降到零。实现这个目标并不容易

在9月22日联合国大会上播放的录像讲话中，中国领导人习近平宣布了一个出人意料的决定。他说，中国在力争二氧化碳排放于2030年前达到峰值（与五年前提出的目标基本一致）的同时，还要努力争取2060年前实现“碳中和”。在气候变化的行话中，这意味着通过技术手段和植树等自然手段实现碳排放和减排的平衡。中国要想取得成功，就必须更快地将排放量从峰值降下来，速度要远远超过任何其他大型经济体曾经达到或承诺的。这将是一个巨大的挑战。

根据2015年达成的针对气候变化的《巴黎协定》，签署国要在今年年底前提交新的减排计划。疫情打乱了这一安排。9月2日，联合国主管气候变化事宜的官员帕特里夏·埃斯皮诺萨（Patricia Espinosa）表示，她预计约有80个国家能够如期完成。在习近平发表讲话之前，许多分析人士预测，中国要等到11月美国大选结束、美国未来四年的气候变化政策更加明朗之后才会亮出底牌。但由于被国际社会批评在疫情爆发之初处理不当，中国可能决定提前亮牌以提升自己的形象。

但这些目标真的现实吗？中国要实现在2030年前排放达到峰值肯定是没有问题的。早在2014年也就是习近平首次宣布这一目标的前一年（当时的措辞是“2030年左右”），专家已经认为最早可能在2025年就迎来峰值。事实上，一些科学家认为中国化石燃料（人为碳排放的最大来源）的排放可能已经见顶。据北京智库清华-布鲁金斯公共政策研究中心估算，中国的碳排放可能在2025年开始下降。因此，习近平在联合国的讲话中提出的2030年目标显然平平无奇。

但是到2060年实现碳中和就完全不同了。在9月14日与欧盟领导人的视频峰会上，习近平已经试探性地提出了中国可能要力争实现这样的目标。一位欧洲外交官表示，尽管在那次会议中习近平并没有对最后期限作出承

诺，但他具体提出碳中和的目标本身就是“一个政治突破”。去年，欧洲领导人设定了到2050年实现“气候中和”的目标。美国在这个问题上保持沉默。

习近平在联合国演讲中用词谨慎。他提出的目标是到2060年实现碳中和，而不是气候中和。在气候术语中，这表明该目标只适用于二氧化碳的排放，而不包括其他温室气体，例如全球变暖的重要来源——甲烷。欧盟的气候中和目标则涵盖了所有排放。

但中国占全球二氧化碳排放的27%。如果它正式承诺实现2060年目标，先前对2100年前全球变暖趋势的预测都将改写。研究机构气候行动追踪组织（Climate Action Tracker）曾计算过，如果各国政府都遵守《巴黎协定》的承诺，到2100年全球平均气温将比工业化前的水平升高2.7°C，与《巴黎协定》1.5至2°C的目标相差甚远。该机构现在表示，习近平宣布的目标可能让原来估算的升温减少0.2至0.3°C。

这仍然意味着升温幅度将超过《巴黎协定》的目标，但中国并非孤军作战。和中国一样，欧盟也尚未正式承诺其到本世纪中叶的目标。而一旦它正式承诺，将会产生巨大的影响：欧盟的二氧化碳排放量占全世界10%。现在所有目光都聚焦在美国选民身上。如果拜登在总统大选中获胜，将意味着全球三大排放地区——中国、美国和欧盟（总共约占全球排放的45%）——都将力争在近似的时间框架内实现净零排放目标。这样一来，实现《巴黎协议》的升温限制目标就“大有希望”，气候行动追踪组织的比尔·黑尔（Bill Hare）表示。

习近平并未说明中国将如何实现其2060年目标。美国的二氧化碳排放在2005至2007年间达到峰值，在随后十年里下降了14%左右。欧盟的总排放在1990年达到峰值，此后减少了21%；现在的目标是在2030年前降低45%。这相当于花40年的时间将排放量减少近一半。而中国提出的目标则意味着要在短短30年内从峰值骤降至接近零。

关键是，中国尚未明确其新目标是只包含国内排放，还是会包含在境外大

量投资于煤炭所带来的排放，包括其全球基建计划“一带一路”倡议。中国明年将实施新的五年经济计划，从中或许能够找到一些中国将如何终结对化石燃料的依赖的线索。

要实现2060年的目标，中国的电力供应必须完全脱碳，目前超过六成发电仍然靠燃煤。但中国兴建燃煤发电厂的速度仍然超过任何其他国家。在2020年的头六个月里，全世界新建煤电厂有60%以上是中国建造的。今天规划和建设的碳密集型基础设施可以持续使用几十年。为了重振受疫情影响的经济，中国采取的措施中就包括放宽此类项目的建设许可。

但中国也担心气候变化的影响——它已备受洪水和干旱的困扰。它可以用一些民主国家难以复制的方式实施变革。例如，它可以增加核能发电而不必担心公众反对，毕竟任何形式的底层民众抗议活动都被压制。能源智库彭博新能源财经（Bloomberg NEF）称，2014到2019年间，中国的核电装机容量翻了一番以上，达到48.7GW。

即使大幅度扩张核电，如果不设法在发电厂排放之前或者直接从环境空气中捕捉二氧化碳并封存于地下，中国要实现目标还是极不现实。目前还没有找到这样大规模捕捉碳的方法。在相关技术发明出来之前，也很难大幅减少工业流程和重型运输的碳排放。植树造林会有助于碳吸收，但要实现所需效果需要极大的规模。

正因为缺乏明显的路线图，习近平的承诺变得更加引人注目。他的雄心壮志要求采用新的经济发展方式，而且需要尽快清晰地呈现在世人面前。■



Bartleby

The only way is ethics

Finding ways for managers to reduce cheating

CORPORATE SCANDALS occur with depressing regularity, from the accounting misstatements at Enron in 2001 to fake bank accounts at Wells Fargo, uncovered in 2016. In June Wirecard, a German payments processor, revealed that €1.9bn (\$2.3bn) was missing from its accounts. What was remarkable about the affair was that the company's book-keeping had been the subject of sceptical articles in the *Financial Times*. Yet the initial reaction of BaFin, the German regulator, was to launch an investigation into the newspaper, not the firm.

It is clearly difficult for people to recognise when a business is heading off the rails. That can be just as true for managers within a business as for people outside it. Executives can be sideswiped by an unnoticed problem in an individual division or a subsidiary; not all scandals make it on to the front pages.

Outright malice is not always the cause. Ethical choices are rarely black or white and individuals are not very good at assessing the purity of their own motivations. In a new book about behavioural biases, "You're About To Make A Terrible Mistake", Olivier Sibony of HEC business school in Paris writes that "as soon as there is any ambiguity about a judgment...we reason in a way that is selective enough to serve our interests and yet plausible enough to convince others (and ourselves) that we are not intentionally distorting the facts." Individuals' choices are also governed by how others behave; people are more likely to break the speed limit if everyone else is doing so.

Philosophers call morally ambiguous decision-making within such

internal and external constraints “bounded ethicality”. Inside companies, it can easily mean that a culture of cheating can spread quickly. A seminal paper* by academics at Columbia and Harvard business schools looked at how, in the light of this problem, companies might reduce cheating within their ranks.

Their first finding was that individuals are more likely to lie, or commit fraud, when they are set excessively difficult and specific goals. Bounded ethicality, the authors argue, can also operate at an unconscious level. Under pressure, people often do not efficiently analyse information that could otherwise keep them on the straight and narrow.

The problem is exacerbated by confirmation bias, a human tendency to seek out facts that back up their pre-existing preferences. Research has found that people given a specific performance target (to reach a 12% annual return over the investment horizon, for example) were more likely to overlook important information about the future performance of investment funds and excessively focus on past performance data.

As a result, the authors suggest, “Organisations might decrease intentional unethical behaviour by defining their goals more broadly and by setting goals at levels that are perceived as fair and relatively attainable by employees.” Another tactic is for managers to signal clearly that ethical issues may arise, so that people take them into account when making decisions. In one study, drivers were found to be more honest in reporting their car mileage when they signed an ethics code of conduct at the top of a mileage form (before they entered the distance on the form) than at the bottom (after the figure had been recorded).

The Columbia and Harvard researchers conducted a test asking people to act as financial advisers and pick from a range of funds. One part of it used the raw data from funds operated by Bernie Madoff, convicted in 2009 for

defrauding investors. The participants did not know the data came from a fraudulent fund. But they did see its high returns and the opaque way it operated. One group was simply asked to recommend a fund; another group was asked to consider which fund made them most suspicious before making their recommendation. The result of this intervention was to decrease the proportion of individuals recommending Mr Madoff's funds to their clients from 68% to 51%.

This figure is still staggeringly high, of course. It might have been reduced further, the academics suggest, if participants could have asked more questions and got more information. Too often, people rush to judgment, which leads them to play down the risks they are taking and the corners they are cutting. And that means scandals are inevitable.

* "Reducing bounded ethicality: How to help individuals notice and avoid unethical behaviour," by Ting Zhang, Pinar Fletcher, Francesca Gino and Max Bazerman ■



巴托比

绕不开的道德问题

找到办法来帮助管理者减少公司舞弊

从2001年的安然假账事件，到2016年富国银行被揭伪造账户，企业爆出丑闻的频率之高令人沮丧。今年6月，德国支付处理公司Wirecard披露自己公司账上有19亿欧元（23亿美元）不翼而飞。这一桩的稀奇之处是在此之前《金融时报》的一些报道质疑这家公司的账目有问题，但德国联邦金融监管局（BaFin）对此的第一反应是开始调查这张报纸，而不是这家公司。

人们要识别出一家公司开始偏离正轨显然很困难。而公司内部管理层可能和外头的人一样无知无觉。高管们可能会因为公司某个部门或某家子公司中一个未被注意到的问题而遭遇“侧击”；也并不是所有丑闻都有机会登上报章头版。

丑闻的起因并非都是彻头彻尾的恶意。道德抉择极少非黑即白，而且个体不太擅长评估自身动机的纯粹性。巴黎高等商学院的奥利维尔·西博尼（Olivier Sibony）在关于行为偏误的新书《你将要犯下一个可怕的错误》（You're About To Make A Terrible Mistake）中写道：“只要一项判断存在模糊地带……我们的推理方式一方面会做足够严格的筛选来为我们的利益服务，同时还要听起来足够有道理来说服他人（以及我们自己）我们并没有在故意歪曲事实。”个人选择还受到他人行为的强烈影响：如果周围的人都在超速行驶，自己也更可能超速。

哲学家把在这类内部和外部制约下做出道德上含混不明的决策称为“有限道德”（bounded ethicality）。在企业内部，它很容易导致舞弊文化迅速传播。哥伦比亚大学商学院和哈佛商学院的学者们发表的一篇开创性论文*探讨了企业如何可能针对这个问题来减少团队内部的舞弊行为。

他们的第一个发现是，当个体被设定了太难而过于具体的目标时，就更可

能说谎或弄虚作假。作者认为，有限道德还会在潜意识层面发生作用。在压力之下，人们往往无法高效地分析信息，而这种分析本可以让他们保持诚实本分。

确认偏误（confirmation bias）加剧了这个问题。它指的是人们往往会寻找事实来支持自己既有的倾向。研究发现，被设定了某个特定绩效目标（比如在整个投资期实现12%的年回报率）的人更可能忽略有关投资基金未来表现的重要信息，而过分盯牢历史绩效数据。

作者据此建议，“组织或许可以更宽泛地界定目标，并把目标设定在员工视为公平且相对可实现的水平，以减少故意的不道德行为。”另一个策略是管理者清楚地预警可能出现的伦理问题，这样人们在做决策时会将它们考虑在内。一项研究发现，相比于让司机在车辆里程表末尾（即填写了里程数字之后）阅读一段行为道德规范并签名，让他们在表格开头（也就是在填写里程数字之前）做这一步能获得更诚实的数字。

哥伦比亚大学和哈佛大学的研究人员做了一项测试：请人们担任理财顾问，从一系列基金中挑选一个。测试的一部分使用了伯尼·麦道夫（Bernie Madoff）做过手脚的基金的原始数据，而麦道夫在2009年因欺骗投资者被定罪。受试者并不知道这些数据源自一个欺诈基金，但确实看到它回报很高而且运作不透明。研究人员请一组受试者直接推荐一个基金，而请另一组人在做出推荐之前想一想哪个基金让他们的操守最受质疑。在第二组中增加的这步干预使得向客户推荐麦道夫基金的人数比例从68%降到了51%。

当然，这个数字仍然高得惊人。这些学者表示，如果当时允许受试者问更多问题并获得更多信息，它可能会变得更低些。太多时候，人们急于做判断，导致他们淡化自己在冒的风险和在抄的近路。而这使得丑闻不可避免。

*“减少有限道德：如何帮助个人察觉和避免不道德行为”，作者：张婷（Ting Zhang，音译）、皮纳尔·弗莱彻（Pinar Fletcher）、弗朗西丝卡

• 吉诺（Francesca Gino）和马克思·巴泽曼（Max Bazerman） ■



America's economy

Snapback

Why the world's largest economy is beating forecasts

“WHEN AMERICANS vote in November, unemployment will be below 6%,” declared Lars Christensen, a maverick economist, in May. Given that lockdowns had sent the unemployment rate soaring to 14.7% only the month before, it was a bold prediction. In June at least 14 of the Federal Reserve’s 17 interest-rate-setters forecast that quarterly unemployment at the end of the year would still be above 9%. Most other prognosticators were equally gloomy. They expected American GDP to collapse in 2020 and recover relatively slowly. Mr Christensen insisted that natural disasters, unlike financial crashes and recessions brought on by economic policy mistakes, are typically followed by rapid recoveries.

He may be proven right. Over the summer the unemployment rate fell fast, to 8.4% in August. And economists have scrambled to upgrade their growth forecasts (see chart). On September 16th the OECD, a rich-country think-tank, predicted that the American economy would shrink by 3.8% this year, rather than the 7.3% expected in June. The outlook was upgraded across the rich world, but nowhere by as much. America still faces a recession about half as deep again as the one it endured after the financial crisis. But expectations are not as apocalyptic as they were—and look better than they do in most of Europe.

The upgrades in America can be attributed to three factors. First, the spread of the coronavirus in the southern “sunbelt states”, which rode a wave of the epidemic in the summer, has slowed. Second, America’s economic stimulus, the world’s largest both in absolute terms and as a proportion of GDP, has been potent. Thanks to one-time stimulus cheques worth up to \$1,200 per person and an extra \$600 a week in unemployment-insurance

(UI) payments, households' disposable income has risen since the pandemic began. Americans did not spend the money all at once, meaning that it continues to support consumption today, even though most of the emergency support has expired. In early September UI recipients were still spending more than they did before the pandemic hit.

The final reason behind the forecast revisions is probably America's flexible labour market. The fall in unemployment in recent months seems to reflect more new jobs, rather than discouraged workers exiting the workforce. In Europe governments have tended to assume much of the payroll cost for furloughed workers. Such schemes are handy in a tight spot. But if prolonged, they could keep workers in jobs that are never coming back. America, by contrast, has mainly protected people's incomes with unemployment benefits (although it has absorbed the payroll costs of many small businesses via loans that may eventually be forgiven). As a result the reallocation of labour from dying industries to up-and-coming ones is happening at speed. For example, the number of travel agents has fallen by 10% since April, even as overall employment has risen. Employment in general-merchandise shops is 6% higher than before the pandemic.

Much could still go wrong. The virus could surge again, as it has in Europe. Many forecasters continue to assume, optimistically, that Congress will pass another stimulus package this year. Americans cannot run down their savings forever. And social-distancing requirements remain in place in much of the country. As a result some labour-market indicators still look dire. In August, even as the overall unemployment rate fell, roughly 3.4m jobs were permanently culled, more than in October 2008, soon after Lehman Brothers collapsed. The rapid rebound this time could yet hit a hard ceiling. But Mr Christensen's optimism no longer looks so exceptional. ■



美国经济

迅速回升

为什么全球最大经济体的表现超出预期

“等到11月美国人为大选投票时，失业率将低于6%。”特立独行的经济学家拉斯·克里斯滕森（Lars Christensen）5月时这样说道。考虑到封锁措施在4月已经令失业率飙升至14.7%，这是一个大胆的预测。6月，美联储17位利率决策者中至少有14位预测今年第四季度失业率仍将高于9%。其他预言者大多也同样悲观。他们预计美国GDP在2020年会暴跌，而后相对缓慢地复苏。克里斯滕森则坚持认为，与经济政策失误导致的金融崩溃和经济衰退不同，自然灾害之后通常会出现快速复苏。

事实可能会证明他是对的。整个夏天失业率迅速下降，到8月已降至8.4%。经济学家纷纷上调对经济增长的预期（见图表）。9月16日，富裕国家智库经合组织预测美国经济今年将萎缩3.8%，而非6月预测的7.3%。所有富裕国家的经济前景都提升了，但没有哪个国家幅度这么大。美国仍面临着一场衰退，程度大概是金融危机后那次衰退的1.5倍。但人们的预期不像以前那样悲惨了，而且看起来比欧洲大多数国家的预期要好。

美国经济前景提升可能有三方面因素。首先，美国南部“阳光地带各州”在夏季经历了一波疫情后，现在新冠病毒的传播速度已经减缓。其次，美国的经济刺激很有效力，无论从绝对数量还是GDP占比来看规模都是全球最大的。因为有高达每人1200美元的一次性刺激支票和除此以外每周600美元的失业保险金，家庭可支配收入自疫情开始以来已经上升。美国人并没有一下子把钱花光，这意味着即使大部分紧急援助项目已经结束，这些钱也还能继续支撑消费。9月初，失业保险领取者的支出仍比疫情爆发前要高。

修正预测背后的最后一个原因可能是美国灵活的劳动力市场。近几个月失业率的下降似乎是因为有更多新岗位出现，而不是沮丧的劳动者退出了劳动市场。在欧洲，政府基本上承担了临时停职员工的大部分工资成本。这

样的计划在危急时刻中能起效。但如果延长下去，可能会把员工困在那些再也不会恢复的工作岗位上。相比之下，美国主要是用失业救济金来保护人们的收入（不过它也通过可能最终会被免除的贷款承担了许多小企业的工资成本）。结果是劳动力迅速从濒死行业重新分配到新兴行业。例如，自4月以来，在整体就业人数上升的同时，旅行社的数量减少了10%。日用杂货店雇用的人数比疫情前多6%。

仍有很多地方可能出问题。病毒可能会再次肆虐，就像在欧洲那样。许多预测者仍然乐观地估计国会今年还会再通过一项经济刺激计划。美国人不可能总也花不完他们的积蓄。美国大部分地区仍然要求保持社交距离。因此，一些劳动力市场指标看起来仍然很糟糕。总体失业率下降之时，8月仍有约340万个工作岗位被永久性裁掉，比2008年10月雷曼兄弟刚破产后还要多。这次的快速反弹仍可能遇到阻力，但克里斯滕森的乐观态度看起来不再那么与众不同了。■



Oracle

Larry's last stand

A Silicon Valley stalwart wants to change direction. Will it work?

LARRY WHO? A few weeks ago asking a young tech worker in Silicon Valley about Larry Ellison, co-founder, former boss and now chief technology officer of Oracle, might have elicited blank stares. More surprising, given that his company is still the world's second-largest software-maker, a follow-up question might have been: "Remind me what Oracle sells?"

Being treated like a has-been must have irked the 76-year-old Mr Ellison. In Oracle's heyday 20 years ago he was Silicon Valley's best-known rogue billionaire—yesteryear's Elon Musk. "The Difference Between God and Larry Ellison", one of the many books written about the firm and its colourful founder, was subtitled "God Doesn't Think He Is Larry Ellison".

Now he and his firm are back in the headlines, thanks to something that, in software terms, is about as far from Oracle's bread and butter of corporate databases as jelly beans are from white toast. Its deal to team up with TikTok has made its brand recognisable even to many teenagers—the main clientele of the Chinese-owned video-sharing platform. Whether the notoriety lasts more than 15 seconds, the length of a typical TikTok video, is another matter.

Attempts at reinvention are nothing new in Silicon Valley. It can be made harder by lucrative legacy businesses; just ask IBM, another once-great information-technology (IT) giant that has been sliding into irrelevance. Oracle would rather emulate Microsoft, which has ridden the cloud revolution to a market capitalisation of \$1.6trn and stellar returns (see chart). The TikTok arrangement, which would see Oracle host the app's data in its cloud, confirms that is Mr Ellison's plan. Like the transaction—which

could yet be blocked by President Donald Trump—Oracle’s metamorphosis is not, however, a done deal just yet.

Since its founding in 1977 Oracle has been the odd one out in Silicon Valley—less focused on inventing the next new thing and more on signing the next big contract. By the mid-1990s it dominated the market for “relational” databases, which underlie corporate applications from book-keeping to supply-chain management. After the dotcom crash in the early 2000s it used its pile of cash and high share price to consolidate swathes of the IT industry. Within a few years it acquired several software rivals, including BEA Systems and PeopleSoft, as well as Sun Microsystems, a maker of powerful computers. It is still hard to find a sizeable firm that does not send a cheque to Oracle’s snazzy headquarters in Redwood City. With customers locked in by the sheer tedium of switching databases, Oracle could extract huge profits. In its last financial year the company earned a net income of more than \$10bn on revenue of nearly \$40bn.

Success in old IT was a big reason why Oracle was late to the new sort: cloud computing. Mr Ellison long dismissed it as a faddish label for existing technology. By the time he realised it was an epochal shift in IT, Oracle had fallen behind. Oracle Cloud Infrastructure (OCI), as it calls its offering, is said to have sales of less than \$2bn annually, compared with more than \$40bn for Amazon Web Services (AWS). The e-commerce titan’s market-leading cloud unit is valued at several times Oracle’s market capitalisation of \$178bn. Cloud-based rivals of the sort that Mr Ellison once dismissed, such as Adobe and Salesforce, are worth around a quarter more than his firm.

Even in databases, Oracle’s core business, the world has moved on. For many new applications, such as customer-facing websites, its tools are too expensive and inflexible. Recent years have seen the rise of more specialised digital repositories, many of them in the cloud and based on

malleable “open source” software. According to Gartner, a research firm, Oracle’s share of the database market fell from nearly 44% in 2013 to 28% last year. And it has yet to shake off a reputation for antagonising clients with things like audits to verify their use of software by workers—and hefty charges for firms that exceed licence limits. Brent Thill of Jefferies, a bank, echoes other Oracle bears when he says that the company has been stuck for years even as “we are living in the data age, the biggest tech-boom ever.”

| *Seers of a brighter future*

Oracle optimists counter that the firm has a few things going for it. One is management. The death last October of a co-CEO, Mark Hurd, left Safra Catz as the woman in charge. She is widely considered an effective operator. Mr Ellison, who stepped down as chief executive in 2014, has in recent years taken a more active role in product development—considered his forte—without treading on Ms Catz’s toes. The upshot, says Ted Friedman of Gartner, is better technology such as the “autonomous database”, which uses artificial intelligence to automate work once reserved for human IT administrators. For example, it allows software updates to be installed without shutting systems down, a dreaded procedure which can go badly wrong.

OCI enjoys the latecomer advantage in the cloud, says Clay Magouyrk, one of its leaders. “We did not have to take the circuitous path others had to take to get it right,” he says. Mr Magouyrk points to Oracle’s next-generation cloud platform, which will, among other things, offer hundreds of local sub-clouds that let customers keep their data close to home, as privacy regulations may require them to. In April Zoom, a videoconferencing service, opted for OCI to help it manage pandemic-fuelled growth (mostly because Oracle charges less for the use of its networks). Landing the TikTok contract would be another boost: the video app spends an estimated \$1bn annually on cloud-computing services.

A bigger opportunity for Oracle lies in cloud-based applications. It has begun converting some of its existing customers to these programs, which are more sophisticated than the basic computing and storage offered by AWS and OCI, observes Mark Moerdler of Bernstein, a broker. The company's bundle of cloud-based services already accounts for 8% of its software revenue; sales have been growing by more than 30% a year.

The wild card is Oracle's political bets. The firm has positioned itself close to Mr Trump. In 2016 Ms Catz served on the president's transition team and this year Mr Ellison hosted a fund-raiser for him. This did not help them win a lucrative cloud contract with the Department of Defence; OCI was not technically up to snuff. But being in the White House's good graces may have helped Oracle beat Microsoft (which won the Pentagon contract) to the TikTok deal. If the deal succeeds—a big “if”—Oracle's cloud may emerge as a digital haven for companies seeking to reassure Washington that their data are safe from prying Communist eyes in Beijing amid the Sino-American tech cold war.

It is, then, too early to write Oracle off. When a group of youngish cloud-services CEOs recently met reporters on a Zoom call, they were unanimous in their assessment. Jennifer Tejada of PagerDuty, which helps firms manage IT incidents, summed it up: “You have to respect Oracle for finding ways to keep itself relevant.” Relevance is not the same as fast growth, which may prove elusive given competition from AWS and others. But it is better than the digital dustbin of obscurity. ■



甲骨文

拉里的最后一战

一位硅谷老将想要改换方向。能成功吗？

“谁？拉里啥？”几周前，若向硅谷某个年轻的科技员工问起拉里·埃里森（Larry Ellison）这位甲骨文的联合创始人、前首席执行官、现任首席技术官，对方可能会一脸茫然地看着你。更让你想不到的是，尽管埃里森的公司仍是全球第二大软件制造商，对方可能会接着问：“能告诉我甲骨文是卖啥的吗？”

被人像过气人物那样对待一定让76岁的埃里森很恼火。在20年前甲骨文的鼎盛时期，他是硅谷最出名的怪咖亿万富翁，好比如今的伊隆·马斯克。有许多书籍讲述甲骨文和它有趣的创始人的故事，其中一本名为《上帝与埃里森的不同》（The Difference Between God and Larry Ellison），副标题是《上帝不认为自己是埃里森》（God Doesn't Think He Is Larry Ellison）。

现在，埃里森和他的公司重回新闻头条，靠的是从软件方面来看和甲骨文的看家业务企业数据库风马牛不相及的东西。甲骨文与TikTok的合作协议甚至让许多青少年都认识了它的品牌，他们是这个中资视频分享平台的主要用户群。这带来的名声会否持续15秒（一段TikTok视频一般是这么长）以上则是另一回事了。

在硅谷，尝试自我重塑并不是什么新鲜事。企业拥有利润丰厚的传统业务可能会让这件事变得更难——问问另一个曾经辉煌但已逐渐淡出人们视线焦点的IT巨头IBM就知道了。甲骨文应该更想效仿微软，后者借云计算革命的东风，把公司市值推高到了1.6万亿美元，并取得了亮眼的回报（见图表）。根据与TikTok的协议，甲骨文将把该应用的数据放到自己的云服务器中，这证实了埃里森的确计划效仿微软。但是，正如这宗交易仍可能被特朗普阻止，甲骨文的蜕变也还未成定局。

自1977年成立以来，甲骨文在硅谷一直是个异类——不怎么在意发明“下一个新事物”，而是努力签下下一份大合同。到90年代中期，甲骨文已称霸“关系”数据库（是从簿记到供应链管理的企业应用程序的基础）市场。本世纪初互联网泡沫破裂后，甲骨文利用自身充沛的资金和高股价在IT行业里大肆并购。短短几年内，它收购了多家对手软件公司，包括BEA系统（BEA Systems）和仁科软件（PeopleSoft），还有高性能计算机制造商太阳微系统（Sun Microsystems）。现在仍然很难找到哪家规模较大的公司不需要给甲骨文位于雷德伍德的时髦总部献上支票。转换数据库异常繁琐，客户就此被锁定，凭这一点甲骨文可以赚取丰厚利润。在上个财政年度，该公司的营收接近400亿美元，净收入超过100亿美元。

在传统IT业里的成功是甲骨文在云计算这一新领域落后的一大原因。在很长时间内，埃里森都认为云计算不过是给现有技术贴上一张时髦标签而已。当他意识到这是IT业的划时代变革时，甲骨文已经落后了。据称，甲骨文云基础设施（Oracle Cloud Infrastructure，以下简称OCI）的年销售额不到20亿美元，而亚马逊云服务（以下简称AWS）的年销售额超过400亿美元。这家电商巨头的云计算部门引领市场，估值是整个甲骨文市值（1780亿美元）的几倍。埃里森从前不屑Adobe和Salesforce等基于云计算的竞争对手，而如今它们的市值比甲骨文高出约四分之一。

即使在数据库这个甲骨文的核心业务领域里，世界也已朝新方向迈进。对于许多新应用（如面向客户的网站）而言，甲骨文的工具太昂贵又不灵活。近年来兴起了更专门的数字存储库，其中许多建在云上且基于可延展的“开源”软件。根据研究公司高德纳（Gartner）的调查，去年，甲骨文在数据库市场的份额从2013年的近44%下降到28%。而且它至今未能摆脱与客户为敌的声名，比如审计核查客户的员工使用甲骨文软件的情况，对超出许可证限制的公司收取巨额费用。投资银行杰富瑞（Jefferies）的布伦特·希尔（Brent Thill）同样看空甲骨文，表示在“我们处于数据时代，史上最大的科技繁荣期”之时，这家公司已多年裹足不前。

| 预见更光明未来

看好甲骨文的人则反驳说这家公司仍具备一些优势。一是管理。去年10

月，甲骨文的联席CEO马克·赫德（Mark Hurd）去世，留下女CEO萨弗拉·卡兹（Safra Catz）独当一面。外界普遍认为她是个能干的经营管理者。埃里森在2014年卸任首席执行官，近年来更多从事产品开发这项被公认是他强项的工作，不干涉卡兹的管理。高德纳的泰德·弗里德曼（Ted Friedman）表示，这样的结果是甲骨文能开发出像“自治数据库”这样更好的技术。这种数据库运用人工智能自动完成以往需要人类IT管理员完成的工作，比如无需关闭系统就能完成软件更新，避免了可能严重出错的令人敬畏的一步。

甲骨文高管克莱·马古伊克（Clay Magouyrk）认为OCI在云计算方面享有后发优势。“我们不用走别人为了找到正确方向而不得不走的那些弯路。”他说。他以甲骨文的下一代云平台为例。该平台将提供的诸多功能之一是成百上千的次级云，能让客户就近保存自家数据，因为隐私法规可能会要求它们这么做。今年4月，视频会议服务商Zoom选择使用OCI来帮助管理因新冠疫情而增长的业务（主要是因为甲骨文的网络服务收费较低）。若能得到TikTok这份合同，将会是另一个提振：该视频应用每年在云计算服务上的支出约为10亿美元。

甲骨文更大的机遇来自基于云的应用。据经纪公司盛博的分析师马克·莫德勒（Mark Moerdler）观察，甲骨文已开始把部分现有客户转到这类程序上，它们的功能比AWS和OCI的基本计算和存储更加先进。该公司的各类云服务已占其软件营收的8%，销售额每年增长30%以上。

变数在于甲骨文的政治押注。该公司已选择走到特朗普那一边。卡兹曾于2016年加入特朗普的过渡团队，而今年埃里森又为特朗普举办过一场竞选筹款活动。这倒没有帮助他们拿下利润丰厚的国防部云合同——OCI在技术上还达不到要求，合同最终被微软拿下。但与白宫交好可能帮助了甲骨文在这次TikTok交易中打败了微软。假如交易最终达成（不确定性还很大），那么对那些想在中美科技冷战中让华盛顿确信自己的数据不受北京方面监视的公司来说，甲骨文的云计算可能会成为一个数字避风港。

所以，说甲骨文不会成功蜕变还为时过早。在最近一次通过Zoom举办的

记者会上，一群颇为年轻的云服务CEO表达了一致的看法。帮助企业管理IT事故的PagerDuty的詹妮弗·特贾达（Jennifer Tejada）总结道：“甲骨文能找到办法让自己留在醒目位置，这一点让你不得不尊敬它。”醒目不等于快速增长，而考虑到来自AWS等公司的竞争，甲骨文也许难以实现快速增长。但这总好过被扔进数字垃圾箱，湮没无闻。■



The database business

Steam engine in the cloud

Snowflake has raised \$3.5bn in a record software listing. Now what?

CATCHING SNOWFLAKES is fun. It has become lucrative, too. Investors scrambled for shares in Snowflake, a maker of database programs, as it went public on the New York Stock Exchange on September 16th. The eight-year-old firm more than doubled its valuation the first day of trading, from \$33bn to over \$70bn, making its initial public offering the largest ever for a software firm. Even Warren Buffett, abandoning his customary tech-shyness, got in on the action. The legendary investor's conglomerate, Berkshire Hathaway, put \$735m into the firm, through a separate private placement and by purchasing shares from a former chief executive—a stake that is now worth \$1.56bn.

The excitement shines a light on an obscure corner of information technology: software for managing corporate data. This database market already generates \$55bn a year in sales (see chart). It is expected to expand rapidly as data become, if not the new oil, then at least an input for most companies. And it is changing in intriguing ways—not all of them good for Snowflake.

A database used to be best understood as a digital steam engine. Before electricity came along, a factory's machines sat near a single power source. Similarly, corporate applications—programs that keep track of a firm's finances or its supply chain, say—were built around databases housing all of a firm's important information. Hard disks were pricey and had limited capacity so the best way to store it was in lean “relational” databases. Max Schireson, who used to run MongoDB, a database-maker, and now works for Battery Ventures, an investment firm, likens these to “a parking garage where, to save space, you put all the seats in one place, the tyres in another

and so on". The industry became dominated by a few firms, with Oracle leading the pack.

As storage got cheaper and data volumes exploded, though, startups erecting new kinds of digital car park proliferated. Many focus not on tracking specific transactions but on analysing all manner of data to glean relevant knowledge about a business, such as where certain products sell best. These more cluttered "data warehouses", as they are known, were pioneered in the late 1970s by a firm called Teradata. Their latest iterations are "data lakes", which take in all sorts of unstructured information, including text and pictures.

Snowflake has gone a step further. It was one of the first firms to lift database systems from companies' in-house data centres and into the computing clouds, the biggest of which are operated by Amazon, Google and Microsoft, a trio of tech giants. Snowflake's customers can add capacity as needed—and pay depending on their use rather than a fixed price for a software licence, as was typical for relational databases. Better yet, its "multi-cloud" service works across the three big computing clouds, so customers need not get locked into any one of them. Recently Snowflake has also added features that let customers share and sell data, setting itself up as a data exchange of sorts.

This has convinced many that Snowflake could be the next Oracle. The firm is certainly on a roll. Although it has yet to make money, its losses, of \$171m in the six months to July, have declined as revenue has more than doubled year on year, to \$242m. On current trends sales could reach nearly \$1bn in the next 12 months.

Despite these promising numbers, and the market's blessing, Snowflake has its work cut out. The company's uniqueness will not last much longer, says Donald Feinberg of Gartner, a research firm. Rival firms, in particular

the big cloud providers, have been beefing up competing products and have even dabbled with the multi-cloud. A few startups are already offering cheaper and more flexible “open source” alternatives such as ClickHouse, a particularly zippy data-management system sold by a startup called Altinity.

Other challengers are building more specialised digital repositories. Data generated by websites, for instance, are often stored on “document-oriented” databases that, in the garage analogy, keep cars intact rather than strip them for parts. MongoDB is the market leader in this segment. Confluent, another startup, is big in “streaming” databases that garner information from sources like sensors. These are more akin to a motorway service station: data are quickly checked to see if action is needed.

Much as today’s assembly lines are driven by dispersed electric motors rather than a single steam engine, then, corporate IT systems will increasingly rely on sundry specialised databases, predicts Zane Chrane of Bernstein, a broker. That—and the fact that data will increasingly be analysed in real time, rather than saved in a conventional database—will limit the power and profits of any single supplier. So Snowflake is unlikely ever to become as dominant as Oracle. Snowflakes fly high in a flurry. They also melt. ■



数据库业务

云上蒸汽机

Snowflake融资35亿美元创下软件公司上市新纪录。然后呢？

用手接雪花很好玩。现在这么玩还能赚钱了。数据库软件公司Snowflake于9月16日在纽约证券交易所上市，引来投资者争抢股份。这家创建八年的公司在上市首日市值上涨了一倍多，从330亿美元增至700多亿美元，成为史上最大规模的软件公司IPO。就连沃伦·巴菲特也抛下他对科技股一贯谨慎的态度，加入了接雪花的人潮。这位传奇投资者拥有的企业集团伯克希尔·哈撒韦公司（Berkshire Hathaway）通过一次单独的定向增发，以及从Snowflake前任CEO手中收购股份，向该公司投资7.35亿美元。如今这些股份已价值15.6亿美元。

投资者的兴奋照亮了信息技术产业中一个不起眼的角落——用于管理公司数据的软件。这个数据库市场每年创造的销售额已达550亿美元（见图表）。未来，数据就算不会变成新的石油，至少也会成为大多数公司的一种投入，因此数据库市场有望迅速扩大。而且它正在以有趣的方式发生变化——并非都对Snowflake有利。

过去，对数据库最好的理解方法就是把它看作数字蒸汽机。在电力出现之前，工厂的所有机器都要靠近这唯一的动力源安放。同样，从前公司的应用程序（例如记录公司财务或其供应链的程序）也都是围绕包含公司所有重要信息的数据库构建的。硬盘价格高且容量有限，因此存储信息最好的方式是把它们放在精简的“关系”数据库中。马克思·希雷森（Max Schireson）曾经执掌数据库公司MongoDB，目前在投资公司Battery Ventures工作，他将这些数据库比作“这么一种停车场：为节省空间，把所有的车座放一起，轮胎放一起，各种东西都这样分门别类地放”。这个行业逐渐由少数公司主导，甲骨文是领头羊。

但随着存储成本降低而数据量激增，建立新型数字停车场的创业公司层出不穷。其中许多注重的不是记录特定交易，而是分析所有类型的数据以收

集关于一项业务的知识，比如特定的产品在哪里卖得最好。这类更杂乱的“数据仓库”在上世纪70年代后期由一家名为Teradata的公司开创。最新迭代的版本是“数据湖”，存储了包括文本和图片在内的各种非结构化信息。

Snowflake则更进一步。它是最早把数据库系统从公司内部的数据中心转移到计算云上的公司之一。这些计算云中规模最大的那些由三大科技巨头亚马逊、谷歌和微软运营。Snowflake的客户可以根据需要扩增存储容量，并按使用量付费，而不是像关系数据库那样通常按固定价格购买软件许可。更妙的是，它的“多云”服务可跨三大计算云运行，因此客户不必锁定在其中任何一个云上。最近，Snowflake还增加了让客户可以共享和出售数据的功能，让自己更像是某种数据交易所。

这让许多人相信Snowflake可能会成为下一个甲骨文。这家公司眼下确实势头强劲。尽管尚未盈利，但亏损在减少：截至7月的六个月里，它总计亏损1.71亿美元。收入同比增长超过一倍，达到2.42亿美元。按照目前的趋势，未来12个月的销售额可能会达到近10亿美元。

尽管这些数字令人鼓舞，又得市场恩宠，Snowflake却面临重大挑战。它的独特性不会持续太久，研究公司高德纳（Gartner）的唐纳德·费恩伯格（Donald Feinberg）说。竞争对手，尤其是大型云供应商，一直在加强竞争产品，甚至也已涉足多云业务。一些创业公司已经在提供更便宜、更灵活的“开源”替代方案，例如ClickHouse，这是一家名为Altinity的创业公司销售的一个特别灵便的数据管理系统。

其他挑战者正在打造更专门的数字存储库。比如，由网站生成的数据通常存储在“文档导向”的数据库中，用停车场的比喻来说，这样的数据库可以让汽车完整停放，而不用拆成零件分开存放。MongoDB是这个领域的市场领导者。另一家创业公司Confluent是“流式”数据库这一块的老大。这种数据库从传感器等来源收集信息，它们更像高速公路服务站——快速检查数据以决定是否需要采取行动。

当今的装配线由分散的电机而非单个蒸汽机驱动，同样地，企业IT系统也

将越来越依赖于各式各样的专门数据库，经纪公司盛博的赞恩·克兰（Zane Chrane）预测。另外，越来越多的数据将被实时分析，而不是保存在常规数据库中。这些都将限制任何单个供应商的影响力和利润。因此，Snowflake不大有机会像甲骨文那样主导整个行业。雪花随风高高飞舞。它们也会融化。■



International trade

Continuity candidate

How much would Joe Biden change trade policy? Less than you think

ON THE SUBJECT of trade policy, America's Democratic presidential nominee, Joe Biden, has been sounding rather like President Donald Trump. He claims that "economic security is national security", promises to create millions of manufacturing jobs and pledges to reduce America's dependence on China. On September 9th he published his "Made in America" plan, only for the White House to tell Fox News that it would host its own "Made in America" day on October 5th. America's trading partners hoping for change may dismiss Mr Biden's tough talk as campaign chatter. That would be unwise.

Mr Biden would bring some changes, of course. Policy would be more consistent. Trade officials in Mexico and the European Union (EU) could stop following presidential tweets so avidly. Having slammed Mr Trump's "empty" agreement with China, Mr Biden seems unlikely to strike shallow, transactional deals. In fact, despite his reputation for liking them, he may not agree to any at all. They can wait, he has said, until after "we have invested in Americans".

Trading partners may hope that America stops applying new tariffs. They should manage their expectations. Mr Biden is no "Tariff Man", as Mr Trump once proclaimed himself to be. But he has pledged to restrict imports from China that are deemed to be a national-security threat. Countries that do not live up to their environmental obligations could face a carbon-adjustment fee in the form of tariffs or quotas.

Mr Biden sees as big a role for the government in supporting American manufacturing as Mr Trump does, perhaps a reflection of the fact that

industrial policy is now in favour across the political spectrum. Mr Biden's plans to strengthen "Buy American" rules would make it harder for the government to buy foreign cement, steel and equipment. Peter Navarro, Mr Trump's trade adviser, would be proud.

Robert Lighthizer, America's chief trade negotiator, reportedly expressed his unhappiness with the Agreement on Government Procurement, an international deal designed to prevent governments from imposing restrictions on how public funds are spent. Mr Biden promises to rewrite the rules, so that America and its allies can "use their own taxpayer dollars to spur investment in their own countries".

Moreover, Mr Biden has committed himself to using a broader range of tools than Mr Trump's tariffs. He plans to spend \$300bn of public funds to support research into artificial intelligence, electric vehicles and 5G. A "clawback" provision would make companies shipping jobs overseas hand back the subsidy. Some governments will see this as unfair: foreign companies facing subsidised competitors will find it as difficult to break into the American market as if they were facing tariffs. Others will take it as permission to hand out subsidies of their own. Either approach will breed tension. Mr Biden has pledged to fight back against countries undercutting American manufacturing using "unfair subsidies".

Mr Biden's silence on two matters has led to foreign suspicions of yet more continuity. The first relates to the World Trade Organisation (WTO), which the Trump administration has hobbled by breaking its system of solving trade disputes. (A WTO judgment on September 15th that American tariffs on Chinese imports broke its rules will not whet the administration's appetite for a fix.) The EU, which sees dispute settlement as integral to the rules-based trading system, wants to repair the mechanism. Mr Biden has not yet said if he will join in.

The other matter is what Mr Biden will do with the tariffs imposed by Mr Trump. He has criticised them without pledging to remove them. Strategy might play a role: a Biden administration may want to dangle tariff reductions in return for concessions abroad. To America's trading partners, that would feel rather familiar. ■



国际贸易

延续性候选人

拜登会在多大程度上改变贸易政策？比你以为的小

谈及贸易政策问题时，美国民主党总统候选人拜登的口气很像总统特朗普。他声称“经济安全就是国家安全”，承诺创造数百万个制造业岗位，誓言减少美国对中国的依赖。他在9月9日发表了自己的“美国制造”（Made in America）计划。白宫随之告知福克斯新闻台（Fox News），它将在10月5日举办自己的“美国制造”日。美国的贸易伙伴们期待形势发生改变，可能会把拜登强硬的言论当成竞选话术。这是不明智的。

当然，拜登还是会带来一些变化。政策会更加连贯。墨西哥和欧盟的贸易官员可以不用再狂热地关注总统的推特。在猛烈抨击了特朗普与中国达成的“空洞”协议后，拜登似乎不太可能达成肤浅的、交易性的协议。事实上，虽然他以喜欢这类交易闻名，却可能根本不会达成任何交易。他说过，这些可以等到“我们投资在美国人自己身上”之后再说。

贸易伙伴们可能希望美国停止实行新的关税。他们应该管理好自己的预期。拜登不是特朗普曾经自诩的那种“关税侠”，但他已经承诺限制从中国进口那些被认为威胁国家安全的产品。不能完全履行自身环境义务的国家可能面临关税或限额形式的碳调整费。

拜登和特朗普一样，认为政府在支持美国制造业方面作用重大。这可能反映出产业政策目前获得了跨党派支持。拜登加强“购买美国货”（Buy American）规则的计划将导致政府更难采购外国的水泥、钢铁和设备。特朗普的贸易顾问彼得·纳瓦罗（Peter Navarro）想必会为此自豪。

美国首席贸易谈判代表罗伯特·莱特希泽（Robert Lighthizer）据称对《政府采购协定》（Agreement on Government Procurement）表示不满，该国际协定旨在防止政府限制公共资金的用途。拜登承诺改写规则，这样美国及其盟友就可以“用自己纳税人的钱来刺激对本国的投资”。

此外，拜登还承诺使用比特朗普的关税类型更多样的工具。他计划动用3000亿美元公共资金支持对人工智能、电动汽车和5G的研究。一项“回溯”条款要求那些把工作岗位转移到海外的公司归还补贴。一些政府会认为这不公平：面对获得资助的竞争对手，外国企业会发现打入美国市场就跟要支付关税一样困难。其他政府则会由此认为自己也可以发放补贴了。无论哪一种都会助长紧张局势。拜登已经承诺要反击那些利用“不公平补贴”削弱美国制造业的国家。

拜登在两件事上保持沉默，令国外怀疑他可能会在更多问题上延续特朗普的政策。第一件事涉及世贸组织，特朗普政府打破了该组织解决贸易争端的体系，令其陷入瘫痪（9月15日世贸组织裁决称美国对中国进口商品征收的关税违反了其规则，但这不会增加特朗普政府修复这个体系的欲望）。欧盟认为解决争端对以规则为基础的贸易体系而言至关重要，想要修复这一机制。拜登尚未表示他是否会加入。

另一件事是拜登将如何处理特朗普实施的关税。他已经批评过这些关税，但并未承诺撤销它们。这其中可能有战略的考虑：拜登的政府可能希望把降关税作为一个诱饵来换取国外的让步。对美国的贸易伙伴来说，这会感觉相当熟悉。■



The future of carmaking

Journeys in the Teslaverse

Tesla used to be the only electric game in town. No longer

A RECENT VIDEO of Elon Musk taking a spin in a new all-electric Volkswagen with Herbert Diess, the German carmaker's boss, set tongues wagging. VW was forced to deny that a deal with Tesla was in the offing. A deeper bromance between Mr Musk's firm and his main rival in the market for electric vehicles (EVs) looks unlikely. But the meeting highlights how the car industry is at last taking the impending EV revolution seriously.

Giant new businesses are gearing up to support the switch from petrol to electricity. Besides changing the way cars are propelled, this requires batteries, software to ensure these work in harmony with motors, and data harvested from cars that may one day allow them to drive themselves. Over 250 firms are manufacturing electric motors. Forty-seven battery factories are under construction. Anjan Kumar of Frost & Sullivan, a consultancy, expects total new EV-battery capacity to go from 88 gigawatt-hours in 2019, enough to power Texas for less than two hours if plugged into the grid, to 1,400 gigawatt-hours in 2025. Established carmakers are pondering how to loosen the grip of big tech on software.

The total market capitalisation of listed makers of exclusively electric cars now exceeds \$400bn. Add producers of batteries that go into them, and the EV-industrial complex, which makes fewer than 400,000 vehicles annually, is worth at least \$670bn (not counting miners of lithium and other battery minerals). That is nearly three-fifths as much as traditional carmakers, which churn out 86m cars a year, nearly all of them petrol-powered (see chart 1). Call it the Teslaverse.

As that moniker suggests, Mr Musk's firm sits at its centre. In July it

overtook Toyota as the world's most valuable carmaker, and kept accelerating—never mind that it made 370,000 cars against Toyota's 10m and a fraction of the Japanese firm's revenues (see chart 2). By August Tesla was worth over \$450bn. A market correction lopped a third off its share price but it has since rebounded. What would it mean to take it seriously, as investors appear to be?

Car sales could fall by 25% in 2020 owing to pandemic disruption. But the share of EVs on the road will continue to grow as emissions regulations tighten, the price of batteries falls and the choice of models expands. Next year three in every 100 cars sold will be pure electric or a plug-in hybrid. The share may rise to 20-25% by 2030, equal to 20m new EVs a year.

At the moment Tesla is the "apex predator", says Adam Jonas of Morgan Stanley, a bank. It has been manufacturing EVs at scale longer than any other carmaker and sells more of them. Its elevated share price translates into the lowest cost of capital in the business. A growing offering, with a lorry and pickup soon to hit the road, will widen its appeal. It attracts the best engineers and possesses in Mr Musk, love him or loathe him, a leader with messianic zeal.

Mr Kumar puts Tesla two to three years ahead of rivals in battery technology. Its batteries have a higher energy density, which means better range and lower costs. On September 22nd Mr Musk presented plans for new production capacity and fresh battery technology. Together, this would extend Tesla's cost advantage.

The firm's edge is even more pronounced in software. Rainer Mehl of Capgemini, a consultancy, calls Tesla cars a "shell around the software and applications inside". Thanks to vertically integrated manufacturing, systems have been interlinked from day one. As Olaf Sakkers of Maniv Mobility, an Israeli fund, explains, big carmakers have outsourced almost

all their technology apart from internal-combustion engines to suppliers, and focused on assembly and marketing. This makes for a “bird’s nest of complexity”, says Mr Sakkers. Tesla’s software and mechanics are seamless by comparison.

All this software means Teslas improve with age, thanks to regular “over-the-air” updates with new features, bug fixes and even performance upgrades. This makes up for a sometimes shabby finish and questionable reliability. Other big carmakers are five years behind, says Luke Gear of IDTechEX, a consulting firm.

Tesla also seems to have mostly put what Mr Musk has called “production hell” behind it. As Philippe Houchois of Jefferies, an investment bank, notes, a reputation for delivering models late and over budget has become one for being ahead of time and on budget. A rapidly built new factory in Shanghai began shipping in December and “gigafactories” are under construction in Berlin and Texas that will boost capacity from 700,000 units to 1.3m in 18 months, says Credit Suisse, a bank. Tesla cheerleaders talk of 3m-5m new Teslas annually by 2025, out of a global total of around 85m cars. Mr Musk eventually wants to make 20m a year.

Mr Jonas says that Tesla’s current share price implies it will end up with 30-50% of the car market. This overlooks other sources of revenue: from selling batteries, its operating system or an EV “skateboard” of battery pack and running gear to which others can add a body (and in time more futuristic data and self-driving systems). Even the most wildly optimistic scenarios for Mr Musk’s company, then, leave room in the Teslaverse for others.

Start with the established carmakers. Their lowly valuations may be read as implying they ought to give up trying to make the transition to EVs and quietly fade away. But even firms with the heftiest petrol-driven legacies

should not be written off. Chinese carmakers show why. The government prodded them to go electric with tough mandates in the hope of dominating the future market. Around half the world's EVs are currently sold in China. The likes of Geely and BYD (which also makes batteries) want to expand overseas.

There, big Western carmakers face a slog. Though some suppliers, such as Aptiv, have spun off legacy operations to concentrate on EVs and self-driving technology, most remain bound to the internal combustion engine. And lots of car firms, in particular the German premium ones, must contend with powerful unions fearful of job losses resulting from the move to EVs' less complex—and thus less labour-intensive—mechanics.

Despite the difficulties, the industry is desperate to make the EV side work. Mr Kumar estimates that 60% of big car firms' research-and-development spending now goes on EVs, up from 5-10% in 2012. Morgan Stanley reckons big carmakers will invest up to \$500bn in EVs over the next five years. According to Bernstein, a research firm, they have been "terrible deployers of capital" but they are "waking up". Potential big sellers on sale this year include VW's ID.3 and Ford's Mustang Mach-E.

| *Electric power to the people's car*

VW is leading the charge. It will spend €60bn (\$71bn) by 2025 on EVs and digitisation. Carmakers typically develop 2-5% of software in-house. In an effort to reinvent itself as a software company, VW wants to boost its share to 60% by 2025. Other carmakers and suppliers harbour similar ambitions. Daimler's recent tie-up with Nvidia, a giant chipmaker, should allow remote updates by 2024. Aptiv already offers integrated software.

Big firms could create distinct units to lure outside capital and talent, and take risks, suggests Morgan Stanley's Mr Jonas. Some already are. General Motors (GM) has the Cruise self-driving arm, BMW has iVentures and

Toyota has its Mobility Foundation. Another tactic is to invest in startups. On September 8th GM said it would buy an 11% stake in Nikola, a controversial electric-lorry firm, for \$2bn. Ford has backed Rivian, which hopes to crack the lucrative pickup market.

The likes of Nikola and Rivian are examples of another part of the Teslaverse. Although they face some big barriers, notably in manufacturing and distribution, raising money is not one of them. Capital is pouring in, helping cars move off the drawing board and into production. Chinese Tesla copycats have sprung up. In America Lucid Motors unveiled its first car at its headquarters near San Francisco on September 9th, with a Tesla-beating 800km range. One of its biggest backers is Saudi Arabia's sovereign-wealth fund. Lordstown, Fisker and Canoo are aiming to follow Nikola, which went public in June through a reverse merger and is now worth \$13bn. Firms working on next-generation solid-state battery technology, such as QuantumScape, backed by vw and Bill Gates, plan to go public soon.

Several Chinese Tesla wannabes, such as Nio, Xpeng and Li Auto, are already listed in New York. They enjoy the benefit of cheap domestic labour, a huge local market and proximity of battery-makers such as BYD and CATL, the world's biggest such firm. Nio, which teetered on the brink of collapse in February before a bail-out by the city government of Hefei, where it has a big factory, is now valued at around \$24bn.

Carmaking remains a tough business to crack. Assembling bodywork or brakes at scale is different to making gadgets or writing code. Dyson, a British maker of high-tech vacuum cleaners and hand-driers, sunk £500m (\$640m) into developing an EV before scrapping the idea. Apple abandoned plans to make a car in 2016, though it is still investing in self-driving systems. Other tech giants are opting instead to invest in startups. In China Baidu, Tencent and Alibaba have backed WM Motor, Nio and Xpeng, respectively. Amazon has put money into Rivian and ordered 100,000 of its

electric lorries (in part to show it is serious about reducing its carbon footprint).

To survive in the Teslaverse, companies have to demonstrate they have valuable intellectual property that sets them apart, as many of the upstarts claim. But they must also prove they can sell and maintain their cars, where legacy carmakers have a long track-record. It is too early to divine the winners and losers. Even Mr Musk's firm could falter. But his vision of an electric future is already emerging victorious. ■



汽车制造的未来

特斯拉宇宙之旅

电动汽车市场上，特斯拉曾一家独大。这种局面到头了

在近期的一段视频中，伊隆·马斯克和德国汽车制造商大众老板赫伯特·迪斯（Herbert Diess）开着一辆新款全电动大众汽车兜风，引得人们议论纷纷。大众被迫否认与特斯拉即将达成一项交易。大众是特斯拉在电动汽车市场的主要竞争对手，两家公司之间似乎不太可能存在更深厚的兄弟情。但二人的会面突显出汽车行业终于开始认真对待即将到来的电动汽车革命了。

各种大型新业务正在加紧准备，好为从汽油到电力的转变提供支持。除了要改变汽车的驱动方式外，还需要电池、确保电池与发动机协调运作的软件，以及从汽车上收集的大量数据——借助这些数据，有朝一日可能会实现无人驾驶。250多家公司正在生产发动机。47座电池工厂正在建设中。咨询公司弗若斯特沙利文（Frost & Sullivan）的安然·库马尔（Anjan Kumar）预计，新增电动汽车电池产能将从2019年的88吉瓦时（如果接入电网可为得克萨斯州供电近两小时）升至2025年的1400吉瓦时。老牌汽车制造商正在思索如何能让大科技公司放松对软件的控制。

目前，专门生产电动汽车的已上市制造商的总市值超过4000亿美元。加上电动汽车电池生产商，这个年产量不到40万辆的电动汽车产业综合体至少价值6700亿美元（不包括开采锂和其他电池所用矿物的矿业公司）。这将近是传统汽车制造商总市值的五分之三。后者每年生产8600万辆车，几乎全部是汽油动力车（见图表1）。我们不妨将电动汽车产业综合体称作“特斯拉宇宙”。

顾名思义，马斯克的公司位于这个宇宙的中心。7月，它超越丰田成为全球市值最高的汽车制造商，而且还在不断加速——先别管它仅生产了37万辆汽车，而丰田为1000万辆；而且它的营收也只相当于这家日本公司的一小部分（见图表2）。到8月时，特斯拉的市值超过了4500亿美元。在市场

修正后，其股价被削去了三分之一，但随后又反弹。重视这家公司——就像投资者表现出来的那样——意味着什么？

由于疫情的破坏，2020年汽车销量可能会下降25%。但随着排放法规收紧、电池价格下降以及可供选择的车型增加，电动汽车的销售份额将继续增长。明年，每100辆售出的汽车中将有三辆是纯电动或插电式混合动力汽车。到2030年，这一比例可能会上升至20%至25%，相当于每年售出2000万辆电动汽车。

摩根士丹利的亚当·乔纳斯（Adam Jonas）说，眼下特斯拉是“顶级掠食者”。它大规模生产电动汽车的历史比其他任何汽车制造商都更久，目前销量也更多。它的高股价转化成了行业内最低的资本成本。它的产品越来越多（一款卡车和一款皮卡即将上路），这将扩大它的吸引力。它吸引了最好的工程师，并拥有马斯克——人们爱他也罢，憎他也罢——这样一位具有救世热情的领袖。

库马尔认为，特斯拉在电池技术上领先竞争对手两到三年。其电池的能量密度更高，因而续航能力更佳、成本更低。马斯克于9月22日宣布了新产能和新电池技术的计划。这两方面的合力将扩大特斯拉的成本优势。

在软件领域，特斯拉的优势更加明显。咨询公司凯捷（Capgemini）的赖纳·梅尔（Rainer Mehl）称特斯拉的汽车为“包裹住软件和各种应用的外壳”。由于采用了垂直整合制造，各类系统从一开始就相互连接。以色列基金Maniv Mobility的奥拉夫·萨科斯（Olaf Sakkers）解释说，大型汽车制造商已将内燃机之外的几乎所有技术都外包给了供应商，自己则专注于组装和营销。这就导致了“鸟巢般的复杂”，萨科斯说。相比之下，特斯拉的软件和硬件是无缝连接的。

所有这些软件能力让特斯拉汽车随车龄的增长而改进，这要归功于定期的“无线”升级，包括添加新功能、修补漏洞，甚至性能升级。这使得人们更容易接受它们有时不够尽善尽美的外观工艺以及可靠性存疑的问题。咨询公司IDTechEX的卢克·基尔（Luke Gear）表示，其他大型汽车制造商在

这方面落后了五年。

特斯拉似乎也基本上爬出了马斯克所说的“生产地狱”。正如投行杰富瑞（Jefferies）的菲利普·霍乔伊斯（Philippe Houchois）所指出的那样，特斯拉延迟交付车型且超预算的名声已变成了超前且符合预算。瑞信（Credit Suisse）表示，一家在上海快速建成的新工厂已于去年12月开始出货，柏林和得克萨斯州的“超级工厂”也正在建设中，这将使特斯拉的产能在18个月内从70万辆提升至130万辆。特斯拉的支持者谈论着到2025年，在全球每年约8500万辆的汽车总产量中有300万至500万辆会是特斯拉。马斯克希望最终每年能生产出2000万辆。

乔纳斯说，从特斯拉目前的股价来看，它最终将获得汽车市场30%到50%的份额。这忽略了其他收入来源：销售电池、操作系统，或由电池组和行驶系统组成的电动汽车“滑板”（skateboard）平台，其他人可以在该平台上添加车身（今后还能添加更多具未来感的数据和无人驾驶系统）。这样说来，即使是在对特斯拉来说最为乐观的情景中，也为其他公司在特斯拉宇宙中留有一席之地。

先来看老牌汽车制造商。人们可能会以为，它们的低估值意味着它们应该放弃向电动汽车转型的尝试，悄然退出历史舞台。但即使是那些汽油动力传统最深重的公司也不应该被完全放弃。中国汽车制造商的经历很能说明原因。政府颁布了严格的命令，敦促它们向电动汽车转变，以期控制未来的市场。目前中国市场约占全球电动汽车销量的一半。吉利和比亚迪（也生产电池）等公司希望能向海外扩张。

而在西方，大型汽车制造商正面临一番苦战。尽管安波福（Aptiv）等一些供应商已经剥离了传统业务而专注于电动汽车和无人驾驶技术，大多数仍未割舍掉内燃机。许多汽车公司（尤其是德国的高档汽车公司）还必须对付强大的工会。电动汽车的机械设备没那么复杂，也就没那么劳动密集，因此工会担心向电动汽车的转向会导致工作岗位流失。

尽管困难重重，但汽车行业迫切希望在电动车这条线上有所成就。库马尔

估计，大型汽车公司如今有60%的研发支出用于电动汽车，2012年这一比例为5%到10%。摩根士丹利估计，未来五年，大型汽车制造商在电动汽车上的投资将高达5000亿美元。按研究公司盛博的说法，一直以来，它们“在资本部署方面一塌糊涂”，但正在“觉醒”。今年上市的可能大卖的电动车包括大众的ID.3和福特的野马Mach-E。

| 电力归于“人民之车”

大众冲在最前。到2025年，它在电动汽车和数字化上的支出将达到600亿欧元（710亿美元）。汽车制造商在内部开发的软件占比通常为2%到5%，大众希望到2025年之前将这一比例提高至60%，力图将自己重塑为一家软件公司。其他汽车制造商和供应商也怀有类似的雄心。戴姆勒近期与芯片巨头英伟达达成合作，这应该能让它在2024年之前实现远程更新。安波福已经在提供集成软件。

摩根士丹利的乔纳斯建议，大公司可以另外组建部门来吸引外部资本和人才并冒险。有些公司已经在这样做了。通用汽车有无人驾驶技术公司Cruise，宝马有iVentures，丰田有移动基金会（Mobility Foundation）。另一个策略是投资于创业公司。9月8日，通用汽车表示将以20亿美元收购备受争议的电动卡车公司尼古拉11%的股份。福特已经注资里维安（Rivian），这家公司希望能打入利润丰厚的皮卡市场。

像尼古拉和里维安这样的公司是特斯拉宇宙另一部分的代表。尽管它们面临一些巨大的障碍，特别是在制造和分销方面，但筹集资金却不成问题。资本正在涌入，帮助汽车从筹划阶段进入生产阶段。在中国，一批效仿特斯拉的公司纷纷涌现；在美国，9月9日，Lucid Motors在位于旧金山附近的总部发布了它的首款车，续航里程超800公里，完胜特斯拉。其最大支持者之一是沙特阿拉伯的主权财富基金。尼古拉在6月通过反向合并上市，目前市值130亿美元，洛德斯顿（Lordstown）、菲斯克（Fisker）和卡诺（Canoo）力争追随其脚步。大众和比尔·盖茨支持的QuantumScape之类的致力于下一代固态电池技术的公司计划很快上市。

几家想成为“中国特斯拉”的公司如蔚来、小鹏和理想汽车都已在纽约上

市。它们享受着种种优势：廉价的国内劳动力、巨大的本地市场，以及靠近电池制造商，如比亚迪和世界最大的电池厂商宁德时代。2月，蔚来曾一度濒临破产，之后获合肥市政府纾困，目前估值约为240亿美元。蔚来在合肥有一家大型工厂。

汽车制造仍然是一个难以攻入的领域。大规模组装车身或刹车装置和制造小设备或写代码是两回事。英国高科技吸尘器和干手器制造商戴森曾投入5亿英镑（6.4亿美元）开发电动汽车，后来放弃了。苹果在2016年放弃了造汽车的计划，不过仍在投资无人驾驶系统。其他科技巨头则选择投资创业公司。在中国，百度、腾讯和阿里巴巴分别支持了威马汽车、蔚来和小鹏。亚马逊已向里维安投资，并订购了10万辆电动卡车（一定程度上是为了表明它对减少碳足迹是认真的）。

要想在特斯拉宇宙中生存，企业必须展示出能让自己脱颖而出的宝贵知识产权——许多新贵自己正是这样声称的。但它们也必须证明它们有能力销售和维修自家的汽车，而传统汽车制造商在这方面有着丰富的经验。现在预测赢家和输家还为时过早。就连马斯克的公司也可能会衰落。但他构想的电动化的未来已经胜利在望。 ■



The Economist film

Meat Makers - prelude

It takes 65 billion farm animals every year to feed our appetite for meat. Is man-made meat the new future of meat farming?



经济学人视频

人造肉工厂 - 预告

每年为了满足全球食肉需求，我们需要宰杀650亿头家畜。人造肉是肉食市场的未来吗？



Global trade

Down but not out

Commerce has shown a strange resilience to covid-19

IN QUENTIN TARANTINO'S "Kill Bill: Volume 2", an action drama, the protagonist, played by Uma Thurman, punches her way out of a coffin. Global trade in goods has performed a similar death-defying stunt during the covid-19 pandemic. In April things looked dismal. Some predicted global trade would slump by more than 30% this year, compared with 2019. But after a gut-wrenching spring, trade volumes recorded their biggest monthly rise on record in June, the last month of available data (see chart). Oxford Economics, a consultancy, predicts that in 2020 as a whole volumes may drop by 10%.

This resilience has defied recent experience, as well as expectations. In 2009, when global GDP fell by 0.1% in the final year of the financial crisis, trade plunged by a whopping 13%. This year the IMF forecasts that global GDP could fall by 4.9%, ie, 50 times more than in 2009. So why will the hit to trade probably be smaller?

After the financial crisis trade volumes fell much further than GDP mostly because people stopped buying heavily traded durable goods, such as cars. But in the current crisis, untraded domestic services have been harder hit than they were back then. Going to the cinema or a restaurant halted during lockdown. Buying an imported fridge did not. That has made the drop in trade relative to GDP smaller.

Moreover, the robustness of the world's production apparatus has underpinned trade flows. Covid-19 froze supply chains, but in Asia at least they swiftly started to thaw. According to Simon Evenett of the University of St Gallen in Switzerland, the number of trade restrictions applied on

medical goods and medicine since the start of the crisis peaked in April, and has since fallen by 15%. Even more importantly, lockdowns were lifted more quickly than expected, allowing exporting powerhouses like China and Germany to reopen factories and boost output.

Pandemic-induced demand gave trade in some products extra pep. America's imports of protective equipment tripled between March and July, calculates Panjiva, a trade-data company. Covid-related products including computing equipment for home-working has accounted for the majority of China's year-on-year export growth in each month since June. Eytan Buchman of Freightos, an online marketplace, reports that ocean-freight prices are surging for routes between America and South-East Asia, partly because of "near-frantic" e-commerce offerings by small businesses.

Policymakers have played a pivotal role in the trade revival. Monetary and fiscal firepower was bigger and faster than trade experts had expected. Central-bank liquidity measures kept trade finance flowing better than it did during the financial crisis, says Jennifer McKeown of Capital Economics, a research outfit.

Although the trade performance is cause for relief, no one should declare victory yet. A second wave of lockdowns, or overhasty efforts to curtail economic stimulus, could derail the recovery. The value of exports from South Korea dipped in August relative to July, as did those of China after adjusting for an artificially depressed base in 2019. Robert Koopman, chief economist of the World Trade Organisation, which oversees global trade, doubts there will be a sustained V-shaped recovery.

Overlaying this is a concern about the lingering unevenness of trade. Brad Setser of the Council on Foreign Relations, an American think-tank, says that the trade slump has shrunk the gap between most countries' imports and exports, reducing imbalances. Yet there have been two standout

exceptions. The first is China, whose rapid reopening has sent its exports of goods surging to a level last seen before the Sino-American trade war—almost \$60bn higher than imports in August. The second is America, whose policies to stoke demand have had the side-effect of causing its trade deficit to increase further—to around \$80bn in July.

This imbalance is ominous. Although the so-called Phase One trade deal between America and China was meant to prop up American exports to China, so far it has disappointed. Meanwhile, President Donald Trump is haranguing China ahead of elections in November. Trade may not have performed as badly as many feared. But it still has an alarming ability to pack a Thurmanesque punch. ■



全球贸易

击倒，未出局

面对新冠肺炎的冲击，贸易活动表现出不可思议的复原力

在昆汀·塔伦蒂诺导演的动作片《杀死比尔2》中，乌玛·瑟曼饰演的主角凭借自己的拳头，破棺而出。新冠疫情期间，全球货物贸易也使出了类似的死里逃生的绝技。4月时，情况显得很是惨淡。一些人预测2020年全球贸易将比去年锐减30%以上。但在经历了一个令人揪心的春季之后，贸易额在6月（最新数据截止到该月）创下有记录以来的最大单月增幅（见图表）。咨询公司牛津经济研究院（Oxford Economics）预计，2020年全年贸易额可能会下降10%。

这样的复原力既超出了各方预期，也背离了近期经验。在2009年也就是全球金融危机的最后一年，全球GDP下降了0.1%，而贸易大跌13%。国际货币基金组织（IMF）预测，今年全球GDP可能下降4.9%，也就是2009年降幅的50倍。那么，为什么贸易受到的冲击却可能变小呢？

全球金融危机后，贸易额的降幅远远超过GDP降幅主要是因为人们不再购买汽车等贸易量大的耐用品。但在这次危机中，不进入国际贸易的国内服务业受到的打击比那时候更沉重。封城期间，人们不再去电影院或餐馆，但还是会购买进口冰箱。这使得贸易的降幅小于GDP。

此外，全球强健的生产体系为贸易流动提供了有力支撑。新冠肺炎导致供应链陷入冰封，但至少在亚洲，供应链很快又开始解冻。瑞士圣加仑大学（University of St Gallen）的西蒙·伊文奈特（Simon Evenett）表示，自疫情爆发后对医疗产品和药品实施的贸易限制数量在4月达到顶峰，此后已减少了15%。更重要的是，解封时间早于预期，这让中国、德国等出口强国的工厂得以复工，推动了产出。

疫情引发的需求给某些产品的贸易带来了额外的推动力。贸易数据公司磐聚网（Panjiva）估算，3月到7月，美国防护设备的进口增长了两倍。自6

月以来，中国每个月的出口同比都有增长，其中大部分来自疫情相关产品，如居家办公所需的电脑设备等。在线市场Freightos的埃坦·布克曼（Eytan Buchman）称，美国和东南亚之间的海运价格正在飙升，一定程度上是由小企业“近乎狂热的”电商交易造成的。

政策制定者在贸易复苏中发挥了关键作用。货币和财政政策的“火力”比贸易专家预计的更猛、更快。研究机构凯投宏观（Capital Economics）的詹妮弗·麦克考温（Jennifer McKeown）表示，央行的流动性措施让贸易融资的流动好于全球金融危机时的情况。

尽管贸易的表现带来了一些安慰，但还没到宣布胜利的时候。发生第二波封城或者太早收缩经济刺激措施都可能破坏复苏的进程。韩国8月的出口额较7月有所下降。中国8月的出口额在对2019年被人为压低的基数做调整后也还有所下降。监督全球贸易的世贸组织的首席经济学家罗伯特·库普曼（Robert Koopman）对是否会出现持续的V型复苏表示怀疑。

在此之上还有对贸易持续不平衡的担忧。美国智库外交关系协会（Council on Foreign Relations）的布莱德·赛斯特（Brad Setser）表示，贸易衰退缩小了大多数国家进口与出口之间的差距，减轻了不平衡。然而有两个国家却是明显的例外。首先是中国，快速复工复产令其商品出口飙升到中美贸易战爆发前的水平——8月的出口额比进口额高出近600亿美元。其次是美国，它用以刺激需求的政策带来了副作用，导致贸易逆差进一步扩大，在7月达到了800亿美元左右。

这样的不平衡不是什么好征兆。尽管美中之间的《第一阶段经贸协议》是要促进美国对中国的出口，但迄今成效令人失望。与此同时，特朗普在11月大选来临之前正在对中国展开猛烈抨击。贸易的表现可能没有像许多人担心的那么糟糕，但它仍有惊人的能力来打出瑟曼式的重拳。■



The world economy

The 90% economy, revisited

A recovery is taking shape—but it is extraordinarily uneven across both industries and countries

THE WORST day of the covid-19 pandemic, at least from an economic perspective, was Good Friday. On April 10th lockdowns in many countries were at their most severe, confining people to their homes and crushing activity. Global GDP that day was 20% lower than it would otherwise have been (see chart 1). Since then governments have lifted lockdowns. Economies have begun to recover. Analysts are pencilling in global GDP growth of 7% or more in the third quarter of this year, compared with the second.

That may all sound remarkably V-shaped, but the world is still a long way from normal. Governments continue to enforce social-distancing measures to keep the virus at bay. These reduce output—by allowing fewer diners in restaurants at a time, say, or banning spectators from sports arenas. People remain nervous about being infected. Economic uncertainty among both consumers and firms is near record highs—and this very probably explains companies' reluctance to invest (see chart 2).

Calculations by Goldman Sachs, a bank, suggest that social-distancing measures continue to reduce global GDP by 7-8%—roughly in line with what *The Economist* argued in April, when we coined the term “90% economy” to describe what would happen once lockdowns began to be lifted. Yet although the global economy is operating at about nine-tenths capacity, there is a lot of variation between industries and countries. Some are doing relatively—and surprisingly—well, others dreadfully.

Take the respective performance of goods and services. Goods have

bounced back fast. Global retail sales had recovered their pre-pandemic level by July, according to research by JPMorgan Chase, another bank. Armed with \$2trn-worth of cash handouts from governments since the virus struck, consumers across the world have stocked up on things to make it bearable to be at home more often, from laptops to dumbbells, which partly explains why world trade has held up better than economists had expected. Global factory output has made up nearly all the ground it lost during the lockdowns.

Services activity is a lot further below its pre-pandemic level, largely because such industries are vulnerable to people avoiding crowds. The number of diners in restaurants remains 30-40% lower than normal worldwide, according to data from OpenTable, a booking platform. The number of scheduled flights is about half what it was just before the pandemic struck.

The variation in economic performance between countries is even more striking. It is common for growth rates to diverge in downturns. But the size of this year's collapse in output means that the differences between countries' growth rates are enormous. On September 16th the OECD, a club of mostly rich countries, issued fresh economic forecasts. Like other forecasters—such as the Federal Reserve, which on the same day published new projections for the American economy—it has become less gloomy in recent months.

Still, the growth gap between best and worst performers in the G7 group of countries in 2020 is expected to be 6.7 percentage points, far wider than that during the last global downturn a decade ago. Of the big economies, only China is set to expand in 2020. Some countries, such as America and South Korea, face a downturn but hardly a catastrophic one (see chart 3). Britain, by contrast, looks to be in line for its deepest recession since the Great Frost of 1709.

Some economists contend that the huge gap between countries is a statistical mirage, reflecting different methods of computing GDP figures. In Britain, for instance, the way statisticians tot up government spending means that school closures and cancelled hospital appointments have a bigger impact on GDP than elsewhere. But this effect is small—the bulk of the fall in output has come from the private sector.

Instead, performance comes down to three factors. The first is industrial composition. Countries such as Greece and Italy, which rely on retail and hospitality, always looked more vulnerable than, say, Germany. Its large manufacturing sector has benefited from the global goods recovery.

Second is confidence, which appears to be determined by a country's experience under lockdown. Britain's poor economic performance is likely to be related to the government's poor handling of the pandemic. Britons seem more nervous than other Europeans about venturing outside.

The third factor is stimulus. America's lawmakers may be unable to agree on a top-up, but they have already enacted the world's largest rescue package, relative to the size of its economy. The OECD thinks it will be one of the better-performing rich countries this year.

What next for the 90% economy? Some authorities have been forced to order further lockdowns. But others may be able to calibrate social-distancing measures better without jeopardising output. That might bring the world closer to, say, a 95% economy. Indeed, the OECD expects global GDP to recover further this year.

It may be tempting to think that a vaccine, if it could be rolled out widely enough, would quickly restore normality. But there will be scars. Firms' reluctance to invest today will mean less productive capital in the future. A growing number of American workers believe they will not be returning to

their old jobs. Reallocating redundant resources towards more productive firms will take time. The Fed's rate-setters reckon unemployment will not return to its pre-pandemic rate of 4% until 2023; analysts at Goldman Sachs think it will do so only in 2025, even though they are optimistic that a vaccine will soon be widely distributed. Much as the disease itself has long-lasting effects, the covid-induced downturn will leave the world economy feeling subpar for some time to come. ■



世界经济

再论九成经济

复苏渐成气候，但行业间以及国家间的差异极大

至少从经济角度来看，耶稣受难日是新冠疫情期间最糟糕的一天。4月10日这一天，许多国家还在实施最严苛的封锁措施，把人们限制在家中并取消了各类活动。当天的全球GDP比假设没有疫情的水平低20%（见图表1）。之后，各国政府陆续解除封锁。经济也开始复苏。分析师预计，今年第三季度全球GDP将比第二季度增长7%或以上。

听起来世界似乎已进入明显的V型反弹，但实际上离回归正常还远得很。为遏制病毒蔓延，各国政府仍在实施社交疏离措施。限制同时在餐馆用餐的人数或禁止观众进入体育场馆之类的措施减少了经济产出。人们仍然担心受到感染。消费者和企业对经济的不确定情绪接近历史最高水平——这很可能也是企业不愿投资的原因（见图表2）。

高盛的计算表明，社交疏离措施继续使全球GDP减少7%至8%——这与本刊在4月的观点基本一致，当时我们提出了“九成经济”这个词来描述封锁开始解除之后情况会如何。不过，尽管全球经济运转已恢复了九成，但行业间以及国家间的差异很大。有些出人意料地更好些，有些糟糕透顶。

分别来看商品和服务两方面的表现。商品产销迅速反弹。摩根大通的调研显示，至7月份，全球商品零售额已恢复到疫情前的水平。自疫情爆发以来，在各地政府2万亿美元现金救助的支持下，世界各地的消费者纷纷囤积从笔记本电脑到哑铃的各种商品，以缓解长时间闭门不出之苦，这在一定程度上解释了为什么世界贸易的表现超过了经济学家的预期。全球工厂产出已接近收复了封城期间的全部失地。

服务业活动与疫情前水平的差距要大得多，主要是因为这些行业非常容易受到人们避免挤到一起的影响。订餐平台OpenTable的数据显示，全球到餐厅就餐的人数仍比正常水平低30%至40%。定期航班的数量只有疫情爆

发前的一半左右。

各个国家之间经济表现的差异还要显著。在经济衰退期，各国增速分化是常事。但由于今年经济产出大幅下滑，各国经济增速间的差异巨大。9月16日，成员主要为发达国家的经合组织发布了最新的经济预测。和美联储（也在当天公布了对美国经济的新预测）等其他预测机构一样，经合组织在最近几个月悲观情绪有所缓解。

不过，在七国集团当中，2020年表现最好和最差的国家之间的增速差距预计将达到6.7个百分点，远远高于10年前上一次全球经济衰退时的差距。在大型经济体中，只有中国预计将在2020年录得增长。美国和韩国等国家面临衰退，但还算不上灾难（见图表3）。相比之下，英国似乎将迎来自1709年“大霜冻”以来最严重的衰退。

一些经济学家认为，国家之间的巨大差距只是统计上的假象，反映了不同的GDP计算方法而已。例如，按照英国统计政府支出的方法，关闭学校和医院取消预约对GDP的冲击比其他地方更大。但是这个因素的影响很小——经济产出减少的大部分还是发生在私营部门。

相反，经济表现可以归结为三个因素。首先是产业结构。希腊和意大利等依赖零售业和酒店招待业的国家看上去总是比德国这样的国家更脆弱。德国庞大的制造业已经从全球商品复苏中获益。

其次是信心，这似乎取决于一个国家在封锁期间的经历。英国糟糕的经济表现很可能与政府应对疫情不力有关。英国人似乎比其他欧洲人更加不敢走出家门。

第三个因素是刺激政策。美国的议员或许无法就额外刺激措施达成一致，但他们毕竟已经通过了全球最大的一揽子救助方案（相对于其经济规模而言）。经合组织认为美国将是今年表现相对较好的发达国家之一。

接下来，九成经济将何去何从？一些国家政府已被迫下令实施进一步封锁。但其他国家或许能够更好地校正社交疏离措施而不影响产出。这可能

会让世界经济进一步恢复，比方说接近于9.5成经济。事实上，经合组织预计今年全球GDP将进一步回升。

人们可能会认为，只要有了疫苗并广泛分发，世界经济就会迅速恢复正常。但疫情会留下伤疤。企业现在不愿意投资，意味着将来的生产资本会减少。越来越多的美国劳动者认为他们将不会回到原来的工作岗位。把过剩的资源重新分配给生产率更高的公司需要时间。设定利率的美联储官员认为，失业率在2023年之前都不会恢复到疫情前的4%的水平；高盛的分析师则预计这个时间点要在2025年，尽管他们乐观地认为疫苗很快就能广泛分发了。正如新冠肺炎本身会有长期的遗留影响，疫情引发的衰退也会在未来一段时间内使世界经济继续处于亚健康状态。 ■



Cloud computing

Better down where it's wetter

How to build a data-centre underwater

EARLIER THIS year a ship hauled a large, barnacle-covered cylinder sporting a Microsoft logo from the seas off the Orkney islands. Inside were a dozen server racks, of the sort found in data-centres around the world. Sunk in 2018, and connected to the shore by cable, the computers had spent the past couple of years humming away, part of an experiment into the feasibility of building data-centres underwater.

On September 14th Microsoft revealed some results. The aquatic data-centre suffered equipment failures at just one-eighth the rate of those built on land. Being inaccessible to humans, the firm could fill it with nitrogen instead of air, cutting down corrosion. The lack of human visitors also meant none of the bumping and jostling that can cause faults on land.

Microsoft hopes some of the lessons can be applied to existing, land-based data-centres. In the longer term, though, it notes that building underwater offers advantages beyond just reliability. Immersion in seawater helps with cooling, a big expense on land. Data-centres work best when placed close to customers. Land in New York or London is expensive, but nearby sea-floor is cheap. More than half the world's population lives within 120 miles (192km) of the sea. Ben Cutler, the engineer in charge of the project, says submarine data-centres could be co-located with offshore wind farms as "anchor" customers. The cylinder fits in a standard shipping container, so could be deployed to remote places like islands, or even disaster areas to support relief efforts. Water and electronics, it seems, do sometimes mix. ■



云计算

水下更好

如何建立水下数据中心

今年早些时候，一艘船从奥克尼群岛（Orkney）附近海域拖出了一个附满藤壶、带有微软标识的大型圆柱体。它里头装着十几个服务器机架——在各地的数据中心的都看得到那种。这些计算机于2018年沉入大海，通过电缆连接到岸上，过去两年里一直在嗡嗡不停地工作。这是建立水下数据中心可行性实验的一部分。

微软于9月14日公布了部分实验结果。这个水下数据中心的设备故障率仅为陆上数据中心的八分之一。由于人类无法进入，微软可以向里面注入氮气而不是空气，从而减少腐蚀。没有人类访客也意味着不会发生任何在陆地上会导致故障的磕磕碰碰。

微软希望实验得出的一些经验可以应用于现有的陆上数据中心。不过微软指出，长远来看水下数据中心的优势不仅仅在于可靠性。浸在海水中有利于机器冷却，这在陆地上是一笔不小的费用。数据中心在位置靠近客户时效果最佳。纽约或伦敦寸土寸金，但附近的海底价格低廉。全球超过一半的人口居住在距海岸120英里（192公里）以内的地方。负责该项目的工程师本·卡特勒（Ben Cutler）表示，海底数据中心可以作为“固定”客户和海上风电场建在一起。这个圆柱体能装进标准船运集装箱，因此可以部署到岛屿等偏远地区，甚至放到灾区支持救援工作。这么看来，水和电子设备有时也能混在一块儿。■



Wizz Air

Rising in the east

A go-getting Hungarian airline sees opportunity in the pandemic

THE MOOD among airline bosses can seem uniformly bleak. For good reason: air travel may not return to pre-pandemic levels until 2024. Not a week goes by without an airline sacking thousands of workers. Against this gloom, Jozsef Varadi, who runs Wizz Air, cuts an audacious figure. While other airlines cancel and defer orders for new planes and put expansion plans on ice, he wants to increase his fleet from 127 planes to 160 by 2022 and double passenger numbers to 80m by 2025. He believes the Hungarian low-cost carrier, founded 17 years ago and now Europe's third-biggest behind Ryanair and EasyJet, will not only survive covid-19 but thrive.

Can the plan fly? "The odds are it will," says Keith McMullan of Aviation Strategy, a consultancy. Wizz Air managed to report a 19% rise in revenues in the 12 months to March, to €2.8bn (\$3.1bn). Net profits doubled year on year, to €281m. Despite unavoidable losses this year, it has sustained less covid-19 damage than rivals.

Luck played a role. Wizz Air's customers are on average 32 years old—younger than those of rivals and less fearful of the virus. It caters to many central and eastern Europeans working in the west, who are keen to fly home frequently. Wizz Air's smaller fleet, less than a third the size of Ryanair's and half of EasyJet's, meant it could keep a bigger share of its aircraft in the air.

Wizz Air's resilience is not all down to good fortune. Mr Varadi's focus on costs helped, too. He claims Wizz Air's are the lowest in the business, thanks mainly to the industry's largest fleet of super-efficient Airbus A321s (though he got lucky here, too, by not picking Boeing's rival 737 MAX jets,

the grounding of which after two fatal crashes has delayed deliveries to big buyers like Ryanair). Using the biggest version of the single-aisle workhorse has helped to spread expenses among more passengers. One estimate put Wizz Air's unit costs at half those of EasyJet, an airline that increasingly resembles the legacy carriers it once sought to subvert. And Mr Varadi has pulled this off without irritating passengers or gaining a Ryanair-like reputation for stinginess.

Now, thanks to mass lay-offs of pilots, cabin crew and other staff, labour costs are tumbling. Empty airports are wooing carriers with cheap landing slots and discounts on other charges. That has allowed Wizz Air to set up ten new bases in the past three months, including at London's Gatwick airport, as well as in Germany, Albania and Russia. Plans to serve the Persian Gulf in a joint venture with Abu Dhabi's sovereign-wealth fund remain on track.

Things could still go wrong. On September 1st, as European countries reimposed travel restrictions, Wizz Air tempered its plans to return to 80% capacity next quarter. It is now aiming for 60%, still better than 45% or so for most European rivals. Its share price is below its peak in mid-February, but back where it was at the start of the year (see chart). Mr Varadi says Wizz Air's €1.5bn in cash would last 20 months even if all its planes stop flying. He relishes the chance to "sort winners from losers". No points for guessing which group he thinks his firm belongs to. ■



威兹航空

从东方起飞

一家雄心勃勃的匈牙利航空公司在疫情中看到机遇

航空公司老板们似乎全体情绪低落。这很容易理解：航空旅行可能要等到2024年才能恢复到疫情前水平。每周都有一家航空公司裁掉数千名员工。在这种灰暗的背景下，匈牙利威兹航空公司（Wizz Air）的老板约瑟夫·瓦劳迪（Jozsef Varadi）显得格外大胆。虽然其他航空公司纷纷取消或延迟新飞机订单，搁置扩张计划，他却想在2022年之前将机队从127架扩大至160架，在2025年前使乘客数翻番至8000万。他相信，这家于17年前成立、目前仅次于瑞安和易捷的欧洲第三大低成本航空公司不仅会渡过疫情难关，还将蒸蒸日上。

他的计划能实现吗？“大概率可以。”咨询公司“航空战略”（Aviation Strategy）的基思·麦克马伦（Keith McMullan）说。在截至3月的12个月里，威兹实现了19%的营收增长，达到28亿欧元（31亿美元）。净利润同比增长一倍，达到2.81亿欧元。尽管今年将不可避免地出现亏损，但威兹因疫情遭受的损失小于竞争对手。

其中有运气的因素。威兹的乘客平均年龄32岁——比竞争对手的乘客更年轻，不那么担心病毒。威兹迎合了许多在西欧工作的中东欧人的需要，他们喜欢经常飞回家。威兹的机队规模较小，不到瑞安的三分之一和易捷的一半，因而闲置飞机的占比可能更小。

但威兹的抗冲击力也不完全是因为好运气。瓦劳迪对成本的关注发挥了作用。他声称威兹的成本是业内最低的，这主要归功于它拥有业内最大规模的超高效空客A321机队（不过在这一点上他也很走运，因为他没有选择A321的竞争机型波音737 MAX喷气式客机，这一机型在发生两起致命事故后停飞，并推迟了向瑞安等大买家的交付）。使用最大版本的单通道主力机型帮助将费用分摊给了更多乘客。据一项估计，威兹的单位成本只有易捷的一半，而易捷如今越来越像它曾经试图颠覆的传统航空公司。瓦劳迪

成功做到了这些，却既没有惹恼乘客，也没落得瑞安那般吝啬的名声。

现在，由于大批飞行员、乘务员和其他工作人员被裁，人工成本在暴跌。空旷的机场正在用廉价的降落时段和其他费用折扣争取航空公司。这让威兹得以在过去三个月内建成十个新基地，包括在伦敦盖特威克机场，以及在德国、阿尔巴尼亚和俄罗斯的机场。与阿布扎比主权财富基金成立合资企业以服务波斯湾的计划继续推进。

但事情仍不好说。9月1日，由于欧洲国家重新实施旅行限制，威兹调整了下一季度将运力恢复到80%的计划。现在它的目标是60%，仍高于大多数欧洲竞争对手的45%左右。威兹的股价低于2月中旬的峰值，但回到了年初的位置（见图表）。瓦劳迪说，就算自家飞机全部停飞，公司的15亿欧元现金也能维持20个月。他很乐意有机会“分出赢家和输家”。不用猜也知道他觉得自己的公司属于哪一队。■



Bribery

A closer look at greasy palms

Bribery pays—if you don't get caught

MANY BIG companies may be struggling with depressed sales, but these are busy times for bribery-busters. Mexico is abuzz over allegations by an ex-boss of Pemex, the state oil giant, that several senior politicians received bungs from companies including Odebrecht, a Brazilian construction firm. The scandal is the latest in a string of graft cases to make headlines this year, starting with Airbus's record \$4bn settlement in January over accusations of corruption for making illegal payments in various countries.

Corporate bribery is hardly new. In surveys, between a third and a half of companies typically claim to have lost business to rivals who won contracts by paying kickbacks. But such perceptions-based research has obvious limitations. A new study takes a more rigorous approach, and draws some striking conclusions.

Raghavendra Rau of Judge Business School at the University of Cambridge, Yan-Leung Cheung of the Education University of Hong Kong and Aris Stouraitis of Hong Kong Baptist University examined nearly 200 prominent bribery cases in 60 countries between 1975 and 2015. For the firms doing the bribing, they found, the short-term gains were juicy: every dollar of bribe translated into a \$6-9 increase in excess returns, relative to the overall stockmarket.

That, however, does not take account of the chances of getting caught. These have risen as enforcement of America's 43-year-old anti-bribery law, the Foreign Corrupt Practices Act (FCPA), has been stepped up and other countries have passed similar laws. The number of FCPA cases is up sharply since the financial crisis of 2007-09, according to Stanford Law School (see

chart). It has dipped a bit under President Donald Trump, who has criticised the FCPA for hobbling American firms overseas, but remains well above historic levels. Total fines for FCPA violations were \$14bn in 2016-19, 48 times as much as in the four years to 2007.

The authors also tested 11 hypotheses that emerged from past studies of bribery. They found support for some, for instance that firms pay larger bribes when they expect to receive larger benefits, and that the net benefits of bribing are smaller in places with more public disclosure of politicians' sources of income.

But they punctured other bits of received wisdom. Most striking, they found no link between democracy and graft. This challenges the "Tullock paradox", which holds that firms can get away with smaller bribes in democracies because politicians and officials have less of a lock on the system than those in autocratic countries, and so cannot extract as much rent. Such findings will doubtless be of interest to corruption investigators and unscrupulous executives alike. ■



贿赂

细看脏手

贿赂生财——只要不被抓到

很多大公司可能都在为销售低迷而苦苦挣扎，但这段时间反贪人员忙个不停。一起丑闻在墨西哥传得沸沸扬扬：国有石油巨头墨西哥国家石油公司（Pemex）的一名前老板指控几名资深政客接受了巴西建筑公司Odebrecht等多家公司的贿赂。这是今年登上新闻头条的一连串贿赂案件中的最新一起。第一起是在1月，空客支付了创纪录的40亿美元，就自己在多个国家非法支付佣金的行贿指控达成和解。

企业行贿不算什么新鲜事。在调查中，通常有三分之一到一半的公司声称自己的业务被那些通过支付回扣赢得合同的竞争对手抢走了。但是，这种基于主观看法的调查显然有局限性。一项新研究采用了更严谨的方法，得出了一些惊人的结论。

剑桥大学嘉治商学院（Judge Business School）的拉格范德拉·劳（Raghavendra Rau）、香港教育大学的张仁良，以及香港浸会大学的阿里斯·斯托伊蒂斯（Aris Stouraitis）调查了1975至2015年间60个国家的近200起著名贿赂案。他们发现，行贿会给公司带来丰厚的短期收益：相对于整体股市，每一美元的贿赂会转化为六到九美元的超额回报。

不过，这没有考虑到东窗事发的可能性。随着43年前出台的美国反贿赂法《反海外腐败法》（以下简称FCPA）执行力度的加大，以及其他国家也通过了类似的法律，被抓获的情况已然增多。斯坦福大学法学院的数据显示，自2007至2009年金融危机以来，FCPA案件的数量急剧上升（见图表）。特朗普批评FCPA阻碍了美国公司在海外的发展，在他执政下相关案件的数量略有下降，但仍远高于历史水平。2016至2019年，因违反FCPA而产生的罚款总额达140亿美元，是2004至2007年这四年的48倍。

作者还检验了过往的贿赂研究得出的11个假设。他们找到了支持其中一些

假设的依据，比如，当公司预计自己会获取更大的利益时会支付更大额的贿赂；在政客的收入来源被更多地公开披露的地方，行贿带来的净收益更少。

但他们也对其他一些流行观点提出了异议。最值得注意的是，他们发现民主和贪污之间没有必然联系。这对“塔洛克悖论”（Tullock paradox）提出了挑战。塔洛克悖论认为，在民主国家，企业可以顺利地用更小额的贿赂就达成目的，因为与专制国家相比，它们的政客和官员对现行制度的控制更少，因而无法谋取同样多的经济租。这样的研究结果无疑会让反腐败调查人员和那些肆无忌惮的高管都很感兴趣。 ■



Cyber-power

Digital dominance

A new ranking of cyber-power throws up some surprises

CHINA HAS the world's largest army. Russia wields the most tanks. America owns the fanciest satellites. But who has the most cyber-power? A new National Cyber Power Index by the Belfer Centre at Harvard University ranks 30 countries on their level of ambition and capability. Offensive cyber-power—the ability to do harm in or through computer networks—is one measure. But so too are the strength of a country's defences, the sophistication of its cyber-security industry and its ability to spread and counter propaganda (see chart).

That America stands at the top of the list is not surprising. Its cyber-security budget for fiscal year 2020 stood at over \$17bn and the National Security Agency (NSA), its signals-intelligence (SIGINT) agency, probably gets well over \$10bn. The awesome scale of America's digital espionage was laid bare in leaks by Edward Snowden, a former NSA contractor, in 2013, which showed the agency hoovering up vast amounts of the world's internet traffic and trying to weaken encryption standards.

China, in second place, has demonstrated a voracious appetite for commercial cyber-espionage abroad and an iron grip on the internet at home. Britain, whose National Cyber Security Centre has parried over 1,800 cyber-attacks since its creation in 2016, is third. Britain is currently setting up an offensive National Cyber Force staffed jointly by spies and soldiers. Russia, whose spies interfered with America's last election, is in fourth place.

The big surprise is the Netherlands in fifth place, ahead of France, Germany and Canada. Dutch expertise in analysing malware is particularly sharp,

says a Dutch insider, who points out that this is handy both for spotting attacks and mounting them. The cybercrime team of the Dutch police has proved adept at apprehending online criminals. And in 2014 the small but world-class group of hackers working for Dutch intelligence managed to penetrate a computer network used by the SVR, Russia's foreign intelligence service—including CCTV cameras in the building—allowing them to watch as the Russians hacked America's State Department.

Measuring cyber-power is fraught with difficulty, warns Marcus Willett, a former deputy director of GCHQ, Britain's SIGINT agency. Many experts are puzzled by Israel's relatively low ranking on the Belfer index, despite its hacking prowess; its secrecy may be one reason for this. "Warships in the Antarctic can easily be seen," says Mr Willett, "yet a piece of code inserted into a power plant is hard to detect." Though some states acknowledge their offensive capabilities—America and Britain boast of smashing Islamic State networks in Iraq and Syria, partly as a signal to Russia and China—most shy away from doing so.

Many countries outsource the dirtiest work to deniable proxies, like "hacktivists" and criminals. And whereas procuring a warship or missile is expensive and time-consuming, potent malware can be stolen or bought online. WannaCry, a ransomware attack mounted by North Korea in 2017, used a hacking tool, EternalBlue, which had leaked out of the NSA.

A forthcoming study of cyber-power by Mr Willett and his colleagues at the International Institute for Strategic Studies (IISS), a think-tank, concludes that, although stealing things and disrupting networks is important, what matters most over the longer term is control of digital infrastructure, such as the hardware that runs mobile telecommunications and key apps. Dominance there will be crucial to economic strength and national security, says the IISS. On that measure, "only China is currently positioned to be able to make the jump to join the US in the first rank." ■



网络力量

数字霸权

一份新的网络力量排名有点出人意料

中国拥有世界上最庞大的军队。俄罗斯拥有最多坦克。美国拥有最先进的卫星。但谁拥有最强大的网络力量？哈佛大学贝尔福中心（Belfer Centre）最新发布的国家网络力量指数（National Cyber Power Index）对30个国家的雄心和能力进行了排名。衡量指标之一是攻击性网络力量，即在计算机网络内或通过计算机网络造成伤害的能力。但同样作为指标的还有一国的防御力、网络安全产业的发展水平，以及宣传和反宣传能力（见图表）。

美国名列榜首并不让人意外。它在2020财年的网络安全预算超过170亿美元，它的信号情报（SIGINT）机构美国国家安全局（NSA）的预算可能远高于100亿美元。国安局前承包商雇员斯诺登2013年泄露的文件揭露了美国数字间谍活动惊人的规模。文件显示国安局占用了全世界大量的互联网流量，并试图削弱加密标准。

位居第二的中国展现出对国外商业网络间谍活动的极大兴趣，对国内的互联网施以铁腕管控。英国排名第三，它的国家网络安全中心（National Cyber Security Centre）自2016年成立以来已经抵御了1800多起网络攻击。英国目前正在组建一个进攻性的国家网络部队（National Cyber Force），成员有间谍也有士兵。俄罗斯排名第四，该国间谍干预了上一次美国大选。

最让人惊讶的是荷兰位居第五，排在了法国、德国和加拿大前面。荷兰一位内部人士称，该国在分析恶意软件方面的专业技能尤为出色，他还指出这在发现攻击和实施攻击上都能派上用场。事实证明，荷兰警方的网络犯罪小组在追捕网络罪犯方面非常娴熟。而在2014年，为荷兰情报机构工作的一群规模虽小但世界顶尖的黑客成功侵入了俄罗斯对外情报局（SVR）的计算机网络，包括大楼里的闭路电视监控摄像头，这让他们看到了俄罗

斯人入侵美国国务院网络的过程。

英国的信号情报机构政府通信总部（GCHQ）的前主管马库斯·威利特（Marcus Willett）提醒道，衡量网络力量困难重重。令许多专家不解的是，以色列尽管黑客技术高超，在贝尔福中心这一指数中的排名却相对较低。该国在这方面的隐秘性可能是一个原因。“在南极的军舰很容易被发现，”威利特说，“而插入到发电厂程序中的一段代码却很难发现。”有些国家承认自己的进攻能力，比如美国和英国夸耀自己捣毁了伊斯兰国（IS）在伊拉克和叙利亚的网络，这一定程度上是为了向俄罗斯和中国发出信号。但大多数国家还是避而不谈。

许多国家把最脏的活儿外包给可矢口否认的代理人，比如“激进黑客”和犯罪分子。购置军舰或导弹费钱又耗时，但强效的恶意软件可以从网上偷窃或购买。朝鲜在2017年发起的一场勒索软件攻击WannaCry就利用了从美国国安局流出的黑客工具“永恒之蓝”（EternalBlue）。

威利特和他在智库国际战略研究所（International Institute for Strategic Studies，简称IISS）的同事们即将发表的一项关于网络力量的研究得出结论称，尽管偷窃和扰乱网络很重要，但从更长远来看，最重要的是对数字基础设施的控制，比如运行移动通信和关键应用的硬件。IISS认为在这方面的支配地位将对经济实力和国家安全至关重要。按照这个标准，“目前只有中国的状况能够实现大步跨越，与美国并列第一集团。”■



Dementia

The forgotten problem

The rising prevalence of dementia is a global emergency

OF ALL THE troubles facing the world, the rising prevalence of dementia might seem among the less pressing. The reason behind it—longer lifespans—is to be cheered; it does not advance at the speed of a viral infection but with the ponderous inevitability of demographic change; and its full effects will not be felt until far into the future. But the reality is very different. Dementia is already a global emergency. Even now, more people live with it than can be looked after humanely. No cure is in the offing. And no society has devised a sustainable way to provide and pay for the care that people with it will need.

“Dementia” is an umbrella term for a range of conditions, with a variety of causes, of which the most common is Alzheimer’s disease, accounting for 60-80% of cases. It usually starts with forgetfulness and a mild loss of cognitive functioning. But as it advances, people lose the ability to look after themselves. Many require round-the-clock care long before they die. It does not just affect the elderly, but they are much more likely to have it—and life expectancy globally has climbed from not much more than 30 a century ago to over 70 now, and over 80 in rich countries. By some estimates, 1.7% of 65- to 69-year-olds have dementia and the risk of developing it doubles every five years after that. At present, about 50m people around the world have the condition, a number expected to rise to 82m by 2030 and 150m by 2050. Most of the new cases are in the developing world, where populations are rising and ageing.

The problems these numbers will bring everywhere have already been felt in countries where people are older, and especially acutely during lockdowns—witness the difficulty of looking after people with dementia in

their own homes, and the large numbers in overstretched care homes who receive little individual attention. As families shrink, single children and grandchildren will struggle to cope with their old folk. Already, dementia care has had a knock-on effect on general health care. Before the pandemic as many as a quarter of beds in British hospitals were occupied by people with dementia. There was nowhere else for them to go.

Not all the news is bad. Recent research has shown that behaviour such as smoking less, exercising more and losing weight in middle age has reduced the risk of dementia among old people in some Western countries in the past 30 years. And America's Food and Drug Administration has promised to decide by March 2021 whether to license a drug said to be the first to stem cognitive decline in Alzheimer's patients. But the risk of dementia still seems to be rising in much of the world and any new therapy in the foreseeable future is likely to benefit only some patients partially.

That is why governments should act now to lessen the social and economic harm from the growing prevalence of dementia. The first step is to recall the urgency with which many were promising to tackle the problem just a few years ago—in 2013, for example, when David Cameron, then Britain's prime minister, used the rotating chairmanship of the G8 to convene a "dementia summit", which promised to fund research with the goal of finding a "disease-modifying treatment" by 2025. Instead, funding for work on dementia has lagged far behind that for cancer or coronary heart disease. And as the pandemic hampers or prevents clinical trials and research, and sucks resources away from other areas, dementia risks again being left behind.

Governments also need to think about long-term care for people with dementia. The question that is most often asked is how to pay for it. Japan's compulsory long-term-care insurance scheme, requiring everyone aged 40-65 to pay a premium, seems attractive, as it avoids penalising the young.

But it is not self-financing. The increasing burden there as elsewhere will fall on individuals and the taxpayer.

And an even more fundamental question than who pays for care is: who will do it? Undertaken with humanity and dignity, it is extremely labour-intensive. Technology can help lighten the load—using remote monitoring to let people stay at home and, perhaps in future, robots to perform some basic tasks. But looking after people with dementia requires people. The job is usually classified as low-skilled and is often poorly paid. In fact it demands huge reserves of patience, empathy and kindness. It should be better rewarded and more highly regarded even though that would add to the bill. In countries such as Japan and Britain, with acute shortages of care-workers, immigration will have to be made easier for those willing and able to do it.

Lastly, evidence suggests that as many as 40% of cases of dementia can be delayed or averted by changing behaviour earlier in life. The trouble is that public-health campaigns have a patchy record and they do nothing for dementia's most intractable pre-existing condition—old age. No cure, insufficient financing and a tricky public-health message: perhaps that is enough to make you throw up your hands in despair. Instead, however, it only underlines how the solutions to dementia, like the disease itself, will take decades to unfold. It is yet another reason to start working on them right away. ■



【首文】痴呆症

被遗忘的问题

痴呆症患病率上升是个全球性的紧急情况

全世界面临的所有麻烦中，痴呆症患病率上升看起来似乎属于不太紧迫的那类。其背后的原因——人们更长寿了——本身值得庆贺，而且它的扩展并不似病毒感染那般迅速，而是与迟缓而不可避免的人口结构变化同步。另外，它的全面影响要到很久以后才能感受得到。但现实却非常不同。痴呆症已经成为全球性的紧急情况。即便是现在也已经有患者得不到人道的照顾。眼下并没有治愈的方法，也没有哪个社会想出了一种可持续的方式来提供和支付患者所需的护理。

“痴呆症”是个涵盖一系列疾病的总称，致病原因也多种多样，其中最常见的是阿尔茨海默病，在所有病例中占到60%到80%。痴呆症通常始于健忘和认知功能轻度丧失。但随着病情的发展，患者会失去自理能力。许多人在去世前很久就需要全天候的护理。它不仅影响老年人，但他们更有可能患上此症——而全球预期寿命已经从一个世纪前的30出头攀升到现在的70多岁，在富裕国家更是超过了80岁。据估计，65岁至69岁的人中有1.7%患有痴呆症，此后每五年罹患该病的风险增加一倍。目前全球约有5000万人患病，预计到2030年将升至8200万，到2050年升至1.5亿。大多数新增病例出现在人口正在增长并老龄化的发展中国家。

这些数字将给全世界带来的难题现在就已在老龄化更严重的国家显现出来，在封城期间被强烈地感知——看看在家里照顾痴呆症患者有多难吧，还有那些不堪负荷的护理院中有大批患者得不到个体化照顾。随着家庭规模的缩小，独生子女和孙辈将很难照顾他们的长辈。痴呆症护理已经对一般医疗系统造成了连锁效应。在新冠疫情发生前，英国医院多达四分之一的床位被痴呆症患者占据。他们也没有别的地方可去。

倒也不是只有坏消息。近期有研究表明，过去30年，部分西方国家的老年人通过在中年时少吸烟、多锻炼和减肥等行为降低了患痴呆症的风险。另

外，美国食品和药物管理局承诺在2021年3月之前对一款药物做出审批决定，据说这是第一款可阻止阿尔茨海默病患者认知能力下降的药物。但是在世界的大部分地区，患痴呆症的风险似乎仍在上升，而且在可预见的未来出现的任何新疗法很可能只会让一些患者部分受益。

因此，政府现在应该行动起来，减轻痴呆症患病率上升带来的社会和经济损害。第一步就是要重新唤起几年前许多人承诺解决这个问题时曾有过的紧迫感——例如在2013年，时任英国首相的卡梅伦利用英国担任八国集团轮值主席国的机会召集了一次“痴呆症峰会”，会议承诺为痴呆症研究提供资助，以期在2025年前找到一种“疾病缓解疗法”。而事实却是，痴呆症研究获得的资助已经远远落后于癌症或冠心病。而且，由于疫情阻碍或阻止了临床试验和研究，并抽走了其他领域的资源，痴呆症有再次被抛在后面的风险。

政府还需要思考痴呆症患者的长期护理问题。最常被问到的问题是该如何为此买单。日本实行强制性的长期护理保险计划，要求所有40到65岁的人支付保险费。这种做法似乎很有吸引力，因为它避免了将重担丢给年轻人。但该计划并不是自我融资的。和其他地方一样，日益加重的负担将落在个人和纳税人身上。

比起由谁支付护理费用，一个更重大的问题是：谁来提供护理服务？护理要体现人道和尊严，是极其劳动密集型的工作。技术可帮助减轻负担：可以利用远程监控让人们待在家里；或许在未来，机器人可以执行一些基本任务。但照顾痴呆症患者还是需要人。这项工作一般都被归为低技能那一类，报酬通常也很低。事实上，它需要有极大的耐心、同理心和善意。这份工作应该得到更好的回报和更多的尊重，尽管这会增加支出。在日本和英国等护理人员严重短缺的国家，需要对那些愿意且有能力强于这项工作的人提高移民的便利度。

最后，有证据表明，多达40%的痴呆症病例可以通过在早年改变行为来延缓或避免。问题是过往的公共卫生宣传活动效果参差不齐，对于痴呆症最棘手的“既有病症”——老龄——也无补于事。无药可医、资金不足、公共

卫生讯息传达难以收效，这一切也许足以让人绝望地举手投降。然而，这实际上只是突显出痴呆症的解决方案就像这种疾病本身一样，需要几十年的时间来发展。这是应该马上开始研究这些方案的另一个理由。■



Bartleby

The delight is in the detail

An excellent guide to leadership by Honeywell's ex-boss

THE MEMOIRS of chief executives can be exercises in pompous self-justification or, just as bad, in grandiose philosophising about social and political trends. Occasionally, however, a corporate titan writes a book that is both readable and a practical guide for managers hoping to follow in their footsteps. David Cote, the former CEO of Honeywell, an industrial conglomerate, has produced an excellent effort with “Winning Now, Winning Later”.

It is true that Mr Cote occasionally comes across as a bit of a martinet. When a team failed to come up with suggestions to cut costs, he ordered them to cancel all other meetings and keep talking until they produced the results. And his juniors were clearly kept on their toes; he was also very much a hands-on manager. “The idea that as a leader you can focus on strategy and delegate its implementation to great people is a fallacy,” he writes. But his approach paid off and the book is a detailed guide to the tricky task of managing a big business.

To give one small example, plenty of executives talk about encouraging greater diversity in the workforce, but little gets done. Mr Cote was fed up with junior managers declaring that they could not find suitable candidates in their area. So he had his team break down the population statistics in places where his factories were located to demonstrate that there should be many opportunities to hire workers from different backgrounds. Diversity duly improved.

The author's broader aim is illustrated by his subtitle: “How Companies Can Win in the Short Term, While Investing for the Long Term”. He thinks

the idea that corporate leaders have no choice but to embrace short-termism in the face of pressure from investors is “one of the most pernicious beliefs circulating in business today”.

When Mr Cote took over at Honeywell in February 2002, he says the company was “a train wreck and on the verge of failure”. Remarkably, the board and outgoing boss refused him any access to the company’s financials until July 2002, when he also became chairman. What he eventually found was that the group had pursued short-term profits through aggressive accounting practices. During the previous decade, for every dollar in earnings Honeywell generated only 69 cents in cash.

He changed the accounting approach, put a greater focus on investment and aimed to expand the business while keeping fixed costs constant. Some of the biggest problems he faced were legacies of the previous regime. For example, former managers had sold a company for \$60m but agreed to be liable for meeting asbestos claims in perpetuity. By the early 2000s, the asbestos liability was \$1bn. He tried to deal with all such legal claims as quickly as possible. “It’s probably going to be cheaper for your organisation to resolve your legacy issues now than it will be a decade from now, when the harm will have mounted even more,” he writes.

When it came to improving the business, Mr Cote spent a lot of time focusing on Honeywell’s processes. Collectively, these changes were known as the Honeywell Operating System and they included such steps as reducing the use of toxic cleaning chemicals, which cut costs, shortened production time and improved worker safety. Reforming a business is a never-ending task. “Over time all organised systems evolve towards chaos,” he writes. “Unless you pursue change relentlessly, your efforts will eventually wither away.”

Over time, all this made a difference. The company increased investment in

research and development from 3.3% of sales in 2003 to 5.5% in 2016, and its operating margins rose from 8% in 2003 to about 16% in 2018. Investors were impressed. Honeywell's market value rose from \$20bn when he took over to \$120bn when he left in 2018, with returns easily beating the S&P 500 index.

One suspects Mr Cote's focus on detail was more important for the company's success than some of the more standard corporate pronouncements he reveals. Honeywell developed five "initiatives" and 12 "behaviours", which seems way too many for an employee to keep track.

And despite his best efforts, he does not quite solve the dilemma expressed in his subtitle. At one point, he admits that "Pursuing both short- and long-term performance requires a period of upfront investment during which performance might lag for a little while." In other words, even an able manager like Mr Cote needs a bit of luck, and patience on the part of directors and shareholders, to turn a company around. ■



巴托比

快乐在于细节

霍尼韦尔的前老板给出的一份出色的领导力指南

首席执行官写出的回忆录可能会是言辞浮夸的自我辩白，或是关于社会和政治趋势宏大却空洞的高谈阔论，反正都一样糟糕。不过偶尔也会有那么一位企业巨子写下一本既有可读性、又能给后来者以实际指导的书。工业企业集团霍尼韦尔的前首席执行官高德威（David Cote）的《赢在当下，赢在未来》（Winning Now, Winning Later）就是这样一份卓越的成果。

的确，高德威偶尔会让人觉得太过一板一眼。当一个团队没能就削减成本给出建议时，他命令他们取消所有其他会议，继续讨论，直到得出结果。他的下级显然丝毫不能松懈，因为他同时也是一个亲身下场的管理者。“有人认为领导者可以专注于战略，把战略的实施交给能人，这是错误的。”他写道。但他的方法得到了回报，而这本书就是管理一家大企业这项棘手任务的一份详尽指南。

举一个小例子，许多高管都大谈要促进员工队伍多元化，但鲜少做到。底层主管声称在自己所在的地区找不到合适的候选人，高德威受够了这样的托词，于是让团队列明工厂所在地的人口统计数据，以证明应该有很多机会雇用来自不同背景的人。多元化由此得到改善。

作者更广泛的目标展示在副标题中：“企业如何能在短期制胜，同时为长期投资”。他指出，认为企业领导人面对投资者的施压别无选择，而只能积极接受短期主义的看法是“现如今流传于商界的最有害的观念之一”。

高德威2002年2月接管霍尼韦尔时说，这家公司“一团糟，濒临破产”。值得注意的是，董事会和即将离任的老板拒绝让他查看公司账目，直到当年7月他兼任了董事长。最终他发现，集团通过激进的会计操作追求短期利润。在之前的十年里，霍尼韦尔每赚一美元，只能产生69美分的现金。

他改变了会计方法，更加注重投资，并力求在扩大业务的同时保持固定成本不变。他面临的一些最大的难题是之前的管理层遗留下来的。例如，前主管们以6000万美元的价格卖掉了一家公司，但同意永久承担石棉损害索赔的责任。到本世纪初，这类索赔造成的财务负担已经达到了10亿美元。他试图尽快处理所有这些索赔诉讼。他写道：“对你的组织来说，现在解决遗留问题可能比留待十年后再解决的成本更低，因为到那时损害已经发展到了更严重的地步。”

在改善业务方面，高德威花了大量时间梳理霍尼韦尔的流程。这些改变被统称为霍尼韦尔运营系统（Honeywell Operating System），涉及多种举措，包括减少有毒清洁用品的使用。它们降低了成本，缩短了生产时间，提高了员工安全度。改革一家企业是一项永无止境的任务。“久而久之，所有组织起来的系统都会朝着混乱的方向发展，”他写道，“除非你不懈地追求改变，否则终将白费心血。”

随着时间的推移，这一切带来了变化。霍尼韦尔的研发投入占销售额的比例从2003年的3.3%增加到2016年的5.5%，营业利润率从2003年的8%上升到2018年的16%左右。这愈发打动了投资者。高德威刚接手时公司市值为200亿美元，到2018年他离任时已升至1200亿美元，回报率轻松超过标普500指数。

笔者怀疑，相比高德威披露的某些更标准化的公司纲领，他对细节的注重对于这家公司的成功更加重要。霍尼韦尔制定了五项“行动方针”和12条“基本行为”，这看起来也太多了，员工应该很难悉数跟进。

而尽管高德威尽了最大努力，他并没能完全解决他在副标题中描述的那个两难困境。在书中某处，他承认，“同时追求短期和长期业绩需要一段时间的前期投入，在此期间业绩可能会稍微滞后一段时间。”换句话说，要扭转一家公司的局面，就连高德威这样能干的管理者也需要一点运气，以及董事和股东的耐心。 ■



Government debt

Putting on weight

Governments can borrow more than was once believed

IF PEOPLE KNOW one thing about the thinking of John Maynard Keynes, who more or less founded macroeconomics, it is that he was in favour of governments borrowing lots of money, at least under some circumstances. The “New Keynesian” orthodoxy that evolved from his work in the second half of the 20th century was much less liberal in this regard. It put less faith in borrowing’s purported benefits, and had greater concerns about its dangers.

The 2010s saw the pendulum swinging back. In large part because they feel bereft of other options, many governments have borrowed heavily—and as yet they have paid no dreadful price. Can this go on?

Keynes’s ideas about borrowing reflected his view of recessions—and in particular, the Depression of the 1930s, during which he wrote “The General Theory of Employment, Interest and Money”—as vicious circles. Recessions come about when the economy is hit by a sudden rise in the desire to save money; such desires lead to lower spending, which leads to more unemployment, which leads to yet less spending, and so on. If the government borrows enough to offset lower private spending with increased spending of its own the circle can be broken—or stopped from getting going.

Most early Keynesians assumed that the deficits caused by borrowing to stimulate the economy would be temporary; after borrowing more than they raised in taxes in order to provide a fiscal stimulus, governments would be able to raise more in taxes, and thus pay off their debts, in the good times that followed. Some, though, suspected that the structure of the

advanced economies of the 1930s might mean they were low on demand even in the good times, and that a permanent deficit might be necessary to keep the economy going at a rate that minimised unemployment.

Debates about the proper role of fiscal stimulus became less urgent in the decades after the second world war, as robust economic growth eased worries that demobilisation might bring a return of Depression-like conditions. Faith in Keynesian orthodoxy was further shaken by the economic developments of the 1970s and 1980s. Some economists began to argue that the public would eventually adjust to stimulus measures in ways that weakened their impact. Robert Barro, a leading proponent of this “rational expectations” approach, argued that a fiscal stimulus paid for by borrowing would see households spend less and save more, because they would know that tax rises were coming. This decreased private spending would then offset the increased public spending.

Linked to, but broader than, such academic questions was the fact that, by the 1970s, the ways in which Keynesian governments had been running their economies seemed to have failed. A trifecta of slowing growth, soaring inflation and high unemployment brought the idea of governments being able to avoid recessions through stimulus into disrepute.

The new orthodoxy was that governments should instead rely on monetary policy. When the economy slowed, monetary policy would loosen, making it cheaper to borrow, thus encouraging people to spend. Government borrowing, for its part, should be kept on a short leash. If governments pushed up their debt-to-GDP ratio, markets would become unwilling to lend to them, forcing up interest rates willy-nilly. The usefulness of monetary policy demanded a sober approach to fiscal policy.

The 2000s, however, saw a problem with this approach beginning to become plain. From the 1980s, interest rates had been in a long, steady

decline. By the 2000s they had reached historical lows. Low rates made it harder for central banks to stimulate economies by cutting them further: there was not room to do so. The global financial crisis pushed rates around the world to near zero.

Governments experimented with more radical monetary policy, such as the form of money printing known as “quantitative easing”. Their economies continued to underperform. There seemed to be room for new thinking, and a revamped Keynesianism sought to provide it. In 2012 Larry Summers, a former American treasury secretary, and Brad DeLong, an economist, suggested a large Keynesian stimulus based on borrowing. Thanks to low interest rates, the gains it would provide by boosting the growth rate of GDP might outstrip the cost of financing the debt taken on.

In the following year Mr Summers followed some 1930s Keynesians, notably Alvin Hansen, in suggesting that borrowing in order to stimulate might be needed not just as an occasional pick-me-up, but as a permanent part of the economy. Hansen had argued that an ageing population and a low rate of technological innovation produced a long-term lack of demand which he called “secular stagnation”. Mr Summers took an updated but similar view. Part of his backing for this idea was that the long-term decline of interest rates showed a persistent lack of demand.

| *Way down we go*

Sceptics insisted that such borrowing would drive interest rates up. But as the years went by and interest rates remained stubbornly low, the notion of borrowing for fiscal stimulus started to seem more tenable, even attractive. Very low interest rates mean that economies can grow faster than debt repayments do. Negative interest rates, which have been seen in some countries over recent years, mean that the amount to repay will actually be less than the amount borrowed.

Adherents of “Modern Monetary Theory” (MMT) went further than this, arguing that governments should borrow as much as was needed to achieve full employment while central banks focused simply on keeping interest rates low—a course of action which orthodox economics would expect to promptly drive up inflation. Currently MMT remains on the fringes of academic economics. But it has been embraced by some left-wing politicians; Senator Bernie Sanders, the candidate beaten by Joe Biden for the Democratic nomination, counted an MMT enthusiast, Stephanie Kelton of Stony Brook University, among his chief advisers.

The shift in mainstream thinking on debt helps explain why the huge amounts of government borrowing with which the world has responded to the pandemic has not worried economists. But now that governments have, if only for want of an alternative, become more willing to take on debt, what should be their limit? For an empirical answer, it is tempting to consider Japan, where the ratio of net public debt to GDP stood at 154% prior to the pandemic.

If Japan can continue to borrow with that level of debt, it might seem that countries with lower levels should also be fine. But this ignores the fact that if interest rates stagger back from the floor, burdens a lot smaller than Japan’s might become perilously unstable. There is no immediate account for why this might be likely. But that does not mean it will not happen. And governments need to remember that debt taken on at one interest rate may, if market sentiment changes, need to be rolled over at a much higher one in times to come.

Given this background risk, governments ideally ought to make sure that new borrowing is doing things that will provide a lasting good, greater than the final cost of the borrowing. If money is very cheap and likely to remain so, this will look like a fairly low bar. But there are opportunity costs to consider. If private borrowing has a high return and public borrowing

crowds it out, then the public borrowing either needs to show a similarly high return or it needs to be cut back.

At the moment private returns remain well above the cost of new borrowing in most places: in America, for instance, the earnings of corporations are generally high relative to the replacement cost of their capital. This makes it conceivable that resources used by the government would generate a greater level of welfare if they were instead mobilised by private firms.

But it does not currently look as though they would be. Despite the seemingly high returns to new capital, private investment in America is quite low. This suggests either that there are other obstacles to new investment, or that the high returns on investment reflect an insufficient level of competition rather than highly productive companies.

Both possibilities call for government remedy: either action aimed at identifying and dismantling the obstacles to investment, or at increasing competition. And until such actions produce greater investment or lower returns, the case for government borrowing remains quite strong. This is even more the case for public investments which might in themselves encourage the private sector to match them—“crowding in”, as opposed to crowding out. Investment in a much better electricity grid, for example, could increase investment in zero-carbon generation.

In the long run, the way to avoid having to borrow to the hilt is to implement structural changes which will revive what does seem to be chronically weak demand. Unfortunately, there is no consensus over why demand is weak. Is technological progress, outside the realm of computers and communications, not what it was? Is inequality putting money into the hands of the rich, who are less likely to spend their next dollar, rather than the poor, who are more likely? Are volatile financial markets encouraging

precautionary saving both by firms and governments? Is the ageing of the population at the root of it all?

Making people younger is not a viable policy option. But the volatility of markets might be addressed by regulation, and a lack of competition by antitrust actions. If inequality is at the root, redistribution (or its jargony cousin, predistribution) could perk up demand. Dealing with the structural problems constraining demand would probably push up interest rates, creating difficulties for those governments which have already accumulated large debt piles. But stronger underlying growth would subsequently reduce the need for further government borrowing, raise GDP and boost tax revenues. In principle that would make it easier for governments in such situations to pay down their increased debt.

The new consensus that government borrowing and spending is indeed an important part of stabilising an economy, and that interest rates are generally low enough to allow governments to manage this task at minimal cost, represents progress. Government borrowing is badly needed to deal with many of the world's current woes. But this consensus should ideally include two additional planks: that the quality of deficit-spending still matters, and that governments should prepare for the possibility of an eventual change in the global interest-rate environment—much as 2020 has shown that you should prepare for any low-probability disaster. ■



政府债务

体重增加

政府可以借的钱比一度认为的更多【“反思经济学基本理论”系列之四】

如果人们对约翰·梅纳德·凯恩斯的思想只有一点了解——他差不多可以说是创立了宏观经济学——那就是他支持政府借入大量资金，至少在某些情况下是这样。20世纪下半叶从他的研究演变而来的“新凯恩斯主义”正统观念在这方面的自由度要低得多。它对借贷号称的好处不抱太大信心，而对其危险更加担忧。

在2010年代，风水轮流转了。很大程度上是由于感到别无选择，许多政府举债沉重——而至今还没有付出可怕的代价。这能继续吗？

凯恩斯对于借贷的观点反映了他对经济衰退的看法——尤其是1930年代的大萧条，他在那时写出了《就业、利息和货币通论》——认为它们是恶性循环。当经济遭到储蓄欲望突然上升的冲击时，就会出现衰退。这种欲望导致支出减少，从而导致失业增加，再导致支出进一步减少，如此往复。如果政府借入足够多的钱，用自身支出的增加来抵消私人支出的减少，就可以打破或停止这种循环。

多数早期凯恩斯主义者认为由借贷刺激经济造成的赤字是暂时的。在借款超过税收以提供财政刺激后，政府将能够在随后的好年景中获得更多税收，从而偿还债务。不过，有些人怀疑，1930年代发达经济体的结构可能意味着哪怕在景气时期需求也很低，可能需要永久赤字才能使经济以把失业率维持在最低的速度运行下去。

在第二次世界大战后的几十年中，关于财政刺激的合理地位的辩论变得不那么紧迫，因为强劲的经济增长缓解了人们对复员可能引发类似于大萧条的状况的担忧。七八十年代的经济进一步动摇了凯恩斯主义的正统信仰。一些经济学家开始辩称，公众最终会适应刺激措施，从而削弱其影响。这种“理性预期”观点的主要倡导者罗伯特·巴罗（Robert Barro）称，

通过借贷支付的财政刺激措施将使家庭支出减少，储蓄更多，因为他们知道未来会加税。私人支出的减少将抵消公共支出的增加。

与此类学术问题相关但比它们宽泛的事实是，到1970年代，凯恩斯主义政府经营经济的方式似乎已经失败。增长放缓、通胀上升和高失业率的三连击让政府能够通过刺激来避免衰退的思想声名扫地。

新的正统观念是政府应改为依赖货币政策。当经济放缓时，货币政策将放松，使借贷成本降低，从而鼓励人们消费。政府借款则应受到严密控制。如果政府提高债务对GDP的比率，市场将不愿向它们放贷，从而迫使利率提高。货币政策的实用性要求对财政政策采取清醒的态度。

但是，在2000年代，这种方法存在的问题开始显现。从1980年代开始，利率一直长期稳定下降。到2000年代，它们已经达到历史最低点。低利率使中央银行更难以通过进一步削减利率来刺激经济：这样做的空间已经没有了。全球金融危机将全球利率推至接近零。

各国政府尝试了更为激进的货币政策，例如被称为“量化宽松”的印钱形式。它们的经济继续表现不佳。这似乎为新思路创造了空间，而一个新版本的凯恩斯主义开始试水。2012年，前美国财政部长拉里·萨默斯（Larry Summers）和经济学家布拉德·德隆（Brad DeLong）提出了基于借贷的大规模凯恩斯主义刺激方案。由于利率低，通过提高GDP增长率而带来的收益可能会超过负债的融资成本。

第二年，萨默斯跟随了一些1930年代的凯恩斯主义者，特别是阿尔文·汉森（Alvin Hansen），提出通过借贷来刺激经济可能不仅需要用作暂时的提振，还要成为经济的永久组成部分。汉森认为，人口老龄化和技术创新速度慢导致长期需求不足（他称之为“长期停滞”）。萨默斯发表了更新但相似的观点。他支持这一想法的部分原因是利率的长期下降表明需求持续不足。

| 一路走低

怀疑论者坚持认为，这种借贷将推高利率。但是，随着岁月的流逝，利率

仍然顽固地维持在低位，借贷以刺激财政的想法似乎变得更站得住脚，甚至变得有吸引力了。极低的利率意味着经济的增长可以快过偿债增加。近年来在一些国家已经出现了负利率，这意味着要偿还的金额实际上将少于借入的金额。

“现代货币理论”（MMT）的拥趸更进一步提出，各国政府应为实现充分就业而借入尽可能多的钱，而央行只应专注于保持低利率——正统经济学认为这么做会迅速抬高通胀。当前，MMT仍然处于学术经济学的边缘。但一些左翼政客已经接受了它。参议员伯尼·桑德斯是拜登在民主党初选提名中击败的参选人，他的首席顾问包括一位MMT支持者——石溪大学的斯蒂芬妮·科尔顿（Stephanie Kelton）。

关于债务的主流观念的转变，有助于解释为什么世界为应对疫情而进行的大量政府借贷并不令经济学家感到担忧。但是，既然政府已经（哪怕只是因为缺乏其他选择）变得更愿意承担债务，那么极限在哪里？疫情前公共债务净额与GDP之比就已达到154%的日本提供了一个诱人的实证案例。

如果日本可以继续以这种债务水平举债，那么看起来债务水平更低的国家也应该没事。但这忽略了一个事实，那就是如果利率从最低点开始逐步攀升，哪怕比日本小得多的负担也可能出现危险的不稳定。还没有什么摆在眼前的理由说明它很可能出现，但这并不意味着它不会发生。政府还需要记住，如果市场情绪发生变化，以一种利率借入的债务可能需要在以后的某个时候以高得多的利率展期。

考虑到这种背景风险，理想情况下政府须确保新借款所派的用处能够提供持久的好处，而且要超过最终的借贷成本。如果钱很便宜并且很可能会一直如此，这看起来将是一个相当低的门槛。但还有机会成本要考虑。如果私人借贷的回报率很高，而公共借贷将其挤出，那么公共借贷要么需要表现出同样高的回报率，要么就得缩减。

目前，私人回报率在大多数地方仍然远远高于新借贷的成本：例如在美国，公司的收益相对于其资本的重置成本而言普遍很高。可以想象，如果

政府使用的资源改为由私人公司运用，会产生更大的福利。

但是目前看来并没有。尽管新资本的回报貌似很高，但美国的私人投资仍然很低。这表明要么存在其他阻碍新投资的障碍，要么表明高投资回报率反映了竞争水平不足，而不是企业的生产率高。

两种可能性都要求政府采取补救措施：要么采取行动查明和消除投资障碍，要么加强竞争。并且，在此类行动引发更大的投资或更低的回报之前，政府借贷的理由仍然很强。公共投资更是如此，它本身就可能会鼓励私营部门与之配套——“挤入”而不是挤出。例如，投资大幅改善电网可能会增加对零碳发电的投资。

从长远来看，避免借债到极限的方法是实施结构性改革，这将令看上去确是长期疲软的需求复苏。不幸的是，对于需求为何疲软，人们尚无共识。是计算机和通信领域之外的技术进步不复往昔吗？是不平等把钱交到了不那么积极花出下一块钱的富人，而不是更有可能花钱的穷人手中吗？是因为波动的金融市场鼓励公司和政府进行预防性储蓄吗？人口老龄化是一切的根源吗？

让民众变年轻不是一个现实的政策选项。但是市场的波动可以通过监管来解决，缺乏竞争可以通过反托拉斯行为应对。如果不平等是根源，再分配（或其类似的术语“预分配”）可能会刺激需求。处理约束需求的结构性问题可能会推高利率，给已经积累了大量债务的政府带来困难。但是，强劲的基础增长将随后减少对政府进一步借款的需求，提高GDP并增加税收。从原则上讲，在这种情况下，政府可以更轻松地偿还增加的债务。

新的共识是，政府的借贷和支出确实是稳定经济的重要组成部分，而且利率普遍低到足以使政府以最小的成本来完成这项任务，这代表了进步。人们迫切需要政府借贷来应对当前世界上许多困境。但是，理想情况下，这一共识还应包括另外两个方面：赤字支出的质量仍然很重要，并且各国政府应为全球利率环境最终发生变化的可能性做准备——就像2020年告诉我们的那样，你应该为任何低概率的灾难未雨绸缪。■



Schumpeter

The one that got away

Hermès seemed destined to become part of LVMH's luxury empire. Not so fast

IN THE AUTUMN of 2010 *le tout Paris* of business braced for the sad, if predictable, end of an era. After 173 years and six generations, Hermès, a purveyor of handbags to bankers and neckties to their husbands, was to become part of LVMH. The champagne-to-evening-gowns mastodon, home to Louis Vuitton and Christian Dior, among many others, had disclosed a stake of 17% and rising. Bernard Arnault, LVMH's boss, with a knack for closing in on companies he admires, had only to pick off a few Hermès heirs ready to cash out. Bankers assumed the “wolf in cashmere” would take mere weeks to gobble up his elegant prey.

Fast forward to autumn 2020, and the various descendants of Thierry Hermès not only still control their family's firm, they have beaten LVMH at its own game. One of their own, Axel Dumas, has reclaimed the helm from an outside manager. Mr Arnault has all but scarpered off the Hermès shareholder register and moved on to other targets, though not always successfully: on September 9th LVMH said it would not go ahead with a \$17bn bid for Tiffany, an illustrious American jeweller. By just about any measure, Hermès has led the luxury pack, nearly trebling revenues between 2010 and 2019, to €6.9bn (\$7.7bn). Operating margins last year hit 34%, best in the industry. Even as it has been roiled by covid-19, its market capitalisation has risen this year to €78bn, while big competitors have shrunk.

Plenty of companies, particularly those with family histories, resist the lure of takeovers by bigger rivals. Often the decision is guided by pride rather than financial sense. Hermès provides a road map of how to stay independent—and how it can pay off.

The first step was to keep the wolf at bay. Though listed since 1993, most of Hermès's shares belonged to 60 or so descendants, split into various branches. Hermès threw up all manner of defences. Mr Arnault was publicly rebuked as a corporate raider (less polite language was used). Lawyers attacked the underhand way in which his stake was built through complex financial products that skirted disclosure rules (LVMH was later fined €8m by the markets regulator). Ultimately, Hermès family members eager to remain in charge created a structure which pooled just over 50% of shares, committing themselves to owning their stakes come what may until 2031. By 2017 Mr Arnault had given up.

The second step is to use independence wisely. That Mr Arnault coveted Hermès is testament to its good management. But the general rule in the past decade has been that multibrand conglomerates like LVMH, Richemont (home of Cartier and Montblanc) or Kering (Gucci and Saint Laurent) hold an edge over single-brand outfits like Burberry, Prada or Hermès. The cost of building new e-commerce capabilities can be spread more widely; size gives a bargaining advantage with landlords. Creators are lured to the biggest names in a virtuous loop of desirability.

Hermès might have struggled to compete head-on. So instead—and this is the wise part—it played to its strengths. While rivals flocked to the fashionable, ostentatious and cutting-edge, it erred on the side of discretion, timelessness and tradition. Its biggest hits today, the Birkin and Kelly handbags that often sell for \$10,000 or more, are refreshed versions of what it has sold for decades. It can do whimsy and eye-catching: its website currently features a functioning porcelain skateboard, a snip at €3,350. And whereas a Dior dress will last one season, an Hermès product is for life. As creative directors shuffle from one brand to the next, at Hermès the same designer has overseen menswear since 1988.

Understatement works as a strategy only because Hermès enjoys an aura of

exclusivity. This gives it pricing power to sell knick-knacks for over ten times what they cost to make. Waiting lists for Birkins stretch for years. Because much of what it sells carries through the seasons, Hermès does not need discounts to get it off the shelves. That preserves both margins and the brand, a luxury group's most valuable asset. The firm claims not to have a marketing department. It is the kind of claim a clever marketing department might dream up, but Hermès does spend only around 5% of revenues on advertising and promotions, half the share of rivals.

The stolid approach has paid off in the pandemic. Sales will probably drop this year because of store and factory closures in the spring. But Hermès looks in better shape than its competitors, says Luca Solca of Bernstein, a broker. It is less reliant than they are on Asian tourists shopping in Paris or New York. It makes most of its wares itself, so does not need to bail out third-party suppliers. Demand wobbles are less of a problem given those long waiting lists. And if well-heeled consumers are to spend in a recession, they favour timeless brands.

For success to endure, Hermès heirs may require one more thing. The company is a digital laggard. A mere 2-3% of its sales last year came from its website, half its rivals' share. Its Instagram account—a measure of a brand's buzziness—has just 10m followers, compared with 41m for Chanel or Gucci. It lacks younger consumers who inject brands with vitality; according to Citigroup, a bank, only a quarter of sales are to Gen-Zs or millennials (the oldest of whom are about to turn 40).

| *Tough as leather*

Mr Dumas is alive to this. Hermès has started to branch out into cosmetics, offering aspiring shoppers a cheaper entry point than Birkins (or skateboards). It has invested in a Chinese venture, Shang Xia, that may be useful if consumers in China—big buyers of luxury goods—start coveting local baubles instead of French ones.

Such moves are not so different from Mr Arnault's. He might have executed the same savvy strategy at Hermès; LVMH executives still speak of the "brand that got away" with reverence. But the Hermès clan can draw satisfaction from the fact that their investment in the family firm has yielded returns of over 400% since 2010—even juicier than if they had traded their stakes for LVMH shares. ■



熊彼特

逃掉的那只

爱马仕当年似乎注定要成为路威酩轩奢侈品帝国的一部分。且慢

2010年秋季，巴黎的商界名流迎来了一个时代的悲惨（虽然是可预见的）终结。创建173年、历经六代人的爱马仕（Hermès）将要成为路威酩轩集团（LVMH）的一部分。爱马仕卖手提包给银行家，卖领带给她们的丈夫。路威酩轩这个庞然大物销售从香槟到晚礼服的各种奢侈品，旗下拥有路易威登和克里斯汀·迪奥等众多品牌。它已披露持有爱马仕17%的股权，而且还在上升。老板贝尔纳·阿尔诺（Bernard Arnault）擅长捕猎自己喜爱的公司，他只需要再搞定几个准备套现走人的爱马仕家族继承人就行了。银行家们认为这头“披着羊绒外套的狼”不出几周就会把他优雅的猎物吞进肚中。

时间快进到2020年秋季，蒂埃里·爱马仕（Thierry Hermès）的后裔不但仍然控制着这家家族企业，还以其人之道还治其人之身，击退了路威酩轩。他们中的一个——阿克塞尔·杜马斯（Axel Dumas）——从一个外聘经理人手上收回了船舵。阿尔诺已经差不多从爱马仕的股东名册上消失了。他转向了其他目标，虽然也不是一帆风顺：9月9日，路威酩轩称不会继续以170亿美元的价格竞购美国著名珠宝商蒂芙尼。从几乎任何方面看，爱马仕都已引领奢侈品行业，它在2010年至2019年间收入增加了近两倍，达到69亿欧元（77亿美元）。去年的营业利润率达到34%，为业内最高。在遭受新冠疫情冲击之时，其市值今年上升到780亿欧元，而大型竞争对手的市值悉数缩水。

许多企业，尤其是那些有家族渊源的公司，都会抵挡被更大的竞争对手收购的诱惑。通常，这类决定是基于尊严感而非财务上的判断。爱马仕提供了一张路线图，显示如何保持独立——以及这能带来什么样的回报。

第一步是把狼关在门外。尽管早于1993年上市，爱马仕的大部分股份由约60个家族子孙持有，分散在多个分支部门。爱马仕拿出了各种各样的防御

措施。阿尔诺被公开谴责为企业掠夺者（当时用的词更难听）。律师抨击他使用狡诈手段，通过规避披露规则的复杂金融产品增持股份（路威酩轩稍后被市场监管机构罚款800万欧元）。最终，那些急于保住掌控权的爱马仕家族成员创建了一个结构，汇集起刚刚超过50%的股份，并承诺无论如何都会持有自己那一部分直至2031年。到2017年阿尔诺已经放弃了。

第二步是明智地利用独立性。阿尔诺对爱马仕的觊觎从侧面印证了这家公司的出色管理。但在过去十年中，一般来说，路威酩轩和历峰集团（Richemont，旗下有卡地亚和万宝龙）或开云集团（Kering，旗下有古驰和圣罗兰）等多品牌企业集团要比博柏利、普拉达或爱马仕这样的单品牌团队更有优势。建立新的电子商务功能的成本可被更广泛地摊薄；公司规模大也带来了同房东还价的底气。在一个吸引力的良性循环中，最大牌的品牌更能引诱设计师。

爱马仕原本可能难以招架正面竞争。所以它宁愿扬长避短——说它明智正是在这里。当竞争对手们涌向时尚、浮华和尖端之时，它选择留在审慎、永恒和传统这一端。它现在卖得最火的产品——售价通常在一万美元以上的铂金包（Birkin）和凯莉包（Kelly）——是它已经卖了几十年的手袋的翻新版本。它也有异想天开和抓眼球的东西：目前它的官网上有一款真的可以拿来滑的陶瓷滑板，售价3350欧元，真是够便宜的。一条迪奥的连衣裙流行一季，一件爱马仕的物品却可以用一辈子。在时尚界，创意总监们从一个品牌跳到另一个，而爱马仕自1988年以来都是同一位设计师在负责男装。

低调之所以能用作一项成功的策略，是因为爱马仕具有尊贵和独享的光环。这给了它强大的定价能力，能以超出制造成本十倍多的价格出售饰品。铂金包的等候名单已经排到了几年后。由于它销售的大部分产品不会在一季后就过时，因此不需要靠打折来清空货架。这既保证了利润，又维系了奢侈品集团最有价值的资产——品牌。这家公司声称自己没有营销部门。这可能是一个聪明的营销部门设计出来的说法，但爱马仕的确仅仅将收入的约5%用在广告和营销上，是竞争对手该比例的一半。

在疫情中，这种不动声色的方式收获了回报。由于春季时商店和工厂被迫关闭，爱马仕今年的销售额很可能会下跌。但它的状况看起来要好过竞争对手，经纪商伯恩斯坦（Bernstein）的露卡·索尔卡（Luca Solca）说。它不像对手那么依赖亚洲游客到巴黎或纽约购物。它自己制造大部分商品，所以不需要救援第三方供应商。鉴于购买等候名单之长，需求波动的问题也没那么大。而如果有钱的消费者要在经济衰退期花钱，他们会更青睐不会过时的品牌。

为让成功持续，爱马仕的继承人可能还必须做一件事。这家公司在数字化方面落于人后。去年它的销售额只有2%到3%来自网站，是竞争对手比例的一半。作为对品牌热度的一种衡量方式，它的Instagram账户仅有1000万名粉丝，而香奈儿或古驰有4100万。它缺少能为品牌注入活力的年轻消费者。据花旗银行称，爱马仕的销量中仅有四分之一卖给了Z世代或千禧一代（他们当中年龄最大的即将满40岁）。

| 坚韧如皮革

杜马斯很清楚这一点。爱马仕的触角已经开始伸向化妆品，这为向往它的产品的购物者提供了比铂金包（或滑板）更便宜的入店门槛。它已经投资了中国企业“上下”。如果中国的消费者（他们是奢侈品的大买家）开始青睐本地产的饰品而非法国货，这一步可能会有用。

这样的策略和阿尔诺的那套差异不大。如果他当年拿下了爱马仕，可能也已经在这家公司实施了同样的明智策略。路威酩轩的主管们至今仍充满敬慕地谈及这个“差一点就到手的品牌”。但是，爱马仕族人们可以从一个事实中获得满足感：自2010年以来，他们对这家家族企业的投资已经产生了超过400%的回报，比他们当年能换取的路威酩轩的股份回报更丰厚。■



Greenback dominance

Buck up

Global trade's dependence on dollars lessens its benefits

CRASHING CURRENCIES hurt. They make imports more expensive, cutting into household budgets and raising businesses' costs. But economics has long held that this pain brings with it its own salve. More expensive imports should drive new demand for home-made replacements and thus for the workers who make them, geeing up the economy. What is more, a devalued currency means exports are suddenly cheaper to buyers abroad. That, too, should boost demand. When the value of the Colombian peso collapsed in the summer of 2014, it was on the basis of these assumptions that the country's finance minister greeted the fall as "a blessing in disguise".

It wasn't. There were, the IMF opined in a subsequent report, a number of reasons for this, many specific to Colombia. But one problem was a factor which is embedded in the machinery of today's international commerce. Colombia does not trade in pesos. It trades almost exclusively in dollars; 98% of its exports are invoiced in them. This is an extreme example of a general point. The amount of trade carried out in American dollars vastly exceeds the amount that America imports and exports. Although that may seem like a detail of book-keeping, it matters a lot. A growing body of evidence suggests that the dollar's prominence in trade undermines the advantages which flexible exchange rates are meant to offer. And when the dollar strengthens, global trade tends to contract.

For decades, economists' thinking about trade and currencies was summarised in a model created in the 1960s by two researchers at the IMF, Robert Mundell and J. Marcus Fleming. They assumed no special role for any dominant currency, but rather that traders would agree on prices in the

exporter's currency. A Colombian devaluation, say, would immediately turn peso-priced batteries into bargains abroad, encouraging foreign buyers to scoop up more of them. Meanwhile shoppers in Bogotá wanting to buy Brazilian T-shirts would resent being made to fork out more pesos to cover the price fixed in real.

This simplifying assumption was potentially consequential. As early as 1947, Joan Robinson of the University of Cambridge noted that the currency companies used for invoicing could mute the expenditure-switching effect. If the prices of Colombian exports were in dollars, not pesos, a devaluation would leave prices faced by American importers—and their demand—unaffected. But though that might matter in principle, did it matter much in practice?

In 1973 Sven Grassman of the Institute for International Economic Studies used Swedish data to answer in the negative. He found that in 1968 around two-thirds of Swedish trade had been indeed invoiced in the currency of the exporter. This “fundamental symmetry in international payment patterns” became known as “Grassman's Law”. Swedish exports to America, which were mostly invoiced in dollars not kronor, were written off as the exception. That suggested that Mundell and Fleming were right.

Over the next decades more data further supported Grassman's Law—always with the same American exception. But by the 1990s some researchers were beginning to doubt its validity. Their main argument was that the actual prices of goods did not vary as much or as quickly as would be expected if payments were in fact symmetrical. Grassman's Law said that the price of Brazilian T-shirts in Colombian markets should vary with the peso-real exchange rate, for example. But such prices were in fact much stickier.

In the mid-2000s Linda Goldberg and Cedric Tille of the Federal Reserve

Bank of New York compiled data describing 24 countries in the late 1990s and early 2000s. This confirmed that Grassman's Law was wrong: exports were not generally priced in the currency of the country they came from. In 2001, for example, they found that South Korea invoiced 82% of its imports in dollars, despite only 16% of its imports coming from America.

Other work confirmed and updated their findings: the dollar has a huge role as a "vehicle currency" in which to invoice transactions to which no Americans are party, particularly in developing countries (see chart). Gita Gopinath of the IMF has compiled data covering just over half of world trade to show that the dollar's share of invoicing was 4.7 times larger than America's share of the value of imports, and triple its share of world exports. Another IMF study showed that the dollar's share has not decreased in step with America's declining share of overall trade.

The euro's creators had hoped that it might supplant the dollar's status. But even though almost half of trade is invoiced in euros, that is mostly because of how much trade involves countries that use the currency. Between 1999 and 2014 euro-denominated trade was only around 1.2 times the euro zone's share of global imports.

Other would-be challengers appear to have failed even more miserably. Scant Chinese data suggest that in 2013 only 17% of Chinese trade was settled in renminbi, and in 2012 only around half of such settlements were invoiced in renminbi. In order to avoid financial sanctions, Russia has recently shifted away from the dollar when paying for imports from China. But the euro, not the renminbi, benefited most.

A lack of historical data makes it impossible to say whether Grassman's Law held in the 1970s and has since weakened or whether it was the always an artefact of insufficient data. Whichever is true, economists busied themselves trying to work out why exporters used dominant currencies.

One suggestion is that using the same vehicle currency when setting prices for a certain market lets companies avoid erratic price movements relative to their competitors. Ms Goldberg and Mr Tille offered some support for this when they showed that dollar invoicing was more common in markets, such as precious metals, where competition is cut-throat. Another suggestion is that the rise of global supply chains saw more exporters importing some inputs. Invoicing imports and exports in the same currency would preserve their profit margins in the event of a devaluation.

The arguments for a vehicle currency do not necessarily mean that that currency has to be the dollar. But why would it not be? The dollar already dominates the financial world. Central banks stash 58% of their official foreign-exchange reserves in it. It is the global currency of choice when issuing securities. Banks use it for around half of their cross-border claims. According to SWIFT, a payments system, it is used in two-fifths of international payments.

Indeed the worlds of finance and trade are intertwined. Exporters borrowing in dollars will want to price their foreign sales in the same currency, to protect against a sudden devaluation which would increase the value of their debt. Assets denominated in dollars offer their owners more security, because they will hold their value relative to imports priced in dollars.

Having established the importance of dollar dominance for global trade, economists updated their understanding of exchange-rate gyrations. In America sticky prices set in dollars mean the demand for imports is impervious to exchange-rate shocks. A Colombian light aircraft priced at \$50,000 will cost the same when the dollar is worth 3,000 pesos as when it is worth 4,000. The change will eventually have an effect—but it will be partial, and slow. One study has found that two years after an exchange-rate shift only 44% of its effect would be seen in prices in America. Another

found that just as prices did not change much, neither did the volumes importers chose to buy. After a 1% dollar depreciation, they found that the volume of imports into America fell by a measly 0.003%.

| *Money, money, money*

All this allows America to enjoy what Ms Gopinath describes as a “privileged insularity”. Its adjustment to a dollar depreciation happens almost entirely through exports, which immediately become cheaper in foreign markets. Devaluations against the dollar in other countries, by contrast, see them suffer. It becomes harder to afford imports while they don’t get the added export oomph the old models suggested. Exporters’ dollar earnings will be worth more in local currency, which might tempt some of them to expand. But that takes time. And the benefits are often offset by the higher cost of imported inputs.

Around the world invoicing imports in dollars means that it is devaluations against the greenback, rather than against the currency of the country you are trading with, that count. Emine Boz of the IMF, Ms Gopinath and Mikkel Plagborg-Muller of Princeton University found that prices of imported goods were relatively unresponsive to bilateral exchange-rate movements. Over short-term horizons they were six times more sensitive to the dollar exchange rate. The price of Brazilian-made football shirts in Mexico will stay the same if the peso depreciates relative to the real, but not relative to the dollar. If the peso drops with respect to the dollar, though, those shirts will become less affordable and may no longer be sold.

During the East Asian crisis of 1997-99 South Korea, Malaysia and Thailand all experienced currency depreciations of at least 60% relative to the dollar—and saw their export volumes stagnate or fall. With prices set in dollars devaluations did nothing for their export competitiveness within the region. And demand for imports from elsewhere in the region—also priced in dollars—plunged. Ms Boz and her co-authors have found that,

after accounting for the business cycle, a 1% appreciation in the value of the dollar translates into a 0.6% decrease in the volume of trade between countries in the rest of the world.

Dollar dominance means trade is vulnerable to the global financial cycle, too. A study by Valentina Bruno and Hyun Song Shin of the Bank for International Settlements found that a dollar appreciation leads banks reliant on dollar funding to shrink their credit supply. Companies reliant on those banks—and their dollar-denominated financing of trade—then slow their exports, an effect particularly marked in companies with longer supply chains. Trade is a finance-hungry business.

Policymakers around the world yearn to be free of the dollar's grip. That seems unlikely. The dollar's dominance is the product of millions of individual decisions, each seemingly optimal, which in concert lead to collective problems. Each dip in the dollar's value leads to a rush of wishful chatter about the dollar's demise, but for long as these optimisations continue to make sense it is hard to see how that wish can come true. At least, though, for a while, the chatter-inducing weakness will provide a fillip to trade. ■



美元主导地位

振作起来

全球贸易对美元的依赖减少了它的益处【“反思经济学基本理论”系列之六】

崩溃的货币让人受伤。这会让进口商品变得更加昂贵，消耗家庭预算并增加企业的成本。但是经济学长期以来一直认为，这种痛楚自带解药。进口商品昂贵将推动对本国替代品的新需求，由此推动对生产它们的工人的需求，从而刺激经济。更重要的是，货币贬值意味着面向国外买家的出口价格突然便宜了。这应该也会刺激需求。当哥伦比亚比索的价值在2014年夏天暴跌时，正是基于这些假设，该国财政部长才将这次下跌视为“因祸得福”。

然而事与愿违。国际货币基金组织（以下简称IMF）在随后的报告中指出，这背后有许多原因，其中许多是哥伦比亚所特有的。但是，其中一个问题是当今国际贸易机制中固有的一个因素。哥伦比亚并不以比索开展贸易，而是几乎只用美元交易；其中98%的出口都以美元开票。这虽是个极端例子，却说明了普遍的问题。以美元进行的贸易额大大超过了美国的进出口额。尽管这看似是簿记中的一个细节，却影响深远。越来越多的证据表明，美元在贸易中的突出地位削弱了灵活汇率本应带来的好处。而当美元走强时，全球贸易趋于收缩。

曾有几十年，经济学家对贸易和货币的思考都被总结到了IMF的两位研究人员罗伯特·蒙代尔（Robert Mundell）和马库斯·弗莱明（J. Marcus Fleming）在1960年代创建的模型中。他们没有假定任何主导货币会承担什么特殊的角色，而是假定交易者会就以出口方货币计价的价格达成一致。比方说，哥伦比亚的货币贬值将立即使以比索定价的电池成为外国眼中的便宜货，从而鼓励外国买家购买更多的电池。同时，想要购买巴西T恤衫的波哥大购物者会因为被迫掏出更多比索来买以巴西雷亚尔标价的衣服而感到不满。

这种简化的假设很可能影响深远。早在1947年，剑桥大学的琼·罗宾逊

（Joan Robinson）指出，公司开票时所用的货币可能会削弱这种支出转移效应。如果哥伦比亚出口商品的价格是以美元而不是比索计价，那么比索贬值并不会影响美国进口商面临的价格及其需求。但是，尽管从原则上讲这可能很重要，但在实践中会有很大关系吗？

国际经济研究所的斯文·格拉斯曼（Sven Grassman）在1973年使用瑞典的数据做出了否定的回答。他发现在1968年，瑞典有约三分之二的贸易确实是以出口商的货币开票的。这种“国际支付模式的基本对称性”被称为“格拉斯曼定律”。瑞典对美国的出口大多以美元而非克朗开票，这被认为是例外情况。这表明蒙代尔和弗莱明是正确的。

在接下来的几十年中，更多的数据进一步支持了“格拉斯曼定律”，而美国一直是例外。但是，到了1990年代，一些研究人员开始怀疑这条定律的有效性。他们的主要论据是，商品的实际价格变化并不像支付货币真的对称时那样大或那样快。比如，格拉斯曼定律认为哥伦比亚市场上的巴西T恤衫的价格应随比索和雷亚尔的汇率变化。但是实际上这些价格的粘性要大得多。

在2000年代中期，纽约联邦储备银行的琳达·戈德堡（Linda Goldberg）和塞德里克·蒂尔（Cedric Tille）编制的描述了1990年代末到2000年代初的24个国家。它证实了格拉斯曼定律是错误的：出口通常不以其来源国的货币计价。例如，在2001年，他们发现，韩国有82%的进口以美元开票，尽管其中只有16%来自美国。

其他研究也证实并更新了他们的发现：在那些没有美国人参与的交易中，美元作为“周转货币”用于开票的职责重大，特别是在发展中国家（见图表）。IMF的吉塔·戈皮纳特（Gita Gopinath）汇编了涵盖全球贸易一半略多的数据，显示以美元开票的比例比美国占全球进口的比例高4.7倍，是其占全球出口比例的三倍。该组织的另一项研究表明，美元所占份额并未随美国在整体贸易中所占份额的下降而同步下降。

欧元的创造者曾希望它能取代美元的地位。但是，即使将近一半的贸易以

欧元计价，这主要是因为有许多贸易涉及使用该货币的国家。在1999年至2014年间，以欧元计价的贸易份额仅是欧元区占全球进口份额的1.2倍左右。

其他可能的挑战者似乎败得更惨。零星的中国数据表明，2013年中国贸易中只有17%是用人民币结算的，而在2012年，此类结算中只有大约一半是用人民币开票的。为了避免金融制裁，俄罗斯最近在支付从中国进口的商品时已经不再用美元了。但是，受益最大的是欧元，而不是人民币。

由于历史数据缺乏，很难说格拉斯曼定律是不是在1970年代时成立而之后被削弱了，还是说它始终是数据不足的产物。无论如何，经济学家忙于弄清楚为什么出口商要使用主导货币。

一个说法是，为特定市场设定价格时使用相同的周转货币，可使公司避免相对于其竞争对手的价格波动。戈德堡和蒂尔为这种说法提供了一些支持，提出在贵金属等竞争激烈的市场中以美元开票更为普遍。另一个说法是，全球供应链的兴起使更多出口商要去进口一些原材料和零部件。以同种货币对进出口开票可在货币贬值时保持利润率。

关于周转货币的论点并不一定意味着这种货币必须是美元。但为什么呢？美元已经主导了金融世界。中央银行将官方外汇储备的58%存放在其中。它是发行证券时的首选全球货币。银行将它用于大约一半的跨国债权。根据付款系统SWIFT的说法，五分之一的国际付款都使用美元。

实际上，金融和贸易世界是相互交织的。以美元借款的出口商会希望以同一货币对国外销售定价，以防本币突然贬值而增加债务价值。以美元计价的资产为所有者提供了更大的安全性，因为它们相对于以美元计价的进口产品可以保值。

在确立美元主导地位对全球贸易的重要性之后，经济学家们更新了对汇率波动的理解。在美国，以美元定价的粘性价格意味着进口需求不受汇率冲击的影响。一架定价为50,000美元的哥伦比亚轻型飞机，不管1美元是值3000比索还是值4000比索，价格都是一样的。这种改变最终还是会产生

影响——但只是部分影响，而且是缓慢的。一项研究发现，汇率变动两年后，在美国的价格中只能看到影响的44%。另一项研究发现，就像价格没有太大变化一样，进口商选择购买的数量变化也不大。在美元贬值1%之后，他们发现美国的进口量仅下降了0.003%。

| 钱钱钱

所有这些使美国能够享受戈皮纳特所说的“特权孤立”。它对美元贬值的调整几乎完全通过出口实现，因为出口品会立即在国外市场上变得便宜。相比之下，其他国家兑美元的贬值则使它们遭受损失。进口商品更加难以负担，却又无法像旧模型显示的那样提升出口的吸引力。出口商的美元收入可以换取更多本地货币，这可能会诱使其中一些人扩大规模。但这需要时间。而且收益通常被进口原材料上升的成本所抵消。

在世界范围内，进口商品以美元开票意味着重要的是对美元的贬值，而不是对交易对手国货币的贬值。IMF的埃米恩·博兹（Emine Boz）、普林斯顿大学的戈皮纳特女士和米克尔·普拉格伯格-穆勒（Mikkel Plagborg-Muller）发现，进口商品的价格相对来说对双边汇率变动的反应不大。在短期内，它们对美元汇率的敏感度要高出六倍。如果比索相对于雷亚尔贬值，而不是相对于美元贬值，那么巴西生产的足球衫在墨西哥的价格将保持不变。但是，如果比索兑美元汇率下跌，那些墨西哥人可能会买不起这些运动衫，它们可能会停售。

在1997至1999年的东亚危机期间，韩国、马来西亚和泰国都经历了相对于美元至少60%的货币贬值，而其出口额却停滞或下降了。由于价格以美元计价，贬值对它们在该地区的出口竞争力没有任何帮助。而从该地区其他地方进口的需求（也以美元计价）则暴跌。博兹等人发现，在考虑了经济周期之后，美元价值升值1%意味着世界其他国家和地区间的贸易额下降0.6%。

美元的主导地位也意味着贸易容易受到全球金融周期的影响。国际清算银行的瓦伦蒂娜·布鲁诺（Valentina Bruno）和申铉松（Hyun-Song Shin）的研究发现，美元升值导致依赖美元资金的银行缩减信贷供应。然后依靠

这些银行以及以美元计价的贸易融资的那些公司就放慢了出口速度，这种影响在供应链较长的公司中尤为明显。贸易是一项对融资十分饥渴的业务。

全世界的决策者都渴望摆脱美元的束缚。这似乎不太可能。美元的主导地位是数以百万计的个别决定的产物，每个决定似乎都是最优的，而这共同导致了集体问题。美元价值每下跌一次，都会引起一阵关于美元垮台的一厢情愿的议论。但是只要这些优化都还说得通，就很难看到这种愿望如何实现。不过至少在一段时间里，这种引发议论的美元弱势还能给贸易带来一丝刺激。 ■



A social turn

Hard work and black swans

To explain wealth and poverty, the ideas of the earliest economists are being revisited and improved

THE EMERGENCE of the discipline of economics in the 18th century was the result of people trying to explain something that had never happened before. At the time a handful of countries were becoming fabulously rich, while others remained dirt-poor. In 1500 the world's richest country was twice as well-off as the poorest one; by 1750 the ratio was five to one. It is no coincidence that the most famous book in economics, published in 1776, inquired into "the Nature and Causes of the Wealth of Nations".

In order to explain such a divergence between rich and poor countries, the early economists were obsessed with culture, a catch-all term encompassing a society's beliefs, preferences and values. Adam Smith, the author of "The Wealth of Nations", explored the ways in which culture helped or hindered capitalism. He argued that certain norms were required in order for market economies to thrive—most importantly, that people would be self-interested, but that they would satisfy their self-interest by adapting to the needs of others. Karl Marx, a few decades later, worried that a culture of "oriental despotism" prevented the emergence of capitalism in Asia.

The speculations of Smith, Marx and others were often vague. Max Weber's "The Protestant Ethic and the Spirit of Capitalism", published in 1905, made them concrete. Weber argued that Protestants, in particular Calvinists, drove the emergence of capitalism due to a strong work ethic.

In the middle of the 20th century such cultural explanations began to fall out of favour. The rapid rise of Japan's economy in the 1950s, and later of

the Asian “tigers”, quashed the Marxist-Weberian notion that Western culture alone was conducive to industrialisation. At the same time the increasing availability of data with which to do statistical analysis meant that economists’ attention went elsewhere. Why bother with hard-to-measure matters such as morals, when it is possible to plug hard data such as capital accumulation, wages or employment into a regression model? In 1970 Robert Solow, a Nobel prizewinner, quipped that attempts to explain economic growth with reference to culture ended up “in a blaze of amateur sociology”.

But an interest in culture remained—and indeed is now making a comeback. Since the 1980s datasets such as the World Values Survey and the General Social Survey have made it easier to quantitatively measure cultural preferences and relate them to economic outcomes. Top economic journals now regularly include papers on the importance of culture. Even many hardline wonks have come to realise the limits to pure economic reasoning.

Perhaps the most influential text in the revival of cultural economics was “Making Democracy Work”, a book from 1993 by Robert Putnam. Mr Putnam tried to understand why for many decades northern Italy had been richer than the south, folding the explanation under the catch-all term “social capital”. People in the south were fiercely loyal to their family, but more distrustful of outsiders—whereas in the north people were happier to form connections with strangers, Mr Putnam argued. In the north people read more newspapers, were more likely to participate in sports and cultural associations, and voted more frequently in referendums. This, the theory went, contributed to better local government and more efficient economic transactions, which in turn produced greater wealth—though Mr Putnam was not clear about the precise mechanism by which one thing led to the other.

A group of researchers, largely dominated by Italians who were inspired by Mr Putnam's work, has since extended his ideas, seeking cultural explanations of why some areas are rich and others poor. A paper from 2004 by Luigi Guiso, Paola Sapienza and Luigi Zingales, also looking at Italy, finds that in high-social-capital areas, households invest less in cash and more in stocks, and make less use of informal credit. In areas where people do not really trust those outside their family, it may be hard to form large business organisations which can benefit from economies of scale and which can drive the adoption of new technologies. This suggests that it is no coincidence that the average business in Lombardy, a rich northern region in Italy, has 13 employees, compared with five in Calabria, a poor southern one.

Others look beyond Italy. In "A Culture of Growth", published in 2016, Joel Mokyr of Northwestern University puts the "principle of contestability" as the reason why some countries industrialised but others did not. Organisations such as the Royal Society, founded in London in 1660, were forums for the exchange of ideas, where people put forward their discoveries and fiercely interrogated the theories of others. Crucially, too, over time the goal of western European science shifted from one concerned with the "mindless piling up of empirical facts", as Mr Mokyr puts it, towards discoveries which could be put to use in the real world. Scientific inquiry laid the groundwork for European economic exceptionalism. Nothing quite comparable happened in other parts of the world.

| *Culture club*

The revival of cultural explanations for wealth and poverty seems to be a methodological step forward. Yet it raises two big questions. The first concerns the origins of cultural traits: where do they come from? The second is why people from apparently similar cultures sometimes have very different economic outcomes. To answer these questions, economists

have come to appreciate the importance of history—and, in particular, historical accident.

Take first the question of the origin of cultural traits. Some research suggests that they are the product of changes which took place hundreds of years ago. A 2013 paper by the late Alberto Alesina and two of his colleagues looks at why countries have very different rates of female labour-force participation. Egypt and Namibia are about as rich as each other, but the share of Namibian women in the labour force is more than twice that of Egyptian women. The paper puts such differences largely down to differences in pre-industrial agriculture and environmental conditions. Plough cultivation, common in Egypt, required lots of upper-body strength—so men were at an advantage. Shifting cultivation, more common in Namibia, used hand-held tools like the hoe which suited women better. The effect of these agricultural technologies echoes in statistics today.

Other economists look to the distant past to explain contemporary disparities in income and wealth. A paper from last year by Benjamin Enke of Harvard University finds evidence that pre-industrial ethnicities which were exposed to a high local prevalence of pathogens exhibited tighter kinship systems—meaning, in effect, that people were strongly loyal to their extended family but suspicious of outsiders. In a place threatened by disease, tight family ties were beneficial because they reduced the need to travel, and therefore the risk of being exposed. Places which had tighter kinship systems hundreds of years ago tend to be poorer today, a relationship which first emerged during the industrial revolution. Other research has looked even further back, suggesting that contemporary cultural traits are the result of genetic variation. But this remains a niche pursuit, and most economists turn queasy when it comes to talking about genetics.

A separate body of research focuses on cases where culture is not a

sufficient explanation for economic outcomes. Take the case of Guatemala and Costa Rica. “The two countries had similar histories, similar geographies and cultural inheritance, and were faced with the same economic opportunities in the 19th century,” write Daron Acemoglu and James Robinson in “The Narrow Corridor”, a book published last year. But today the average Costa Rican is more than twice as rich as the average Guatemalan. The cause of the divergence initially appeared random, according to Mr Acemoglu and Mr Robinson. Eventually it became clear it was down to coffee. In Costa Rica the development of coffee plantations for the European market led to a more balanced relationship between state and society, possibly because the country had more marginal land and more smallholders. In Guatemala, by contrast, it led to the emergence of a rapacious government.

In addition to culture, therefore, a growing band of economists is looking at “institutions”, often taken to mean the legal system and regulations. Some cultural economists argue that the focus on institutions proves their point: what are institutions if not the product of norms, values and preferences? Americans’ and Europeans’ differing beliefs about the causes of inequality, for instance, go a long way towards explaining why European welfare states are more generous than America’s.

But in many cases the emergence of different institutions may have nothing to do with a country’s culture. Sometimes it is just luck. Mr Mokyr shows that Europe, which was fragmented into lots of states, was the perfect setting for innovation: intellectuals who challenged received wisdom and incurred the wrath of the authorities could move elsewhere (Thomas Hobbes wrote “Leviathan” in Paris). By contrast in China, Mr Mokyr argues, free thinkers had few escape routes. Europeans did not plan such a system. It just happened.

Other work by Mr Acemoglu and Mr Robinson, along with Simon Johnson

of MIT, has found a further element of randomness which may explain contemporary patterns of wealth and poverty—namely, which countries are more prone to certain diseases. The mortality rate of settlers was low in some colonised countries, such as New Zealand and Australia, in part because the kinds of diseases that were there were less virulent. In others, such as Mali and Nigeria, mortality rates were far higher. Colonisers did not want to settle in countries with a high risk of disease, even as they wanted to take those countries' raw materials. So in countries such as Mali and Nigeria, rather than permanently settling, they set up systems which enabled the maximum of resource extraction with the fewest boots on the ground. That, say Messrs Acemoglu, Johnson and Robinson, produced rapacious political systems which have endured to this day.

Are economists any closer to answering the foundational question of their science? Far from the simplistic certainty of Weber, it seems likely that some countries are rich and others poor because of a messy combination of economic incentives, culture, institutions and chance—which is most important remains unclear. In 1817 Thomas Malthus, one of the early economists, wrote in a letter to David Ricardo, another, that “the causes of the wealth and poverty of nations [were] the grand object of all enquiries in Political Economy”. The revival of cultural economics two centuries on has helped in that quest, but it is not over yet. ■



转向社会学

勤劳与黑天鹅

在探索富裕和贫穷的成因的过程中，最早的一批经济学家的观点正被重拾并改进【“反思经济学基本理论”系列之五】

经济学这门学科在18世纪出现，是缘于人们尝试解释前所未有的事。当时有几个国家富得流油，另一些却仍然一贫如洗。1500年，世界上最富裕的国家的富裕水平是最穷国家的两倍；这一比例到了1750年已经扩大到五倍。1776年经济学最赫赫有名的著作问世，它研究的是“国民财富的性质和原因”，这并非巧合。

为解释富国和穷国这种分化，最早的一批经济学家执着于研究“文化”——这个笼统的表述涵盖了一个社会的信仰、偏好和价值观。《国富论》的作者亚当·斯密探索文化如何以各种方式推动或阻碍了资本主义。他认为，要让市场经济蓬勃发展，一些社会规范必不可缺——其中最重要的一点是，人是利己的，但会通过适应他人的需求来满足这种自利。几十年后，卡尔·马克思担心“东方专制主义”的文化阻碍了资本主义在亚洲出现。

斯密、马克思和其他一些人的猜想常常是模糊含混的。马克斯·韦伯于1905年出版的《新教伦理与资本主义精神》把它们变得具体化。韦伯认为，新教徒，尤其是加尔文主义者，以强烈的职业道德推动了资本主义的出现。

到了20世纪中叶，这类文化上的解释渐受冷落。1950年代日本经济迅速崛起，加之后来亚洲四小龙经济腾飞，反驳了马克思和韦伯这一派认为西方文化本身有利于工业化的观点。同时，随着可用于统计分析的数据越来越多，经济学家的注意力转移到了别处。既然可以把资本积累、工资或就业之类的硬数据输入回归模型，为什么还要去烦心道德这类难以衡量的事物？1970年，诺奖获得者罗伯特·索洛（Robert Solow）打趣说，试图用文化来解释经济增长的尝试最终落入了“民科社会学的烈焰”。

但对文化的兴趣并未消失，实际上如今它又东山再起了。自1980年代以来，诸如“世界价值观调查”（World Values Survey）和“一般社会调查”（General Social Survey）之类的数据集使得人们更容易量化衡量文化偏好并将它们与经济成果关联起来。顶级经济期刊现在经常性地刊登有关文化的重要性的论文。甚至许多强硬派学究也开始意识到纯经济推理的局限性。

在文化经济学的复兴中，最有影响力的著作也许是罗伯特·帕特南（Robert Putnam）于1993年出版的《使民主运转起来》（Making Democracy Work）。帕特南试图理解为何几十年来意大利北部一直比南部更富裕，他将答案归于笼统的“社会资本”。他认为，南方人极度忠于家庭，更不信任家庭以外的人。而在北方，人们更乐意与陌生人来往。北方人看更多报纸，更可能参加体育活动和文化组织，在全民公决中投票频率更高。他认为，这帮助建立起了更好的地方政府和更高效的经济交易，继而带来了更多财富。不过，帕特南没有清楚解释一件事如何导致另一件事的确切机制。

在这之后，一批研究人员——主要是受帕特南的著作启发的意大利人——发展了帕特南的观点，寻求从文化上解释某些地区何以富裕而另一些却贫穷。路易吉·圭索（Luigi Guiso）、保拉·萨皮恩扎（Paola Sapienza）和路易吉·津加莱斯（Luigi Zingales）于2004年发表的一篇论文也观察了意大利，它发现在那些社会资本高的地区，家庭现金投资更少，股份投资更多，也更少使用非正式信贷。在那些人们并不真正信任家人以外的人的地区，那种能从规模经济中受益并能推动采用新技术的大型企业组织可能难以形成。这表明一个差异并非出于偶然：意大利富裕的北部大区伦巴第的企业平均雇用13名员工，而贫困的南部大区卡拉布里亚仅雇用5人。

其他人把目光投向了意大利之外。西北大学的乔尔·莫基尔（Joel Mokyr）于2016年出版的《增长的文化》（A Culture of Growth）中提出，“可论辩性原则”（principle of contestability）是某些国家实现了工业化而另一些没有的原因。诸如1660年在伦敦成立的皇家学会之类的组织是思想交流的论坛，人们在那里提出自己的发现并强烈质疑其他人的理论。

同样至关重要，随着时间推移，西欧科学的目标逐渐从关注莫基尔所说的“经验事实的盲目堆积”转向了可被应用于现实世界的探索发现。科学探究为欧洲经济的“例外论”奠定了基础。在世界其他地方没有发生真正可比拟的事情。

| 文化俱乐部

关于贫富分化的文化解读的复兴似乎在研究方法上是一种进步。不过这带来了两个大问题。第一个关乎文化特征的起源：它们源自何处？第二个是，为什么来自表面相似的文化的人们有时会创造截然不同的经济结果。在解答这些问题的过程中，经济学家开始认识到历史尤其是历史偶然事件的重要性。

首先说文化特征的起源问题。一些研究表明，它们是几百年前发生的变化的产物。已故的阿尔贝托·阿莱西纳（Alberto Alesina）和他的两名同事在2013年发表的一篇论文探讨了为何国与国之间女性劳动力参与率的差异如此之大。埃及和纳米比亚的富裕程度差不多，但纳米比亚的女性占劳动力的比例是埃及的两倍多。该论文将这种差异主要归因于前工业化时代里农业和环境条件的差异。埃及惯用的犁耕需要强大的上身力量，因此男性更有优势。纳米比亚则更常用轮耕，它用到的锄头等手持工具更适合女性使用。这些农业技术的影响依然回荡在今天的统计数据中。

其他经济学家回溯久远的过去来解释当代的收入和财富差异。哈佛大学的本杰明·恩克（Benjamin Enke）去年发表的一篇论文发现，证据表明，在前工业化时代，那些暴露于本地病原体高度流行的环境中的种族呈现出更紧密的亲属体系——也就导致人们非常忠于大家庭，而对家族之外的人保持戒心。在一个受疾病威胁的地方，紧密的家庭纽带是有益的，因为它们减少了旅行的需要，从而降低了染病的风险。那些在几百年前亲属关系更紧密的地区如今往往更穷，这种关联最早在工业革命期间显现。另一批研究还要探源到更早，指出当代文化特征是遗传变异的结果。但这仍只是个小众的研究方向，而大多数经济学家谈到遗传学时都会感到不舒服。

另一个研究分支专注于那些文化不足以解释经济结果的案例。以危地马拉

和哥斯达黎加为例。“这两国有相似的历史、相似的地理条件和文化传承，在19世纪面对相同的经济机遇。”达龙·阿西莫格鲁（Daron Acemoglu）和詹姆斯·罗宾逊（James Robinson）在去年出版的《狭窄的走廊》（The Narrow Corridor）一书中写道。但今天，哥斯达黎加人的平均财富是危地马拉人的两倍多。阿西莫格鲁和罗宾逊说，一开始这种分化看起来缘于偶然。最终，一件事变得清楚了——起因在咖啡。在哥斯达黎加，面向欧洲市场的咖啡种植园的发展导致政府和社会间的关系更平衡，这可能是因为该国有更多边际土地和更多小农户。相反，在危地马拉，它催生了一个掠夺性的政府。

因此，除文化外，越来越多经济学家正在研究“制度”——通常指法律体系和规章监管。一些文化经济学家认为对制度的关注恰恰证明了他们的观点，因为制度不就是规范、价值和偏好的产物么？例如，美国人和欧洲人对不平等的成因看法不同，这种分歧可以很好地帮助解释为何欧洲福利国家比美国更慷慨。

但在许多案例中，不同制度的出现可能与一国的文化毫无关系。有时纯粹是运气。莫基尔论证到，被分割成许多国家的欧洲是创新的理想场所：挑战流行观点而惹怒当局的知识分子可以搬去其他地方（托马斯·霍布斯就是在巴黎写就《利维坦》）。相比之下，莫基尔认为，在中国，自由思想家们没什么逃跑路线。欧洲人并没有事先规划过这样一个系统。它就这样发生了。

阿西莫格鲁、罗宾逊以及麻省理工学院的西蒙·约翰逊（Simon Johnson）的其他研究发现了另一个或许可以解释当代富贫局面的随机因素：哪些国家更容易爆发某些疾病。在一些殖民地国家，如新西兰和澳大利亚，殖民者的死亡率很低，部分原因是当时在那些地区流行的疾病不那么凶险。在其他国家，如马里和尼日利亚，死亡率则要高得多。殖民者不愿搬到疾病风险高的国家，与此同时又想掠夺这些国家的原材料。因此，在马里和尼日利亚这样的国家，他们不在当地定居，而是建立起能以最少的进驻人力来最大程度地开采资源的系统。阿西莫格鲁、约翰逊和罗宾逊说，这催生了延续至今的掠夺性政治制度。

今天的经济学家是否更接近于找到这个学科的一个根本问题的答案了？远不同于韦伯当年简单化的确信无疑，如今看来，之所以一些国家富裕而另一些国家贫穷可能是缘于经济激励、文化、制度和偶然性的混乱结合，其中哪个因素最为关键尚不清楚。1817年，早期的经济学家之一托马斯·马尔萨斯在给同僚大卫·李嘉图的信中写道：“国家富裕和贫穷的成因是政治经济学中所有探索的宏大目标。”两个世纪后，文化经济学的复兴为这一求索做出了贡献，但旅程尚未结束。 ■



China's recovery

One-armed fighter

China is almost back to its pre-pandemic growth trajectory

“THE EIGHT HUNDRED” is an unusual Chinese film for its depiction of Nationalist soldiers as heroes in a grinding battle against Japanese invaders in 1937. The Nationalists, or Kuomintang, fought a long on-off civil war against the Communist Party and so are typically portrayed as villains and stooges on Chinese screens. From a global perspective, the film is unusual for a different reason. It is that rarest of things in these covid-clouded times: a box-office hit. Released over a month ago, it has pulled in just over 3bn yuan (\$440m), propelling Chinese cinemas to their best showing by far since January, when the country went into near-total lockdown.

Many of China's factories reopened as early as February, but it is only now, nearly eight months on, that the broader economy is approaching its normal trajectory. Based on a batch of activity data published on September 15th, China is on track to expand by roughly 5% in the third quarter compared with a year earlier, a smidgen below the 6% growth rate that it reported in the second half of 2019, before covid-19 erupted. That puts it well ahead of all other big economies in the scale of its recovery.

But the shape of China's recovery is unbalanced. The supply side of the economy had a head start over the demand side, and has maintained a big lead. Industrial output rose by 5.6% year-on-year in August, while retail sales rose by just 0.5%. A range of alternative measures underline this gap. Power generation rose strongly in August thanks in part to resilient factory activity. The number of underground journeys, by contrast, levelled off at about a tenth below normal, indicating that some people are still wary of venturing into crowded places (see chart). Some analysts worry that these imbalances are spilling into the global economy as excess production ends

up abroad. China's share of world merchandise exports hit a record high of more than 13% in the second quarter, according to data from CPB World Trade Monitor.

A key question is thus whether the uneven growth is simply the ephemera of the covid-19 economy or whether it points to a more fundamental problem. The answer is probably a bit of both. Weak consumer spending has long been a feature of China's economy. Household consumption was just 39% of GDP last year, well below the global average of 63%. The pandemic has shone a harsh light on one explanation: a threadbare social safety-net. During the depths of China's lockdown, just 3% of the roughly 80m people without jobs collected unemployment insurance. As low-income earners have a higher propensity to spend, the lack of support weighs on consumption more generally.

Some of the extreme unevenness of the recovery will not last, however. The government prioritised reopening factories over restarting the rest of the economy because of its calculations about how to control the pandemic. That was the right call. It is easier to maintain strict health protocols in factories, which can be managed as semi-closed environments, than in shopping malls, where people come and go.

Encouragingly, a closer look at the data for August suggests that China's consumers may be starting to close the gap with its producers. In month-on-month terms, retail sales grew a little more quickly than industrial output—the first such outperformance in half a year. The demand rebound would be even stronger except for the social-distancing rules still in place. Cinemas, for example, can sell tickets for only half their seats. “The Eight Hundred” is climbing the box-office charts with one arm tied behind its back. ■



中国复苏

独臂战士

中国差不多已回到疫情前的增长轨道

《八佰》是一部不同寻常的中国电影，因为主角是一群国民党士兵，讲述的是他们在1937年对抗日本侵略者的一场艰苦战斗。历史上国共两党曾断断续续地长期内战，因此中国银幕上的国民党人往往被刻画成反派和傀儡。从全球角度来看这部电影也非比寻常，不过是因为另一个原因。它是那种在眼下疫情阴霾笼罩的日子里最稀奇的事：票房爆棚。该片于一个多月前上映，目前票房收入已冲破30亿元，推动中国影院取得自1月（当时全国开始进入近乎全面封锁阶段）以来的最好表现。

中国的许多工厂早在2月就已复工，但到了近八个月后的现在，中国整体经济才接近重回正常轨道。根据9月15日发布的一系列经济活动数据，中国有望在第三季度同比增长约5%，略低于2019年下半年疫情爆发前报告的6%。这使得中国在复苏规模上遥遥领先于其他所有大型经济体。

但中国经济复苏的形态并不均衡：供给先行，需求落后，而且一直保持着较大差距。8月，工业产值同比增长5.6%，而零售额仅增长0.5%。一系列替代指标也突显出这一差距。8月的发电量增长强劲，部分原因是工厂生产迅速恢复。相比之下，地铁客流量仍停留在比正常情况低十分之一的水平，表明部分民众对于冒险进入拥挤的场所仍心存警惕（见图表）。一些分析师担心，随着过剩产出最终流向国外，这些失衡也溢出到全球经济中。据荷兰经济政策分析局世界贸易监测（CPB World Trade Monitor）的数据，今年第二季度，中国占全球商品出口的比例创下新高，超过了13%。

所以一个关键问题是，中国的不均衡增长是经济在疫情下的暂时现象，还是指向了更根本的问题。答案可能是两者兼而有之。消费支出疲弱一直是中国经济的一个特点。去年家庭消费仅占GDP的39%，远低于63%的全球平均水平。疫情格外清楚地突显了这背后的一种解释：社会保障体系薄

弱。在中国封城最严苛的时期，约8000万失业人口中仅3%领到了失业保险金。由于低收入人群的消费倾向更高，缺乏社会保障会更普遍地对消费造成压力。

但复苏中的某些极端不平衡现象不会持续下去。中国政府以工厂复工为先，重启其他经济部门为次，是出于控制疫情的考虑。这是正确的决策。工厂可以按半封闭环境管理，在那里保持严格的防疫措施要比在人来人往的大型购物中心容易得多。

令人鼓舞的是，细看8月的数据，会发现中国消费者似乎正在缩小与生产者的差距。零售额的环比增长稍快于工业产出，是半年来的首次赶超。要不是仍有保持社交距离的规定，需求反弹会更强劲。例如，电影院目前被要求每场上座率不得超过50%。《八佰》可是在一条手臂绑在身后的情况下攀登票房榜的。■



Buttonwood

Eggheads

What the world can learn from Chinese futures trading

“SO LONG AS you think about what others are thinking about, and stick to your trading strategy, you can always be successful.” This encouraging, if dubious, sliver of market wisdom was proffered on September 3rd by Zhou Chengji, a Chinese investment adviser, during a two-hour online tutorial. China is hardly alone in having a raucous community of would-be market gurus and day traders. But Mr Zhou’s focus was on an asset that makes China look rather unusual: egg futures, the only ones of their kind in the world nowadays.

For punters with strong views about whether hens will be productive this autumn and whether people will crave egg-fried noodles and the like, China is the place to be. All they need do is contact local brokerages and put down a 4,000 yuan (\$585) deposit. Going long eggs (ie, betting prices will rise) was, briefly, one of the trades of the summer, with futures soaring 65% from late May to late July. Since then the market has cracked, prices tumbling more than 20%. Turnover is extraordinarily high. Investors buy and sell roughly 3m tonnes in egg futures every day, about a tenth of the total that China actually consumes in a full year. The rights to a single egg may, in effect, pass through a few dozen hands before it lands in boiling water.

All this makes it tempting to dismiss Chinese futures as a hotbed of speculative excess. Retail traders do play a much bigger role on the country’s commodity exchanges—in Shanghai, Dalian and Zhengzhou—than in Chicago or London, which have long been the world leaders in, respectively, agriculture and metals. Officials estimated that in 2016 about 85% of open positions on Chinese exchanges were held by

individuals, compared with less than 15% in America, where institutions dominate trading. Nevertheless, the very immaturity of the Chinese market also reveals some enduring truths about futures that are obscured by the smoother functioning of century-old exchanges.

Start with the most basic, the need to hedge. Futures are a tool for producers to guard against prices plunging and for consumers to guard against them soaring. In the West this can look quite straightforward because market power is so concentrated. The top four steel companies accounted for about 80% of production in America in 2017 versus just 20% or so in China. Fragmented spot markets make it harder for futures to serve as a benchmark. Yet it is dangerous to operate without a pricing backstop. So China has been rushing to expand its universe of futures. In the past two years alone it has launched more than ten new contracts, from crude oil and stainless steel to apples and red dates. It will take time to establish their credibility.

If China still has much to learn about futures, there is something to be said for its trading intensity. Of the 20 most active contracts in the world last year, 14 were on Chinese exchanges, according to the Futures Industry Association, a global trade body. Some of that is because of double counting. It can also reflect the swirling pool of money trapped in China by capital controls. Nevertheless, there are limits to the potential irrationality in futures trading because ultimately the underlying commodities are due for physical delivery. Futures contracts thus converge with spot prices as they near expiry. Two other factors help explain China's trading volume. Lot sizes are generally small (for example, five tonnes for copper futures in Shanghai, compared with 25 tonnes in London). And ordinary investors have easy access through their brokerage accounts. Institutional traders in China love the liquidity that results from this. It eliminates the risk of being unable to enter or exit a position because of a lack of trading.

There is another reason why institutional traders like China. They can profit with relative ease. Commodity futures illustrate how cloistering a financial system from the rest of the world leads to distortions. Darin Friedrichs of StoneX, a commodities brokerage, says that easily disprovable rumours can cause price swings; unfounded reports of a Brazilian port closure recently drove up soyabean futures. Traders relish their “import-arb” windows, when prices of Chinese futures exceed those of their global counterparts, making it worthwhile to arbitrage by buying abroad and selling onshore.

Slowly, regulators are dismantling the walls, allowing more international firms to trade in China. Futures with international counterparts such as oil and corn are starting to align more with global prices. For the adventurous, though, there are always eggs. ■



梧桐

蛋中有机

世界能从中国的期货交易中学习到什么

“只要你能考虑得到别人考虑到的，只要你能够严格按照交易系统去做，我始终相信没有成功不了的。”这句鼓舞人心（尽管值得怀疑）的话出自中国投资顾问周承基，这是他在9月3日一场两小时的在线辅导课上分享的一点市场智慧。一群未来的市场大师和日内交易员聚在一起高谈阔论的情景并非中国独有。但周承基关注的是一种让中国显得相当不同寻常的资产——鸡蛋期货，它是目前中国独有的期货品种。

如果投机者对于今年秋季母鸡是否会多产蛋、人们是否很想吃鸡蛋炒面之类的问题很有想法，那么中国是最好的去处。他们需要做的只是联系当地的经纪商，支付一笔4000元（585美元）的保证金。做多鸡蛋（即押注价格会上涨）一度是今夏最热门的交易之一，从5月底到7月底鸡蛋的期货价格飙升了65%。此后市场就崩盘了，价格暴跌超过20%。成交量异常高。投资者每天买卖约300万吨的鸡蛋期货，约为中国全年实际消费总量的十分之一。事实上，一个鸡蛋在下锅之前，它的所有权可能要转手几十次。

这一切都很容易让人觉得中国的期货市场不过就是过度投机的温床。散户交易者在上海、大连和郑州的大宗商品交易所中所起的作用的确远远超过芝加哥和伦敦的交易所，后两地长期以来分别在农业和金属交易中引领全球。官员们估计，2016年，中国交易所大约85%的敞口头寸由个人持有，而在交易由机构主导的美国，这一比例还不到15%。但是，中国市场的成熟恰恰也显露出有关期货的一些恒久事实，它们因为那些百年老交易所相对平稳的运营而表现得不那么明显。

先从最基本的对冲需求说起。期货是生产者防范价格暴跌和消费者防范价格飙升的工具。在西方国家，这可能看上去一目了然，因为市场势力非常集中。2017年，美国四大钢铁公司的产量约占全国总产量的80%，而中国的这一比例只有20%左右。分散的现货市场使得期货价格很难被用作衡量

基准。但是，没有一个定价上的最后担保的操盘是危险之举。因此中国一直在加紧拓展自己的期货市场。仅过去两年中国就推出了十几个新的期货合约，从原油、不锈钢，到苹果和红枣。让它们建立起信誉则需要时间。

如果说中国在期货方面还有很多要学的，它在交易强度上的优势值得一说。全球行业组织期货业协会（Futures Industry Association）称，去年全球最活跃的20个期货合约中，有14个来自中国的交易所。这有一部分是因为存在重复计算。这同时也能反映出，由于资本管制，大笔资金被困在国内打转。不过，期货交易中潜在的不合理是有限度的，因为标的商品最终要实物交割。因此，期货合约在即将到期时趋同于现货价格。还有两个因素有助于解释中国的交易量。中国期货的交易单位通常较小（比如上海的铜期货为5吨，而伦敦为25吨）。并且普通投资者也可以通过自己的经纪账户轻松进入期货市场。中国的机构交易员喜欢由此产生的资产流动性，它消除了因缺少交易而无法进入或退出头寸的风险。

机构交易员青睐中国还有另一个原因。他们可以相对轻松地获利。大宗商品期货显示了与世界其他地方隔绝的金融体系会产生怎样的扭曲。大宗商品经纪公司StoneX的达林·弗里德里克斯（Darin Friedrichs）表示，即使一些很容易被证伪的传闻也可能导致价格波动——近期关于巴西一个港口关闭的不实报道推高了大豆期货价格。交易员们享受“进口套利”的窗口：当中国的期货价格超过其他国家时，在海外买入、在岸卖出就足以让他们套利。

监管机构正在慢慢拆除壁垒，允许更多的国际公司在中国交易。至于石油和玉米这些国际通行的期货品种，它们在中国的价格开始与全球价格更趋一致。不过，对于喜欢冒险的人来说，总还有鸡蛋。■



Netflix

The Hastings doctrine

Can the streaming giant's boss preserve its culture of innovation as it grows bigger and more global?

THE BEST way to stay innovative, many bosses will tell you, is to hire the best people and let them get on with it. Few take this as literally as Reed Hastings of Netflix. The video-streamer's employees can take as much holiday as they fancy and put anything on the company's tab so long as, to cite the entirety of its corporate expense policy, they "act in Netflix's best interest". Anyone may access sensitive information like a running tally of subscribers, which Wall Street would kill for. Executives seal multimillion-dollar deals without sign-off from top brass. High-achievers are rewarded with the plushiest salaries in the business—whether their business is writing computer code or film scripts. Underperformers are unceremoniously cut loose.

It sounds like a recipe for expensive anarchy. But managing "on the edge of chaos", as Mr Hastings mischievously puts it, has served Netflix well. Most of its 7,900 full-time workers seem happy being treated like professional athletes, paid handsomely as long as no one can do their job better. Each generates \$2.6m in annual revenue on average, nine times more than Disney employees, and \$26.5m in shareholder value, three times more than a Googler does.

Investors lap it up as hungrily as Netflix binge-watchers, who now number 193m worldwide. Since going public in 2002 the firm's share price has risen 500-fold (see chart 1), in the top ten 18-year runs in America Inc's history, as Mr Hastings points out with a hint of pride in his voice. This year it briefly overtook Disney to become the world's most valuable entertainment company.

This track-record has earned Mr Hastings kudos. A PowerPoint “culture deck” outlining his management philosophy has been viewed 20m times since he posted it online 11 years ago. Sheryl Sandberg, Mark Zuckerberg’s right-hand woman at Facebook, has called it the most important document ever to emerge from Silicon Valley. A new book in which Mr Hastings fleshes out those 125 slides is destined for the bestseller list. But it raises a question: are the “No Rules Rules” of the title the right set as Netflix metamorphoses from California startup into global show-business colossus?

It is easy to put too much stock in corporate culture, which can be a story triumphant companies tell themselves after the fact. GE’s rise in the 1990s had more to do with financial engineering than with the much-aped habit introduced by Jack Welch, the conglomerate’s CEO at the time, of ranking employees and “yanking” the bottom 10%. Netflix would not be where it is without its boss’s uncanny foresight to bet on streaming in the late 2000s, or the uncannily flat-footed response from Hollywood incumbents, which took a decade to grasp the threat. Investors have displayed deep reserves of cheap capital, and deeper ones of patience. Over the past year the firm’s prodigious revenue-generators each burned through \$123,000 of cash (see chart 2); this year quarterly cashflow turned positive for only the first time since 2014. Luck played a role, as when cut-price DVD players debuted just in time for Christmas in 2001, months after the dotcom crash forced Mr Hastings to lay off a third of his 120-odd workers, from what was then a DVD-by-mail rental service.

Still, as Michael Nathanson of MoffattNathanson, a consultancy, observes, “Every time that Netflix faced a roadblock it found a clever way to work around it and emerge stronger.” Most notably, when TV networks and studios at last woke up to the reality of streaming and began to hog content licences, Netflix started producing its own shows, and later feature films.

The swivel might have taken longer with employees bogged down in chains of approvals. “Radical candour”, whereby everyone’s ideas, from Mr Hastings down, can be challenged by all-comers, helps weed out bad ones. “Sunshining”, the stomach-churning spectacle of publicly explaining choices, helps not to repeat mistakes. Senior Netflixers’ “ability to swallow their pride is truly exceptional”, says Willy Shih of Harvard Business School, who has written two case studies on the firm.

Now this innovation-friendly culture is under fire on three fronts. The first two—the firm’s growing size and scope—are internal to Netflix. The third source of pressure comes from the outside.

Start with size. The flat hierarchy and frankness that works in Silicon Valley, with its narrow range of temperaments and socioeconomic backgrounds, is harder to sustain in a global workforce that has swelled nearly fourfold in five years (more if you include temporary contractors, who now number over 2,200, up from fewer than 400 in 2015). Asians, Europeans and Latin Americans can find visitors from headquarters “exotic”, in Mr Hastings’s words. Negotiating “context”, as Netflix managers and their subordinates do constantly in the absence of explicit rules, offers useful flexibility. But it takes time that could be spent perfecting a product—ever more of it as tacit cultural understanding is diluted by international expansion. Revenue per worker is down by 7% from 2015.

Many countries grant workers more protections than America does. This is a problem for the “keeper test”, which requires managers constantly to question if they would fight to stop their underlings from leaving—and, if the answer is “no”, immediately send the individual on their way with generous severance. These golden handshakes, which range from four months’ salary in America to more than six months in the Netherlands, are “too generous” to reject, says Mr Hastings. Netflix has not been sued even in Brazil, where employee lawsuits are a national sport to rival football. The

bonhomie may not last.

A larger workforce poses a separate risk to internal transparency. Even while the attrition rate hovers at around 10%, the number of ex-Netflixers with knowledge of the firm's finances and strategic bets is now growing by hundreds each year. Unwanted disclosures have been rare and, says Mr Hastings, immaterial. But, he concedes, serious leaks may be "a matter of time".

The second challenge has to do with Netflix's sectoral girth. In its first decade it was primarily a firm of technologists like Mr Hastings, whom his co-founder, Marc Randolph (who left the firm in 2003), likened to the hyper-rational, emotionless Mr Spock in "Star Trek". That was never entirely fair—Netflix products are data-driven but Mr Hastings attaches as much weight to judgment in managing people as Captain Kirk ever did. Still, by the standards of Tinseltown, where he now spends a couple of days most weeks amid studio intrigues and moody showrunners, he and his firm can come across as robotic.

One producer who has worked with Netflix detects hints of its horizontal hierarchy permeating Hollywood "by osmosis". This can speed things along. But, she grouses, "sometimes you need a production assistant to assist, not commission scripts." At the same time, Netflix missed a chance to revolutionise other old studio ways. The \$150m five-year deal it signed in 2018 with Shonda Rhimes, a star TV producer, may be more generous than most networks could afford. But it is Hollywoodian in its structure, says a former executive—and antithetical to the keeper test.

Moreover, Netflix may have no choice but to expand into new industries. This would be a departure from its laser focus on its core product: quality streamed entertainment. But show business is increasingly the preserve of conglomerates. Disney has theme parks, merchandising and TV networks.

Comcast (the cable giant that owns NBCUniversal) and AT&T (the telecoms group which controls HBO and WarnerMedia) possess the pipes along which content flows. Apple's and Amazon's Hollywood ambitions are tethered to their powerful technology platforms.

Disrupting sluggish behemoths is one thing. Competing with them head-on may require a different trade-off between flexibility and efficiency. It may also mean takeovers. Mr Hastings has no shopping plans. But a strong culture, he admits, "is a material weakness if you are going to make big acquisitions". Cultural sparks could fly when you integrate more than a few dozen people, as they flew when his first firm, Pure Software, bought rivals in the 1990s.

The third set of challenges is external. Covid-19 has muted the exchange of ideas. It is also harder to evaluate—and dismiss—people by Zoom; Netflix's 12-month rolling attrition rate has declined by a third, to 7%. Mr Hastings said earlier this month he did not see "any positives" to home-working.

| *Dear White People*

Then there is public pressure for corporate America to care more about diversity. Mr Hastings added inclusion to Netflix values in 2016 but it barely features in his investor letters or annual reports. He acknowledges a tension between the desire for diversity and Netflix's arch-meritocratic ideals (the firm eschews quotas, as it does all management metrics, in favour of that Kirkian judgment). Its corporate temperament screams "hypermasculine", as Erin Meyer, Mr Hastings's co-author and professor at INSEAD business school in France, has herself noted. And one person's radical candour is another's microaggression.

Netflix shareholders and their representatives on the board have confidence that Mr Hastings can reconcile these strains. He has given them plenty of reasons to trust his own judgment. But he is fully aware that his

position is safe only as long as he can keep the magic going. The keeper test applies to him, as well.

For an interview with Reed Hastings, see online at economist.com/reedhastings ■



奈飞

哈斯廷斯主义

这家流媒体巨头日益庞大和国际化，它的老板能否保住其创新文化？

许多老板都会告诉你，要保持创新，最好的办法就是用最好的人，然后随便他们怎么干。没有几个老板像奈飞（Netflix）的里德·哈斯廷斯（Reed Hastings）那样，真的就是按这句话的字面意思做的。奈飞的员工可以随心所欲地休假，在花公司的钱方面也没有限制，只要是“合乎奈飞的最大利益”——而这也就是公司报销政策的全部内容。任何人都可以访问敏感信息，例如会让华尔街为之疯狂的订户流动总数。高管们签署几百万美元的交易也无需顶层批准。表现突出的员工能拿到业界最高的薪酬，无论干的活是编写计算机代码还是创作电影剧本。表现不佳的则会被毫不客气地裁掉。

这听起来会导致代价高昂的无政府状态。但是，这种被哈斯廷斯调侃为“在混乱边缘试探”的管理方式让奈飞受益良多。它的7900名全职员工中的大多数人似乎很满意被像职业运动员那样对待——只要没有人能比他们把手头的活干得更出色，他们就可以获得丰厚的报酬。奈飞员工人均创造260万美元的年营业收入，是迪士尼员工的九倍；人均创造2650万美元的股东价值，是谷歌员工的三倍。

投资者对奈飞的追捧一如从世界各地到它网上追剧的1.93亿人。自2002年上市以来，奈飞的股价已经上涨了500倍（见图表1），是美国企业史上上市18年后股价涨幅十强之一，哈斯廷斯语带自豪地指出。今年，它一度超越迪士尼成为全球市值最高的娱乐公司。

| 125个理由

这样的业绩记录为哈斯廷斯赢得了名望。自11年前他概述自己管理理念的“文化手册”幻灯片在网上发布以来，浏览量已达2000万次。马克·扎克伯格在Facebook的得力助手谢丽尔·桑德伯格（Sheryl Sandberg）称之为硅谷有史以来最重要的文件。哈斯廷斯将这125张幻灯片扩充成了一本注定

会畅销的新书。但这也引出了一个问题：随着奈飞从一家加州的创业公司变身全球娱乐业巨头，书的标题所述“无规则之规则”是否仍然适用？

人们很容易太过看重企业文化，而它可能就是成功企业讲给自己听的事后诸葛亮的故事。GE在上世纪90年代的崛起更多是靠金融运作，而不是时任CEO杰克·韦尔奇引入的、后来被普遍效仿的绩效排名和“淘汰掉”排在后10%的人的做法。如果奈飞的老板在2000年代末没有凭诡异的先见之明去押注于流媒体，或者好莱坞的老牌公司不是不可思议地毫无准备，用了十年的时间才意识到威胁，奈飞就不可能有今天的成就。而投资者也展示了深厚的廉价资本储备，更展示了极大的耐心。过去一年中，奈飞那些创造超高营业额的员工每人烧掉了12.3万美元的现金（见图表2）；公司到今年才实现自2014年以来季度现金流首次转正。运气也起到了一定的作用：廉价DVD播放器正好赶上在2001年圣诞节前亮相，就在几个月前，哈斯廷斯因互联网泡沫破裂被迫解雇了120多名员工中的三分之一，当时奈飞还是一家DVD邮寄租赁公司。

但是，正如咨询公司MoffattNathanson的迈克尔·内桑森（Michael Nathanson）所说：“每次奈飞遇到障碍，总能找到聪明的变通办法，并变得更强大。”最值得注意的是，当电视网络和制片公司终于意识到流媒体的趋势并开始努力抢占内容许可时，奈飞已经开始制作自己的节目，后来又开始制作长电影。如果员工做事要层层审批，这一转身可能就需要更长时间。奈飞奉行“彻底的坦率”，上至哈斯廷斯，所有人的想法都可以被任何新老员工挑战，这有助剔除坏点子。“晒晒太阳”的做法——即当众解释做出某些选择的原因——可能让人不好过，但有助避免重蹈覆辙。奈飞的资深员工“放下身段的本事实属少见”，写过两篇奈飞案例研究的哈佛商学院教授史兆威说。

现在，这种创新友好型文化正从三个方面受到冲击。前两个来自奈飞内部：公司不断扩大的规模和业务范围。第三个源自外部。

先看规模。扁平化的层级结构和开诚布公的态度在硅谷很管用，因为那里的人性情相似、社会经济背景相近，但这一套在已经国际化的奈飞员工队

伍中很难维系下去。它的员工人数五年内已翻了近两番（算上临时雇员还要更多，这类员工2015年时还不足400人，现在已有2200多人）。用哈斯廷斯的话来说，亚洲、欧洲和拉丁美洲的员工可能会觉得总部来的人“很奇异”。在没有明确规则的情况下，奈飞的主管们及其下属不断协商“任务情境”，这带来了有益的灵活性。但这么做花费时间，而这些时间本可以用于完善产品——而随着文化理解上的默契被国际扩张所稀释，在这上头耗费的时间就越发地多了。人均营收比2015年下降了7%。

许多国家对劳动者的保护比美国更多。这对于“去留测试”来说是个问题。这种测试要求管理者不断自问是否愿意竭力争取下属不要走人，如果答案为“否”，就立即掏出慷慨的遣散费让其走人。这些“分手协议”的大方程度从美国的四个月工资到荷兰的六个月以上工资不等，哈斯廷斯说这“慷慨”得令人难以拒绝。就连在巴西这样员工诉讼可与足球并列为国民运动的国家也没有人状告奈飞。不过这种好合好散的情况可能不会持久。

员工增多给内部透明度带来了额外的风险。即使员工流失率徘徊在10%上下，了解奈飞财务和战略押注的前员工数量目前仍以每年数百人的速度增长。哈斯廷斯表示不利的信息泄露仍很少见，而且无关紧要。但他承认，严重的泄漏可能是“迟早的事”。

第二个挑战与奈飞的业务范围有关。在成立的头十年，公司主要是由哈斯廷斯这样的技术专家组成，联合创始人马克·兰道夫（Marc Randolph，2003年离职）把他比作《星际迷航》中超理性、没有情感的斯波克（Spock）。这个评价从来就不完全公道。奈飞的产品是由数据驱动的，但哈斯廷斯和柯克船长（Kirk）一样重视人员管理上的判断力。不过，按好莱坞的标准（他现在基本上每周都有几天在那里，在影视公司的勾心斗角和情绪化的制作人中周旋），他和他的公司可能已经和机器人差不多了。

一名与奈飞合作过的制片人觉察到它的水平层级结构“潜移默化地”渗入好莱坞的迹象。这样可以加快工作进度。但是，她抱怨道，“有时你需要的是一个制作助理来协助自己，而不是让他来委托自己创作剧本的。”同

时，奈飞错过了革新影视公司其他一些老式做法的机会。它在2018年与金牌电视制作人珊达·莱梅斯（Shonda Rhimes）签署了五年1.5亿美元的协议，大多数电视网络可能都付不起这个价。但一位前高管表示，这份协议的安排是好莱坞式的，与去留测试的理念相悖。

再者，奈飞可能别无选择，只能向新行业拓展。这将分散它对优质流媒体娱乐这个核心产品的聚焦。但是，娱乐业正日益变成各大企业集团的保留地。迪士尼有主题公园、周边商品销售和电视网络。有线电视巨头康卡斯特（Comcast，拥有NBC环球[NBCUniversal]）和电信集团AT&T（控制着HBO和华纳媒体[Warner Media]）握有内容渠道。苹果和亚马逊在好莱坞的野心与它们强大的科技平台紧密联系。

扰乱这些动作迟缓的巨兽是一回事，而与它们正面竞争可能就需要在灵活和效率之间做不一样的权衡。这也可能意味着收购。哈斯廷斯没有购物计划。但他承认，强大的文化“在寻求大型收购时是一大弱点”。当整合规模在几十人以上时就可能发生文化冲突，他的第一家公司Pure Software在90年代收购竞争对手时就出现过这种问题。

第三类挑战来自外部。疫情抑制了思想交流。通过Zoom评估和解雇员工也更困难。奈飞的12个月滚动员工流失率下降了三分之一，至7%。哈斯廷斯本月稍早时表示，他没看到居家工作的“任何积极面”。

| 亲爱的白人

此外还有敦促美国公司更加关注多元化的公众压力。哈斯廷斯2016年在奈飞的价值体系中加入了包容，但在他致投资者的信中或公司年报中几乎都没有提及。他承认对多元化的渴望与奈飞的唯精英理想之间存在冲突（奈飞在所有管理指标上都不设定额，更倾向于柯克船长式的判断）。正如哈斯廷斯新书的合著者、法国欧洲工商管理学院（INSEAD）教授艾琳·迈耶（Erin Meyer）所指出的那样，奈飞的企业气质是掩藏不住的“超男子气概”。而一个人的极度坦率会是对另一个人的不经意冒犯。

奈飞的股东及它们在董事会的代表对哈斯廷斯调和这些冲突的能力有信心

心。哈斯廷斯也给了他们很多理由来相信他的判断。但他也完全清楚，只有继续让神奇上演，自己的位子才能坐稳。去留测试他同样逃不掉。

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Globalisation

Lowering the drawbridge

Two books expound the virtues of open societies, past and future

IT WAS NOT just roads that led to Rome. The shipping lanes did, too. By the first century BC, Rome had conquered the entire Mediterranean coastline. Some 90% of its people lived within 15km of the sea, buying corn from Egypt, olive oil from Spain and toga dye from Carthage. The Roman Empire prospered because it was open to trade, people and ideas, says Johan Norberg, a Swedish thinker. Galleys brought “all the crafts that exist or have existed”, as one Greek observer put it. Foreigners could become citizens; a slave’s son could (occasionally) rise to become emperor.

Mr Norberg’s “Open” is one of two new books that offer big ideas about globalisation, past and future. He argues that progress depends on openness, but that this tends to create resistance that sets back the clock. In “One Billion Americans” Matthew Yglesias, a co-founder of Vox (a wonky leftish news outlet), ponders how the United States might evolve if it were much more open to immigrants.

“Open” is clear, colourful and convincing, marshalling evidence from a range of eras and civilisations. The Roman Empire ceased to prosper when it ceased to be open. Christianity became the established religion, and sought to crush all others. “This new intolerance...led to vicious conflicts...between Christians and pagans, who saw their old gods being banned and their temples torn down.” Persecuted pagans joined Rome’s enemies, even welcoming barbarian invaders as liberators.

Human history, in Mr Norberg’s telling, is a cacophony of drawbridges being lowered and then raised. Mathematics and medicine flourished under the cosmopolitan Abbasid caliphate, but froze when religious

conservatives won control. By driving out Jews, Muslims and heretics, he argues, the Inquisition helped impoverish Spain (between 1500 and 1750 the Spanish economy actually shrank).

China's Song dynasty, which welcomed Muslim traders, Indian monks and Persians, developed paper money, water-powered textile machines and the makings of an industrial revolution 400 years before the West. But later dynasties turned inward and stagnated. Ming officials smashed clever machines, banned overseas trade on pain of death and curbed movement within China itself. The Manchus were even worse: to prevent contact with the outside world, in 1661 they forced the whole population of the southern coast to move 30km inland. A century later the Qianlong emperor banned or burned any books that seemed sympathetic to previous dynasties, including a great encyclopedia of economic and technical matters.

The author is often amusing as well as illuminating. Genghis Khan was a vicious warlord, but his domestic policies "would today open him up to accusations of being a politically correct, latte-drinking virtue signaller". The Mongols practised ethnic and religious tolerance, which is one reason why they were so effective. They promoted skilled fighters, engineers and administrators of all backgrounds. Of the 150,000-strong horde that invaded Europe in 1241, only around a third were ethnic Mongols. Habsburg soldiers were surprised to find that one captured officer was a middle-aged literate Englishman, who had fled persecution for heresy at home and sought refuge among the more open-minded Mongols.

All regions have had rulers who tried to preserve stability by shutting out foreign influence. The key to thwarting them has often been for the ruled to vote with their feet. Early modern Europe was no more advanced than China, but power was more dispersed, so thinkers who offended one prince could simply move. Hobbes wrote "Leviathan" while in exile in Paris; Locke and Descartes went to Amsterdam. Their books could always be printed

somewhere, and so were impossible to suppress.

Backlashes against openness are inevitable because they are rooted in human nature, Mr Norberg contends. Human brains evolved over millennia in which disruptive change often meant death; mutually beneficial exchanges with strangers were rare. If the past 300,000 years of history were compressed into a single day, it would not be until the final minute that steady material progress, fuelled by disruptive innovation, took off. Small wonder people's instincts are so conservative. When threatened, they seek shelter within their tribe, which is why demagogues try to scare them. Fear wins elections.

| *The more the merrier*

The book ends on an optimistic note. Populist demagogues eventually lose power because they are hopeless at governing. Four in ten wind up being indicted for corruption, by one count. Citizens get used to change: today American Muslims are as tolerant of homosexuals as the country was overall in 2006. The open society "may yet be saved", Mr Norberg concludes.

Mr Yglesias makes a bold case for openness in his own country. If America made both child-rearing and immigration easier, its population could in time swell to 1bn. It would thus remain the pre-eminent power, outstripping China and India. A bigger America would make for a more innovative and democratic world, he argues.

But wouldn't an America of 1bn people be horribly crowded? No, it would be as sparsely populated as France is now. Even popular cities could accommodate many more residents if building codes were less restrictive. Enlightened visa rules could revive declining towns. Congestion could be eased with policies that have worked elsewhere, from road pricing to better railways.

Mr Yglesias is swimming against the tide, and knows it. He notes that a recent immigration bill backed by Donald Trump is so restrictive that it would not let Kazuo Ishiguro, a British Nobel prizewinner, apply for a work visa unless his job paid \$240,000 or more. Yet as Mr Norberg shows, political tides can change. ■



全球化

放下吊桥

两本书阐述了开放社会从过去到未来的种种优点【《开放》、《十亿美国人》书评】

当年不只是条条大路通罗马，海上航线也一样。公元前一世纪，罗马已经征服了整个地中海沿岸。约九成罗马居民距海不到15公里，他们从埃及购买谷物，从西班牙购买橄榄油，从迦太基购买长袍染料。瑞典思想家约翰·诺伯格（Johan Norberg）说，罗马帝国之所以繁荣，是因为它对贸易、人员和思想开放。正如一位希腊观察家所言，桨帆船带来了“一切现有或曾有的工艺”。外国人可以成为罗马公民；奴隶之子也可以（偶尔）坐上皇位。

诺伯格的《开放》（Open）是对全球化的过去与未来提出重大思考的两本新书之一。他论述道，进步取决于开放，但开放往往又会引发阻力，导致开倒车。而在《十亿美国人》（One Billion Americans）中，Vox（一家摇摆的左倾新闻媒体）的联合创始人马修·伊格莱西亚斯（Matthew Yglesias）思索如果美国大大提高对移民的开放程度将会如何。

《开放》一书条理清晰，丰富多彩，令人信服，列举了来自许多不同时代和文明的佐证。当罗马帝国不再开放，繁荣也走到了尽头。基督教成为国教，并试图镇压所有其他宗教。“这种新的不宽容……导致了基督徒和异教徒之间的……恶性冲突，异教徒的旧神被禁止，庙宇被拆毁。”被迫害的异教徒站到了罗马的敌人那一边，甚至将野蛮的入侵者奉为解放者。

在诺伯格的讲述中，人类历史充斥着吊桥放下后又被拉起的嘈杂刺耳的声响。在开放包容的阿拔斯王朝治下，数学和医学蓬勃发展，但当宗教保守派上台后，这些领域就陷入了停滞。他认为，宗教法庭驱逐了犹太人、穆斯林和异教徒，是西班牙陷入贫困的原因之一（1500年至1750年间西班牙经济实际萎缩了）。

中国的宋朝欢迎穆斯林商人、印度僧侣和波斯人，比西方早400年发明了

纸币、水力纺织机和工业革命的其他要素。但后来的朝代闭关自守，止步不前。明朝的官员捣毁了精巧的机器，以死刑严禁海外贸易，还限制国内人口流动。满族人的统治更糟糕：为阻止民众与外部世界接触，1661年他们强迫南部沿海的全体居民向内陆迁移30公里。一个世纪后，乾隆皇帝禁止或焚烧了任何带有同情前朝意味的书籍，包括一部经济和技术类的大百科全书。

作者富于启迪的论述常常也很风趣。成吉思汗是个残暴的大军阀，但他的国内政策“若放到今天，会让他被斥为政治正确的喝着拿铁的自由主义者，浑身道德优越感”。蒙古人在族裔和宗教上施行宽容政策，这也是他们如此高效的原因之一。无论来自何种背景的精兵强将、工程师和管理者都会得到提拔。1241年远征欧洲的15万大军中只有约三分之一是蒙古族。哈布斯堡的士兵惊讶地发现，一名被俘军官是个受过教育的英国中年人，原来他在英国因异端罪名遭到迫害，逃亡后投奔了更加开明的蒙古人。

无论在哪里，总有统治者试图通过隔绝外国影响力来维持稳定。挫败他们的关键往往在于被统治者会用脚投票。近代早期的欧洲并不比中国先进，但势力更分散，所以如果思想家得罪了哪位君主，搬走就是了。霍布斯在流亡巴黎期间写下了《利维坦》，洛克和笛卡尔逃亡到阿姆斯特丹。他们的书总能找到出版的地方，因而不可能被完全压制。

诺伯格认为，开放将不可避免地遭到强烈抵制，因为这植根于人性。在人脑进化的漫长岁月中，颠覆性的变化往往意味着死亡；与陌生人的交流极少能够产生互惠互利的结果。如果把过去30万年的历史压缩成一天，那么直到最后一分钟才开始了受颠覆性创新驱动的稳定的物质进步。难怪人的天性如此保守。受到威胁时，人们会在自己的族群中寻求庇护，这也是煽动者试图恐吓他们的原因。恐惧在选举中胜出。

| 人越多越好

这本书以乐观的笔调收尾。煽动民粹主义的政客终将下台，因为他们的执政水平无可救药。据统计，十个煽动者中有四个最终因腐败遭到起诉。公民也逐渐习惯了改变：如今美国穆斯林对同性恋的宽容程度已经相当于

2006年美国的整体水平。开放社会“可能还有救”，诺伯格总结说。

伊格莱西亚斯提出了一个让他自己的国家更加开放的大胆理由。如果美国让抚养子女和移民都变得更容易，那么某天它的人口可以膨胀到十亿之多。这将让它继续保持独步全球的地位，压过中国和印度。他认为，一个人口更多的美国将让世界更具创新力也更民主。

但是，十亿人口的美国难道不会太拥挤吗？不会，人口密度并不高，只相当于现在法国的水平。如果放宽建筑的法规限制，即使热门城市也还能再容纳众多居民。开明的签证规定可以重振衰落的城镇。道路收费和改善轨道交通等在其他地区已行之有效的政策可以用来缓解交通拥堵的问题。

伊格莱西亚斯知道他的观点是反潮流而行。他指出，特朗普最近支持的一项移民法案限制性极强，哪怕是英国的诺贝尔奖得主石黑一雄都没法申请工作签证，除非他的工作报酬不少于24万美元。然而，正如诺伯格所展示的那样，政治潮流是会改变的。 ■



Atmospheric dynamics

Fire, then ice

Wild weather spans the world

ON SEPTEMBER 7TH in Denver, Colorado, the temperature reached 34°C (93°F), 6°C above what is normal for the time of year. The city was sitting under the dome of hot air encouraging record fires across the American West. The next day snow started to fall. By midnight the temperature was below freezing. What happened?

The immediate cause was the polar jet stream, a world-girdling high-altitude wind driven by temperature differences between Arctic air to the north and warmer air to the south. Its meandering path is set by patterns of high and low pressure known as Rossby waves. And because fluid dynamics are never simple, the jet stream exerts its own influence in turn upon these guiding waves.

As the jet stream passed to the north of the high pressure over America's west coast, the big temperature difference between that hot air and what lay farther to the north added to its energy. This extra impetus meant that as the jet came down the east side of the high-pressure zone it curved back on itself towards the west. In meteorological terms, the Rossby wave broke. In this case the breaking wave's white water took the form of large quantities of cold air from the Canadian north that were suddenly pulled south, and which crashed down on Colorado.

This is not in itself evidence of climate change. But that may lurk in the background. Go back to the first days of September and Typhoon Maysak was passing north over the Koreas, the second of an unprecedented troika of typhoons to do so this summer, thanks to hot seas and cyclone-friendly conditions to the south. The heat Maysak gave up over eastern China drove

the jet stream there to particularly impressive speeds. That intensification travelled on over the Pacific, possibly predisposing the system towards what happened five days later in Denver, says Philippe Papin of America's National Weather Service.

Not all typhoons that pass over Korea will have such effects. (Maysak's successor, Haishen, did not.) They need to hit the jet stream in the right way. But greenhouse warming is making the tropics larger. Models suggest this will mean that more tropical storms reach high latitudes, where they can invigorate the meanders of the jet stream in rather the same way that a child sends a wave down a skipping rope with a flick of the wrist.

Some scientists are concerned that, as climate change worsens, the ability of Rossby waves to drive sudden changes in the weather will increase. Even today, they can bring about whiplash weather when the circumstances are right. ■



大气动力学

火，而后冰

极端天气横扫全球

九月七日，科罗拉多州丹佛市的气温达到了 34°C ，比往年同期正常水平高出 6°C 。这座城市被一个热空气构成的穹顶笼罩，这股热浪已经推动美国西部各地发生规模创纪录的火灾。第二天丹佛又开始下雪。到午夜时分，气温已跌至冰点以下。这是怎么回事？

直接原因是极地喷射气流，这是一种环绕地球流动的高空风，由北方的北极气团和南方的较暖气团之间的温差驱动。其蜿蜒曲折的路线是由被称作罗斯贝波的高低压模式决定的。而因为流体动力学本身很复杂，喷射气流反过来会对这些导向性的罗斯贝波施加影响。

当喷射气流经过美国西海岸上空的高压带北侧时，热空气与北侧更远处的空气之间的巨大温差增加了喷射气流的能量。由于这种额外的推动力，气流从高压带东侧下行时又向西弯曲转回原方向。用气象学术语来说，罗斯贝波中断了。在本例中，波浪中断时生成的白色水花以大量冷空气的形式出现，这些原本来自加拿大北部的冷空气被突然拽向南方，又哗啦一下砸在科罗拉多州。

这本身并不足以证明气候变化。但这种变化可能藏在暗处。回到9月的头几天，台风“美莎克”（Maysak）正北上经过朝鲜半岛上空，它是今夏造访该地的前所未见的“台风三连击”中的第二个，这要归功于南部的高温海域和气旋友好型条件。“美莎克”在中国东部上空释放的热量推动该区域的喷射气流达到了特别惊人的高速。美国国家气象局的菲利普·帕潘（Philippe Papin）说，强化的气流继续在太平洋上空移动，可能诱发了天气系统五天后再在丹佛发生的极端情况。

并非所有经过朝鲜半岛上空的台风都会产生这样的效果。（“美莎克”之后的“海神”就没有。）它们需要恰到好处地撞击喷射气流。但温室变暖正在扩大

热带地区的范围。模型显示，这将意味着更多的热带风暴会到达高纬度地区，在那里它们可以刺激喷射气流，致其路线更加蜿蜒曲折，就像一个孩子轻抖手腕就能让波浪沿着长绳传出那样。

一些科学家担心，随着气候变化的加剧，罗斯贝波推动天气突变的能力将会增强。即使在今天，当环境条件合适时，它们也能带来“天气之鞭”。■



Japanese business

Rebalancing act

Japan Inc is caught in the rift between America and China

WHEN ABE SHINZO became Japan's prime minister for a second time in 2012, relations with China were on the skids. Tensions over disputed islands brought the two countries to the brink of conflict. Japanese car dealerships in China were set ablaze. Protests at a Panasonic factory turned violent.

After that, tempers cooled and relations warmed. Mr Abe had planned to host Xi Jinping for a state visit in Tokyo this spring, the first by a Chinese leader since 2008. Japan Inc, too, has been dining out on the bonhomie. Annual trade between China and Japan, the world's second- and third-biggest economies, amounts to more than \$300bn. Japanese firms accumulated over \$130bn in assets in China. The flow of Japanese foreign direct investment there hit an all-time high of \$14.4bn last year.

According to Morgan Stanley, an investment bank, listed Japanese firms derived only 4% of revenues from China. But 26% of their profits were tied to China through suppliers or customers, more than depended on America, calculates Jesper Koll, a Tokyo-based economist. He reckons this profit share shot up to 63% in the second quarter, as the Chinese economy recovered faster than others from covid-19.

Now the mood seems once again to be souring. Covid-19 put paid to Mr Xi's visit. His crackdown on democracy in Hong Kong and the economic cold war between Beijing and Washington have led senior Japanese officials to speak of risks rather than opportunities in China. Earlier this year Mr Abe's government imposed new restrictions on foreign investment to protect certain industries, battered by covid-19, from Chinese bargain-hunters. The

pandemic and the spectre of further American sanctions against Chinese companies such as Huawei, a telecoms-equipment giant, are making Japanese companies think about the stability of their supply chains, not just efficiency, says Ke Long of the Tokyo Foundation for Policy Research, a think-tank. Mr Abe's sudden resignation on August 28th over ill health has added to the uncertainty.

Closer inspection reveals a more nuanced picture, however. One source close to the government says its aim is to focus on "several strategic choke-points" in China (such as medical supplies), while "keeping many areas open for commercial activity". Not so much a great decoupling, then, as a quiet rebalancing.

Mr Abe's ¥244bn (\$2.2bn) programme to induce Japanese firms to diversify their supply chains away from China is a case in point. In July 57 companies, including Iris Ohyama, a big plastics producer, and Sharp, a maker of electronics, received a combined ¥57bn to invest in production at home; others got help to build factories in South-East Asia. But of the 87 winning projects, 60 will be producing masks, disinfectants, drugs or other medical supplies.

Having business in China was not a precondition for the handouts; many companies, especially small and medium-sized ones that made up the bulk of applicants, had little or none. An executive at Novel Crystal Technology, a producer of materials for semiconductors, says his firm applied for the subsidy to reduce overconcentration—in the American market. The sums on offer are far too small to spur all-out decoupling, says Onishi Yasuo, a former official at the Japan External Trade Organisation, an independent government agency.

Most Japanese firms with lots of exposure to China are in "wait and see" mode, says Mr Ke. America may have a new government soon. The scope

and enforcement of American sanctions is vague. Even if tensions keep rising, Japan Inc is unlikely to behave as a monolith. Makers of niche products for export may decamp from China. Firms with a large Chinese business, such as carmakers, will be loth to leave.

In the long run the risk for corporate Japan is less geopolitics than competition. China already transformed once, from a land of cheap labour into a booming consumer market; more than 70% of what Japanese companies' affiliates produce in China is sold there. Now a second shift is under way, from consumer market to rival in sophisticated technology.

The latest annual survey of 74 technology products and services by *Nikkei*, a Japanese business newspaper, found that last year Chinese companies overtook Japan in market share for liquid-crystal displays installed in smartphones and insulators for lithium-ion batteries used in electric vehicles. As an adviser to a large Japanese bank observes, that is what really makes Japanese firms nervous. ■



日本企业

再平衡动作

中美失和，殃及日企

安倍晋三在2012年第二次出任日本首相时，日中关系正在走下坡路。围绕争议岛屿的紧张局势升级，冲突一触即发。在中国，日本汽车经销店被纵火。松下一家工厂的抗议活动演变成了暴力事件。

此后，怒火平息，关系回温。安倍原计划邀请习近平在今年春天前往东京，对日本进行国事访问。如果成行，将是中国领导人自2008年以来首次访日。日本企业也一直从这种友好的氛围中受益。中国和日本分别是全球第二大和第三大经济体，两国间的年贸易额超过3000亿美元。日本企业在中国的资产累计超过1300亿美元。去年，日本对中国的外国直接投资流入创历史新高，达到144亿美元。

投资银行摩根士丹利的数据显示，日本上市公司只有4%的收入来自中国。但据在东京工作的经济学家杰斯珀·科尔（Jesper Koll）估算，它们有26%的利润通过供应商或客户与中国绑定，比对美国的依赖更深。他估计，由于中国经济从新冠疫情中的恢复速度比其他国家更快，这一利润份额在第二季度飙升至63%。

现在，氛围似乎正再度转冷。习近平的出访因疫情搁浅。他对香港民主运动的镇压以及中美之间的经济冷战让日本的政府高官开始谈论在中国的风险而非机遇。今年早些时候，安倍政府出台了限制外国投资的新举措，以防止受疫情冲击的某些行业被中国买家趁虚而入。智库东京财团政策研究所（Tokyo Foundation for Policy Research）的柯隆表示，受疫情影响，以及担忧美国未来进一步对电信设备巨头华为之类的中国企业施加制裁，日本公司开始考虑自己供应链的稳定性，而不仅仅是效率。8月28日，安倍因健康问题突然辞职，加剧了局势的不确定。

然而，如果深入观察，就会发现情形更加微妙。一位与日本政府关系密切

的消息人士表示，政府的目标是重点关注在中国的“几个战略咽喉点”（比如医疗用品），同时“继续保持很多领域对商贸活动开放”。由此看来，与其说这是一次重大脱钩，不如说是一次悄然进行的再平衡。

一个例证是安倍2440亿日元（22亿美元）的企业资助项目，它引导日本企业将自身供应链多元化，扩散到中国以外。7月，包括大型塑料制品生产商爱丽思和电子产品制造商夏普在内的57家企业获得了总计570亿日元的资金，用于投资本土制造；其他企业获得帮助在东南亚建厂。但在87个获批项目中，有60个将生产口罩、消毒剂、药品或其他医疗用品。

并不是只有在中国有业务的公司才有资格申请资助。很多公司，尤其是构成此次申请主体的中小企业，在中国几乎或完全没有业务。半导体材料制造商Novel Crystal Technology的一名高管称，自己公司申请补贴是为了减少过度集中在美国市场。独立的政府机构日本贸易振兴机构（Japan External Trade Organisation）前官员大西康雄表示，政府此次提供的资金太少，根本不足以推动全面脱钩。

大多数与中国有密切业务关联的日本公司还处于“观望”状态，柯隆说。美国可能很快会迎来新政府。美国制裁的范围和执行情况并不明确。即使紧张形势持续加剧，日本企业界也不太可能整齐划一地行事。制造利基出口商品的企业可能会从中国撤离。而像汽车制造商这样在中国有大量业务的公司会不愿意离开。

从长远来看，日本企业面临的风险更多来自竞争，而不是地缘政治。中国已经实现了一次转型——从廉价劳动力国家转变为繁荣的消费者市场；日本企业的中国子公司生产的产品超过70%在中国出售。现在，中国正在进行第二次转型——从消费者市场转变为尖端技术领域的竞争者。

日本商业报纸《日本经济新闻》（Nikkei）对74项科技产品和服务的最新年度调查发现，去年中国企业在智能手机液晶显示屏和电动车锂电池绝缘材料上的市场份额超过了日本。正如一家日本大银行的顾问所说，这才是让日本企业真正感到紧张的事。■



Influenza

Cold case

2020 has been a year without a flu season in the southern hemisphere

EVERY WINTER, from May to October, tens of thousands of Australians and New Zealanders are asked how they feel. More precisely, they are asked by their governments in weekly surveys if they have a cough or a fever. Although 2020 has been a difficult year in many ways for Aussies and Kiwis, it has not necessarily been bad for their physical health. This winter only around 0.4% of people in the two countries said they were suffering from flu-like symptoms, down by four-fifths compared with last year. Other countries in the southern hemisphere have reported similar slowdowns in the spread of influenza.

The cause for this steep decline in infections is clear. Governments all around the world have enacted costly lockdowns to fight the novel coronavirus. In doing so, not only have countries in the southern hemisphere slowed the spread of covid-19, but they also appear inadvertently to have stopped the proliferation of another deadly disease: the flu.

Since 1952 the World Health Organisation (WHO) has tracked influenza in member countries, relying on local partner laboratories to report both the number and types of viruses they detect. In the first two weeks of August, the WHO processed nearly 200,000 influenza tests, and found just 46 were positive. In a typical year, the number would be closer to 3,500.

One might worry that because health-care systems are strained, the declines in reported flu cases reflect reduced testing capacity, rather than a genuine reduction in infections. Fortunately, this is not so. WHO data are readily available in six countries in the southern hemisphere: Australia,

Argentina, South Africa, Paraguay, New Zealand and Chile. There the total number of influenza tests has fallen by just 20%, while the share of tests that have come up positive has plummeted to record lows.

Data from Australia tell a remarkable tale. From May to mid-August of 2015-19, an average of 86,000 Australians tested positive for the flu each year, and around 130 died of it. This winter the government has registered only 627 influenza infections and just a single death.

The reduction in flu cases helps explain at least one puzzle in covid-19 data: some countries have seen a smaller increase in overall mortality than their covid-19 deaths would suggest. For instance, Chile has recorded around 9,800 covid-19 deaths from June to August 25th, but an increase of only about 8,800 deaths overall compared with the same period in 2015-19. It is possible that Chile is undercounting how many of its residents have died. But the near elimination of the flu has helped too.

Influenza cases may yet rise in the south both this year and next, since fewer people have developed immunities. Meanwhile, countries in the northern hemisphere should expect fewer flu cases since fewer will be imported from abroad, and most people are social distancing. Seasonal influenza kills an estimated 300,000-650,000 people annually. In a year filled with terrible news, a victory against the flu is a welcome respite. ■



流感 遇冷

2020年是南半球没有流感季的一年

每年冬天，从5月到10月，成千上万澳大利亚人和新西兰人会被问到他们感觉如何。确切地说，政府会每周调查，询问他们是否咳嗽或发烧。尽管对澳新两国民众来说，2020年在很多方面都很难熬，但在身体健康方面倒未必糟糕。今年冬天，这两个国家只有约0.4%的人报告有类似流感的症状，比去年减少了五分之四。南半球的其他国家也报告了类似的流感传播放缓。

流感感染率急剧下降的原因很明显。世界各国政府实施了代价高昂的封城措施以对抗新冠病毒。这不仅减缓了南半球国家新冠肺炎的传播，而且似乎也在无意中阻止了另一种致命疾病流感的扩散。

自1952年以来，世卫组织一直在追踪成员国的流感传播状况，依靠当地的合作实验室报告它们检测到的流感病毒数量和类型。8月头两周，该组织完成了近20万次流感检测，只发现46例阳性。在通常年份，这一数字会接近3500。

有人可能会担心，由于当前医疗体系承压，流感报告病例下降反映的是检测能力下降，而不是感染人数真的减少了。所幸事实并非如此。世卫组织已发布的数据包括南半球的六个国家：澳大利亚、阿根廷、南非、巴拉圭、新西兰和智利。这六国的流感检测总数仅下降了20%，但阳性检出率已大跌至历史低点。

来自澳大利亚的数据令人瞩目。从2015年到2019年，每年5月到8月中旬平均有8.6万澳大利亚人被检出流感阳性，其中约130人死于流感。而今年冬天，澳大利亚政府仅录得627例感染、1例死亡。

流感病例的减少有助于解释新冠肺炎数据中的至少一个谜团：有些国家的

总死亡人数增长少于其新冠死亡人数数据所应体现的增长。例如，6月至8月25日，智利共记录约9800例新冠死亡病例，但与2015年至2019年同期相比，总死亡人数仅增加约8800例。存在这样一种可能性：智利对其国民的死亡人数统计不足。但流感几近绝迹也不无关系。

今明两年南半球的流感病例可能还会上升，因为获得免疫力的人更少了。与此同时，北半球国家的流感病例应该会减少，因为从国外输入的病例会减少，而且大部分人都在保持社交距离。据估计，季节性流感每年造成30万到65万人死亡。在这充满可怕消息的一年里，在抗击流感上获胜给了人们一个可喜的喘息机会。 ■



Multinational business and protectionism

Birth of the Frankenfirm

Corporate contortions at TikTok and Arm are an unfortunate sign of things to come

ON AUGUST 6TH, when the White House told TikTok that it had 45 days to shut down or find an American buyer, there was a risk that the Chinese-owned video app would disappear from America, infuriating its 100m users there and destroying billions of dollars of investors' wealth. Now a last-minute fudge seems to have been found. TikTok has said it will enter a complex partnership with Oracle, an American tech giant, that is designed to show it is more under American sway. The day before Nvidia, an American semiconductor company, bid \$40bn for Arm Holdings, a British-based chip-design firm, triggering a storm in Britain about how to stop its tech champion from being dragged into America's trade war. Far from being oddities, the two episodes offer a preview of how the new age of nationalism will change the way multinational firms are run—for the worse.

Both companies straddle geopolitical divides and are at the heart of the digital economy. TikTok is owned by ByteDance, a Chinese tech star. The White House says it fears that users' data are being sent to China, where Big Brother can spy on them, and that the algorithm which selects videos is vulnerable to Chinese manipulation. Arm's designs are used worldwide, not least in America and China, its two largest markets. Britain's government worries that a takeover will see key activity shifted abroad (in 2016 Arm was bought by SoftBank, a Japanese firm, which promised to keep the firm's base in Britain until 2021). A further concern is that, under American ownership, Arm will no longer be a "neutral" supplier, instead becoming an instrument of Uncle Sam's expanding sanctions regime.

Throughout history companies have adapted to geopolitics. In the

freewheeling era of globalisation that began in the 1980s, the idea took hold around the world that all firms should be treated equally, regardless of their nationality. That made it efficient to operate as a global firm with a unitary management, capital structure and system of production. By contrast the 1930s and 1940s were plagued by wars and protectionism. Businesses such as General Motors responded by allowing their foreign operations to become semi-autonomous. Rather than merge, many firms co-operated across borders through alliances and cartels.

The proposed TikTok deal shows how business is heading in a 1930s direction. Although the details are not yet public, the firm's ownership will probably change, with American shareholders, including Oracle, and possibly Walmart, holding a large minority stake, perhaps with rights to veto some decisions. The location of key assets will shift, with the headquarters moving to America and Oracle managing the data-storage there (and monitoring the algorithm). Arm, meanwhile, has already contorted its structure once to deal with geopolitics: in 2018 it sold a 51% stake in its China operation to mainly Chinese investors, including state-backed funds. Now it may face a new metamorphosis. The British government, for example, may demand further legal guarantees that it is run autonomously in Britain. That would be part of a push to bolster the country's industrial base, which has triggered a row with the European Union.

These corporate contortions have glaring limitations. Politicians get to play God: President Donald Trump seems to favour Oracle—whose chairman, Larry Ellison, is a Trump supporter—rather than a bid by Microsoft, which made slightly more commercial sense. Mr Trump may now demand more concessions, and any deal will also need approval from the newly beefed up investment-screening regimes in America and China. Subdividing businesses into national silos duplicates costs, and complex structures can leave it unclear where control lies. Arm is locked in a bitter dispute with a

Chinese executive over who is really in charge of its Chinese joint venture.

Despite this, expect more multinational manoeuvres as globalisation unwinds. Australia's government is asking for Rio Tinto, a scandal-prone global mining firm, to be run by an Australian. European tech firms may bifurcate, with one production line serving Chinese clients and another American ones. Chinese companies may have to make do with buying minority stakes abroad, not full control. Firms crippled by sanctions—Huawei, say—may dissolve, with their intellectual property and best people migrating to competitors that do not face such constraints. Geopolitics is twisting global business into a form that is less efficient and less free. That is to be lamented. ■



【首文】跨国经营与贸易保护主义

“科技怪企”的诞生

TikTok和安谋的扭曲变形是未来趋势的不幸征兆

八月六日，白宫颁令要求TikTok在45天内找到一个美国买家，否则将被封禁。这意味着这款中资视频应用可能从美国消失，这会让它的一亿美国用户愤怒不已，并导致投资者的几十亿美元灰飞烟灭。现在，在最后关头似乎找到了一个权宜之计。TikTok已表示将与美国科技巨头甲骨文

（Oracle）建立一种复杂的合作伙伴关系，以便展示出它更多是处于美国的控制之下。前一天，美国半导体公司英伟达（Nvidia）出价400亿美元收购英国芯片设计公司安谋控股（Arm Holdings），在英国引起轩然大波，各界争论该如何阻止自己国家的科技领头羊被拽进美国的贸易战。这两宗事件不会是稀奇的个案，而是预演了一个民族主义的新时代将如何改变跨国公司的运营方式——变得更糟。

这两家公司都横跨地缘政治鸿沟，也都处于数字经济的核心。TikTok为中国明星科技企业字节跳动所有。白宫称它担心美国用户的数据被发送到了中国，在那里被“老大哥”监控，还担心选择视频的算法容易被中方操纵。安谋的设计在全球各地应用广泛，尤其是在它最大的两个市场——美国和中国。英国政府担心收购会使这家公司的关键活动转移到国外（2016年，日本软银集团收购安谋，但承诺2021年前公司总部都会留在英国）。更进一步的担忧是，被收归美国企业所有后，安谋将不再是“中立”的供应商，而会成为山姆大叔扩大的制裁机制中的工具。

历史上，企业一直都在调整适应地缘政治局势。在始于上世纪80年代的全球化自由发展的年代，不论哪国企业都应被一视同仁的理念深入人心。这使得实行统一的管理体系、资本结构和生产系统的全球化公司可以高效运作。上世纪三、四十年代的情形正相反，世界饱受战争和贸易保护主义的折磨。当时通用汽车等企业的应对方法是让自己的外国业务转为半自治。许多公司不是采取并购的方式，而是通过联盟和卡特尔来跨境合作。

这次提出的TikTok交易显示了商业正朝着上世纪30年代的方向发展。尽管细节尚未公开，但TikTok的所有权很可能发生变动，包括甲骨文（可能还有沃尔玛）在内的美国股东将持有较高份额的少数股权，并可能有权否决某些决策。关键资产的所在地将发生变化，总部迁至美国，由甲骨文在美国管理数据存储（并监控算法）。而在安谋这个案例中，这家公司已经为应对地缘政治而扭曲过一次自身结构：2018年，安谋把它中国业务51%的股权出售给了主要来自中国的投资者，包括有政府背景的基金。现在它可能面临又一次“变形记”。例如，英国政府可能会要求做进一步法律保证，确保该公司在英国自主经营。这将是英国巩固自身工业基础的行动之一，这一行动已经引发了与欧盟的争执。

这类企业变形的局限性显而易见。政客趁机扮演上帝：特朗普似乎更支持由甲骨文而非微软收购TikTok，尽管由微软收购在商业上稍合理一些。甲骨文的董事长拉里·埃里森（Larry Ellison）是特朗普的支持者。现在，特朗普可能会得寸进尺要求更多让步，而且任何交易还将需要经过中美两国新近升级的投资审查制度批准。按国界分割企业将导致经营成本翻倍，而复杂的结构可能导致控制权不清晰。安谋就在谁实际掌管其中国合资公司的问题上陷入了与一名中国高管的激烈争执。

尽管如此，随着全球化的倒退，可以预期跨国公司将使出更多应对招数。澳大利亚政府要求丑闻迭出的全球矿业公司力拓（Rio Tinto）由澳大利亚人掌管。欧洲科技公司可能会自我分叉，一条产品线服务中国客户，另一条服务美国客户。中国公司投资海外时也许不得不购入少数股权就算了，忘了完全控股这回事。像华为这种被制裁重创的企业可能会解体，其知识产权和顶尖人才将流入未遭受这类压制的对手公司。地缘政治正在扭曲全球商业的形态，把它变得更低效、更不自由。可悲可叹。■



Work and

Office politics

The fight over the future of the workplace has just begun

MOST PEOPLE associate the office with routine and conformity, but it is fast becoming a source of economic uncertainty and heated dispute. Around the world workers, bosses, landlords and governments are trying to work out if the office is obsolete—and are coming to radically different conclusions. Some 84% of French office workers are back at their desks, but less than 40% of British ones are. Jack Dorsey, the head of Twitter, says the company's staff can work from home "forever" but Reed Hastings, the founder of Netflix, says home-working is "a pure negative". As firms dither, the \$30trn global commercial-property market is stalked by fears of a deeper slump. And while some workers dream of a Panglossian future without commutes and Pret A Manger, others wonder about the threat to promotions, pay and job security.

The disagreement reflects uncertainty about how effective social distancing will be and how long it will take before a covid-19 vaccine is widely available. But it is about more than that: the pandemic has revealed just how many offices were being run as relics of the 20th century, even as it triggered the mass-adoption of technologies that can transform white-collar work. As a result the covid calamity will prompt a long-overdue phase of technological and social experimentation, neither business as usual nor a fatal blow to the office. This era holds promise but also brings threats, not least to companies' cultures. Instead of resisting change, governments need to update antiquated employment laws and begin reimagining city centres.

Two hundred years ago steam power brought workers to factories where they could use new machines. As corporate giants emerged in the late 19th

century, staff were needed to administer them. They held planning meetings and circulated memos, invoices and other paperwork to record what they had done. All this required workers to be close together and created the pattern of people commuting by car or train in order to meet in a central office.

This system always had glaring shortcomings, some of which have become worse over time. Most people hate the hassle and expense of commuting, which eats up over four hours a week for the average American worker. Some dislike the noise and formality of offices, or suffer from discrimination within them. Office-bound workers find it harder to look after their children, a growing issue as more families have two working parents.

You might think that new technologies would have shaken up this unsatisfactory status quo. After all, the PDF electronic document was born in 1991, the cost of bandwidth collapsed in the 2000s, and Zoom and Slack, two firms whose technology powers remote working, are both nearly a decade old. Yet inertia has allowed the office to escape serious disruption. Before covid-19 struck, for example, flexible-office companies (including the troubled WeWork) had a tiny global market share of under 5%. Most businesses were unwilling to switch wholesale to remote-working technologies before their clients did; or to write off sunk costs in the form of property assets and leases.

Covid-19 has upended all this. Before the pandemic only 3% of Americans worked from home regularly; now a huge number have tried it. Even Xerox, a firm synonymous with office printers spewing unread pages, has many of its staff working from home. As more people adopt remote-working technologies there is a powerful network effect, with each new customer making the service more useful. Together Microsoft Teams, Zoom, Google Meet and Cisco Webex now have well over 300m users. Bureaucratic

hurdles to remote work have been blasted out of the way. Civil courts are operating remotely. Notaries have gone online and some banks have eliminated the need for new customers to enter a branch to confirm their identity and open an account.

How much of this change will stick when a vaccine arrives? The best available guide is from countries where the virus is under control. There the picture is of an “optional office”, which people attend, but less frequently. In Germany, for example, 74% of office workers now go to their place of work, but only half of them are there five days a week, according to surveys by Morgan Stanley. The exact balance will depend on the industry and city. In places with easy commutes more workers will go to the office; megacities with long, expensive journeys may see fewer.

Companies will have to adapt to this pattern of sporadic attendance in which the office is a hub, not a second home. There is a risk that over time a firm’s social capital erodes, creativity flags, hierarchies ossify and team spirit fades, as Mr Hastings fears. The answer is more targeted staff interactions, with groups gathering at specific times to refresh friendships and swap information. New technologies that “gamify” online interactions to prompt spontaneity may eventually supersede the stilted world of Zoom. As they retool their cultures firms will need to rejig their property: sober investors expect a reduction of at least 10% in the stock of office space in big cities. With the typical corporate lease lasting at least half a decade, this will take time to play out.

For governments the temptation is to turn the clock back to limit the economic damage, from the collapse of city-centre cafés to the \$16bn budget shortfall that New York’s subway system faces. Britain’s government has tried to cajole workers back to the office. But rather than resist technological change, it is far better to anticipate its consequences. Two priorities stand out.

First, a vast corpus of employment law will need to be modernised. Already the gig economy has shown that it is out of date. Now new prickly questions about workers' rights and responsibilities loom: can firms monitor remote workers to assess their productivity? Who is liable if employees injure themselves at home? Any sense that white-collar workers are getting perks will create simmering resentment in the rest of the workforce.

The second priority is city centres. For a century they have been dominated by towers filled with swivel chairs and tonnes of yellowing paper. Now complex urban-planning rules will need a systematic overhaul to allow buildings and districts to be redeveloped for new uses, including flats and recreation. If you step back into the office this month, sit down and log on to your computer—but don't get too comfortable. ■



【首文】工作以及 办公室政治

有关办公场所的未来的争执才刚开了个头

提到办公室，大多数人会联想到例行公事和循规蹈矩，但它正在迅速变成经济不确定性和激烈争议的一个源头。世界各地的工人、老板、房东和政府正试图搞清楚办公室到底是不是过时了，它们得出的结论大相径庭。约84%的法国上班族已经回到了公司办公桌前，而在英国只有不到40%。推特的CEO杰克·多尔西（Jack Dorsey）表示其员工可以“永远”在家工作，但奈飞（Netflix）的创始人里德·哈斯廷斯（Reed Hastings）认为居家办公是“纯粹负面的”。企业举棋不定之时，价值30万亿美元的全球商业地产市场被经济进一步衰退的忧虑笼罩。而尽管有些上班族盲目乐观地憧憬着一个再也不用通勤和吃快餐的未来，另一些则怀疑这会影影响晋升、薪资和工作稳定。

这种分歧是某些不确定性的反映：保持社交距离有多大效果？还要多久，新冠疫苗才能广泛供应？但不止于此。疫情促使人们大规模采用各种可能改变白领工作方式的技术，与此同时也揭示出有多少办公室的运作仿佛20世纪的文物。因此，这场疫情将推动一场早就该发生的科技和社会实验，在这个阶段既不会一切如常，也不会是对办公室的致命打击。这一时期充满机遇，但也带来了威胁，尤其是对企业文化。政府不应抗拒变革，而是要改进过时的劳动法规，并开始重新构想城市中心。

两百年前，蒸汽动力把工人带进工厂，他们在那里使用新型机器从事生产。随着19世纪后期大型企业的出现，又需要员工来管理企业。他们召开规划会议，传阅备忘录、单据及其他文件来记录自己的工作。所有这些都需需要员工紧密聚集在一起，这就形成了一种模式：人们开车或乘火车通勤，去往集中式的办公室会合。

这套体系一直存在明显的缺点，其中一些随着时间推移变得越发严重。大多数人都讨厌通勤费事又费钱，普通美国雇员一周要耗费四个多小时在通

勤上。有些人不喜欢喧闹而拘谨的办公室环境，或者在办公室受到歧视。上班族难以照顾小孩，随着双职工家庭的增多，这个问题愈加突显。

你也许觉得，到了这会儿新技术应该已经撼动了这种令人不满的现状。毕竟，PDF电子文档在1991年就已面世，带宽成本在本世纪头十年大幅下降，提供支撑远程办公技术的公司Zoom和Slack都已经有近十年的历史。然而，出于惯性，办公室领域一直没有发生真正的颠覆。例如，疫情爆发前，灵活办公空间公司（包括陷入困境的WeWork）的全球市场份额还不到5%。大多数企业都不愿先于客户全面改用远程办公技术，也不愿意冲销房产和租约这类沉没成本。

疫情颠覆了这一切。疫情前只有3%的美国人经常性地在家办公，现在有大量人都已尝试这样做。就连施乐（Xerox）也让自己的许多员工在家办公，这家公司生产的同名打印机吐出无人阅读的文件。随着越来越多人采用远程办公技术，强大的网络效应出现了，每一个新客户都让相关服务变得更有用。微软的Teams、Zoom、谷歌的Meet和思科的Webex的总用户数远超三亿。远程办公的官僚程序障碍已被扫除。民事法庭已在远程运作。公证处在线上办理业务，一些银行已不再要求新开户时本人到网点确认身份。

等有了疫苗后，这些变化有多少能保持下来？那些疫情已得到控制的国家最具参考意义。在那些地方正在实行“选择性坐班”，也就是还去办公室，但不是天天去。例如，据摩根士丹利的调查，德国现在有74%的白领会去办公室，但其中只有一半人是一周五天都去。具体的比例因行业和城市而不同。在通勤方便的地方会有更多人去办公室，而在通勤距离远、费用高的大城市可能少一些。

公司将不得不去适应这种零散的出勤模式，办公室会变成一个中心，而非第二个家。这样下去，企业会逐渐面临社会资本被侵蚀、创造力流失、层级僵化和团队精神淡化的风险，这也是哈斯廷斯所担心的。解决办法是开展更有针对性的员工互动，让团队在特定时间聚会，增进情谊并交流信息。把在线互动“游戏化”以促进自发交流的新技术最终可能会取代Zoom

那种僵硬死板的模式。企业在重置自身文化的同时也需要调整资产配置：精明的投资者预计大城市的办公空间存量将减少至少10%。由于企业办公楼租约一般至少为五年一签，这还需要时间来实现。

市中心的咖啡馆纷纷倒闭，纽约地铁系统面临160亿美元的预算缺口。为减少这类经济损失，政府难免会希望一切照旧。英国政府已在试图劝说企业员工回办公室工作。但相比排斥和抵制技术变革，为这种变革的后果做好准备要明智得多。其中有两大要点。

首先，劳动法规的一大块需要修订以跟上时代。零工经济已经显现出法规的过时。现在，新的有关劳动者权利和责任的棘手问题也逼近了：公司可以监控远程办公的员工以评估其生产率吗？如果员工在家中受伤，谁该被问责？任何认为白领享受到了额外优待的感知都会在其余劳动者中酝酿不满。

第二个重点是城市中心。一个世纪以来，城市的中心地带被大厦林立的办公区域占据，这些大楼里充斥着转椅和成吨逐渐泛黄的纸张。现在，需要系统性地改革复杂的城市规划法则，以重新开发建筑物和区域用于新用途，包括用作公寓和娱乐场所。假如这个月你重新走进办公室，那就坐下来，登录你的电脑吧——但也别太习惯这一切了。■



Abe Shinzo

Family man

“The Iconoclast” situates the former prime minister’s ideas in the broader context of Japanese history

ABE SHINZO was just five years old in 1960 when protesters surrounded his grandfather’s house in Tokyo. Kishi Nobusuke, then Japan’s prime minister, was in the midst of a pitched battle over Japan’s security treaty with America. Kishi would get his treaty that year, though it led to him losing power. For a young Mr Abe, the episode would be “the touchstone of his political identity”, argues Tobias Harris in “The Iconoclast”, a new biography of Japan’s longest-serving prime minister.

Mr Abe’s status as the grandson of a former prime minister and the son of a former foreign minister, Abe Shintaro, is well-known. Mr Harris, a longtime observer of Japanese politics, astutely explains how Mr Abe’s family influenced his thinking, and situates that thinking in the broader context of Japanese history stretching back to the Meiji restoration of 1868. This comprehensive and engaging tome may become the definitive English-language portrait of Mr Abe, made all the more relevant by his recent resignation.

As Mr Harris shows, Mr Abe is the progeny of Kishi, but a product of the American occupation and the many strange compromises it engendered. His grandfather’s fate is one of the most striking. Kishi made his name orchestrating forced labour for the Japanese war machine as a minister in Japanese-occupied Manchuria in the 1930s. He served loyally in Japan’s wartime cabinet and was arrested as a war criminal in 1945. As the cold war ramped up, Kishi was one of several ex-leaders the Americans let off in order to help rebuild Japan as a bulwark against Soviet communism. Kishi climbed to the pinnacle of power in Japan by helping to found the Liberal

Democratic Party (LDP) with a bit of help from the CIA.

Re-establishing Japan's sovereignty and seeking greater equality in the partnership with America became Kishi's mission. But in the battle of post-war ideas, his vision lost out to the "Yoshida Doctrine" (so named after Japan's first significant post-war prime minister, Yoshida Shigeru), wherein Japan would rely upon America for security while focusing on its own economic development. Mr Abe made it his cause to revise that consensus, embodied in the American-imposed post-war constitution that bars Japan from having armed forces (though it does, with American support, maintain mighty armed forces for the purpose of self-defence).

Mr Abe may have drawn on his grandfather's ideas but he learned his trade at his father's side. Shintaro visited 81 countries in the 1980s; the younger Mr Abe served as his secretary. "His father's globe-trotting personal diplomacy impressed upon his son the importance of building trust with foreign leaders," Mr Harris writes. That has been one of Mr Abe's main achievements. He also inherited his father's unfinished business: Shintaro died of cancer while trying to settle a territorial dispute with the Soviet Union in 1991.

After Mr Abe followed his father into the Diet, Mr Harris shows how he came to be a leader of a "new conservative" movement. He argued for a more equal alliance with America in which Japan could bear a greater burden, and latched on to the cause of Japanese citizens abducted by North Korea to prove his bona fides as a defender of his country. He also engaged in some appalling whitewashing of Japan's wartime atrocities. Mr Abe's allegiance to the new conservative ideas helped doom his first short-lived term as prime minister in 2006-07, which became bogged down in ideological battles over the past.

Belonging to a political dynasty gave Mr Abe a big head start. He rose fast

despite having been an average student who whizzed around in a red Alfa Romeo and played a lot of mahjong. Yet it has also been a heavy burden. The reader cannot help but quake alongside Mr Abe when his mother tells him, “The LDP of the present was made by my father Kishi Nobusuke, and you must never forget those great footprints.” His mother is an enduring presence: they live in the same apartment building, and even as prime minister, he and his wife, Abe Akie, ate breakfast with her.

That, in part, explains why changing Japan’s constitution was so important to Mr Abe. He cited his failure to do so as one of his biggest regrets when he announced his resignation on August 28th. Yet history will remember Mr Abe more fondly for his readiness to subsume his ideology in favour of a pragmatic approach to national interests during his second stint in office. (Such as with his conciliatory statement on the 70th anniversary of the end of the second world war.) Even what Mr Harris dubs an “Abe Doctrine”—building up Japan’s defence capabilities and ties with other regional powers—is less a break with the Yoshida Doctrine than an offshoot.

As Mr Harris notes, Mr Abe was a keen reader of the German sociologist Max Weber. “With regard to what one should do as a politician, my grandfather consistently acted according to ‘responsibility for consequences,’” he wrote in 1996. “That is, Max Weber’s ‘ethic of responsibility.’” Mr Abe was too kind to his grandfather. The description fits him better. ■



安倍晋三

忠于家庭

《反传统者》把这位前首相的理念置于日本历史的大背景中【《反传统者》书评】

一九六〇年，安倍晋三还只有五岁，抗议者包围了他的外祖父位于东京的宅邸。时任日本首相的岸信介身处因日美安保条约而起的激烈纷争的中心。这一年稍晚些时候，岸信介让新版条约生效，而他本人因此被迫下台。对于小安倍来说，这段历史将成为“他政治身份的试金石”，托比亚斯·哈里斯（Tobias Harris）在这位日本在任时间最长的首相的新传记《反传统者》（The Iconoclast）中这样指出。

安倍是日本前首相的外孙，前外务大臣安倍晋太郎的儿子，这一身份众所周知。长期观察日本政治的哈里斯敏锐地阐释了安倍的家族如何影响了他的思想，并将这一思想与1868年明治维新之后的日本历史大背景联系起来。这本内容详尽、引人入胜的大部头可能会成为最权威的安倍英语传记，而他在近日辞职也让这本书愈显恰逢其时。

正如哈里斯所展现的，安倍是岸信介的后代，但却是美国占领日本以及由此产生的诸多奇怪妥协的产物。他外祖父的命运尤其不同寻常。上世纪30年代，岸信介在日本占领的伪满洲国政府任职，因负责为日本的战争机器强征劳动力开始扬名。他忠心耿耿地在日本战时的内阁任职，在1945年作为战犯被捕。随着冷战加剧，美国为了帮助把日本重建为抵御共产主义苏联的堡垒，释放了包括岸信介在内的几位前领导人。借由美国中央情报局的一点帮助，岸信介参与创立了自由民主党，由此登上了日本权力的顶峰。

重建日本主权，以及寻求与美国建立更平等的伙伴关系成为岸信介的使命。但在战后各路思潮的较量中，他的主张输给了“吉田主义”（以日本战后第一位重要首相吉田茂的名字命名），即日本将专注于本国经济发展，而依赖美国保障国家安全。安倍把修改这一共识作为自己的目标。这种共识体现在美国强加的日本战后宪法中，它禁止日本拥有武装力量（尽管日

本在美国的支持下仍然维持着以自卫为目的的强大武装力量)。

安倍或许汲取了外祖父的思想，却是跟在父亲身边学到了职业本领。安倍晋太郎在上世纪80年代访问了81个国家，年轻的安倍担任他的秘书。“他的父亲在全球奔波的个人外交给儿子留下了深刻的印记，让他认识到与外国领导人建立互信的重要性。”哈里斯写道。这成为安倍的主要成就之一。他还继承了父亲未竟的事业：1991年晋太郎因癌症去世，当时他正试图解决与前苏联的领土争端。

哈里斯描述了安倍在追随其父进入国会后，如何成长为“新保守派”运动的领袖。他主张与美国建立更平等的同盟关系，日本能在其中承担更大的责任。他抓住日本公民被朝鲜绑架事件来证明自己保卫国家的诚意。他还试图淡化日本战时暴行，令人惊骇。一定程度上由于他对新保守派思想的忠诚，他的第一个首相任期（2006年到2007年）逐渐陷入关于过去的意识形态斗争的泥潭而匆匆结束。

出身政治世家给了安倍巨大的先发优势。尽管他学业平平，开着一辆红色的阿尔法·罗密欧到处转悠，还经常打麻将，但他平步青云。不过这也是个沉重的负担。安倍的母亲告诉他，“现在的自民党是我父亲岸信介打下的江山，你永远也不能忘了这些伟大的足迹。”读到这里你会禁不住和安倍一起哆嗦。他的母亲在他的生活中是一个永恒的存在：他们住在同一栋公寓楼里，即使当了首相，他和妻子安倍昭惠也会和母亲一起吃早餐。

这在一定程度上解释了为什么修宪对安倍如此重要。8月28日宣布辞职时，他提到未能做到这一点是自己最大的遗憾之一。不过历史会更怀念他在第二个执政期愿意把自己的思想体系纳入以务实的方式维护国家利益的大方向。（比如他在二战结束70周年时发表的安抚性声明。）即便是哈里斯所称的“安倍主义”——加强日本国防实力及与其他区域性大国的关系——与其说是与吉田主义分裂，不如说是其分支。

正如哈里斯提到的，安倍是德国社会学家马克斯·韦伯的忠实读者。“说到身为政治家应该做什么，我的外祖父一贯按照‘对后果负责’的原则行

事，”安倍在1996年写道，“那也是马克思·韦伯的‘责任伦理’。”安倍对他的外祖父太宽容了。这个描述更适合他自己。■



Campaign finance

Wall Street's money

Who are America's financial elite backing in 2020?

THE TIES between Wall Street financiers and politicians are the subject of a lot of scrutiny. Not for nothing is Goldman Sachs, a bank, sometimes nicknamed “Government Sachs”. But how important are the moneybags in New York to political success in Washington, DC? Quantifying the relationship can be done using the extensive data collected about campaign donations. It's not an uplifting exercise.

The first task is to decide who counts as Wall Street's elite. As well as encompassing the bosses of banks like JPMorgan Chase and Morgan Stanley, they also include the heads of some hedge funds, private-equity shops, asset managers and wealth-management firms in New York, New Jersey and Connecticut. In addition are billionaire New Yorkers on the *Forbes* list, who have earned their wealth via some form of finance, such as Michael Bloomberg of the eponymous financial-information firm. Totted up this way, the financiers amount to 68 people. Of these, 52 have given money to political campaigns in at least one of the two most recent general-election cycles (2015-16 and 2019-20). Together they are worth \$310bn and manage firms with assets of over \$32trn.

Estimates of their political contributions are drawn from campaign-finance data in the Federal Election Commission, a regulator. *The Economist* has attempted to contact larger donors to verify them. Not all have responded. Most of these Wall Street donors hedge their bets; they give to campaigns from both parties. But the biggest contributors have, in the past, tended to be one-party loyalists (see chart). Eight of the 52—including Cliff Asness of AQR Capital Management, an investment-management firm; Robert Mercer, then co-CEO of Renaissance Technologies, a hedge fund; and Paul

Singer of Elliott Management, an activist-investment firm—gave exclusively to Republican campaigns in the 2016 election cycle. Nine—including Mr Mercer’s then-colleague Jim Simons, who founded Renaissance, George Soros, a hedge-fund veteran, and David Elliot Shaw of D.E. Shaw, another hedge fund, gave only to candidates of the Democratic Party.

In the intervening years, the pro-Republicans have appeared to grow less partisan. Just three of them have remained Republican-only, including Mr Singer and Mr Mercer. Total donations went mostly to Republicans in 2016, but are now evenly split.

Political leanings aside, much else has shifted since the last election. Firstly, the sums given have fallen. In 2016 the financiers provided \$130m to political campaigns, or 1.4% of the total raised. So far this cycle, their share is just 0.5%. Strikingly, many appear to be sitting 2020 out; around a fifth of those who gave meaningfully in the last election have given nothing in 2020. This decrease is largely the result of a drop in contributions to the presidential campaign, particularly that of Donald Trump. Stephen Schwarzman of Blackstone, a private-equity firm, who has given more than \$18m this year, compared with around \$5m last time, is the only titan who has increased his share to the president. Mr Mercer gave more than \$15.7m to Trump-affiliated committees in 2016. This time he has given less than \$400,000.

It is a similar story with Joe Biden, the Democratic challenger. His two biggest Wall Street supporters are Mr Soros and Mr Shaw, both of whom have given around \$500,000 each—less than they had given to Hillary Clinton at this point in her race against Mr Trump in 2016.

The congressional races are attracting more attention. The Wall Street group has given over \$8m to Senate races and \$19m to House races, triple

the total contributed to congressional races at this point in 2016. The “Senate Majority PAC” (SMP) is particularly popular with Democratic donors. Mr Shaw has given more to Senate campaigns than he has to Mr Biden. Mr Simons has given \$3.5m to the SMP.

The Senate race is of keen interest because it is considered particularly tight. But the lowly sums in the presidential battle may reflect a dispiriting reality—that neither Mr Trump nor Mr Biden generates much enthusiasm. At least those worried that Wall Street has Washington in its pocket can console themselves that so far the financiers are not providing the sort of sums that can help define the race. ■



竞选筹款

华尔街的钱

美国的金融精英在2020年支持谁？

华尔街金融家和政客之间的关系向来备受审视。高盛有时被昵称为“高府”（Government Sachs）也不无原因。但是，纽约的金主们对于在华府获得政治成功到底有多重要？可以使用有关竞选捐赠的大量数据来量化这一关系，虽说做这件事不是多么让人振奋。

第一步是要确定哪些人算是华尔街精英。除了摩根大通和摩根士丹利等银行的老板，还有纽约、新泽西州和康涅狄格州的一些对冲基金、私募股权公司、资产管理公司和财富管理公司的一把手。此外还有在某些金融相关领域积聚财富而登上《福布斯》榜单的纽约亿万富翁，例如金融资讯公司彭博的老板迈克尔·布隆伯格。这样计算的话，入选的金融家有68人，其中，52人至少在最近两个大选周期（2015至2016年，以及2019至2020年）之一向竞选活动捐过款。这些华尔街精英的身家总共达3100亿美元，他们管理的企业拥有超过32万亿美元的资产。

对于这些人的政治捐款的估算来自监管机构美国联邦选举委员会（Federal Election Commission）的竞选筹款数据。本刊曾尝试联系其中较大的捐款人核实，但不是全部都有回复。这些华尔街金主大多两面下注，对两党的竞选活动都有捐款。但最大的捐款者过去往往都忠实地支持一个党（见图表）。52人中有八人在2016年大选期间只捐款给共和党的竞选活动，包括投资管理公司AQR资本管理（AQR Capital Management）的克里夫·阿斯尼斯（Cliff Asness）、对冲基金文艺复兴科技（Renaissance Technologies）的联席首席执行官罗伯特·默瑟（Robert Mercer）、维权投资公司埃利奥特管理公司（Elliott Management）的保罗·辛格（Paul Singer）。有九人只给民主党参选人捐款，包括默瑟的前同事、文艺复兴科技的创始人吉姆·西蒙斯（Jim Simons）、对冲基金元老索罗斯和另一家对冲基金德劭（D.E. Shaw）的大卫·艾略特·肖（David Elliot Shaw）。

在之后的几年里，亲共和党的金主们的党派倾向似乎有所减少。他们当中坚持只支持共和党的只有三人，包括辛格和默瑟。在2016年，华尔街的捐款大部分流向了共和党，现在则是两党均分。

撇开政治倾向不谈，自上次大选以来许多事情都变了。首先是捐款额减少了。2016年，金融家为政治竞选活动提供了1.3亿美元，占募资总额的1.4%。而这轮大选到目前为止，他们的捐款只占0.5%。令人惊讶的是，许多人似乎不再参与2020年大选捐款了，在上届大选中大笔捐钱的金融家中约有五分之一的人在2020年还分毫未捐。捐款减少主要是对总统竞选活动（特别是对特朗普）捐款减少的结果。私募股权公司黑石集团（Blackstone）的苏世民（Stephen Schwarzman）是唯一提高了对特朗普捐款的巨头，今年捐款超过1800万美元，而上次大选时约为500万美元。默瑟在2016年向特朗普的竞选委员会捐款超过1570万美元，这一次他的捐款不到40万美元。

民主党总统候选人拜登的遭遇也差不多。他最大的两位华尔街金主索罗斯和肖到目前各捐给他约50万美元，少于他们在2016年的这个时间点已经捐给特朗普的对手希拉里的金额。

金主们现在更关注国会议员竞选。这些华尔街精英对参议院竞选活动捐款超过800万美元，对众议院竞选捐款1900万美元，是2016年同一时期对国会竞选捐款总额的三倍。民主党的金主尤其支持参议院多数党政治行动委员会（Senate Majority PAC，以下简称SMP）。肖对参议院竞选活动的捐款超过了对拜登的捐款。西蒙斯已向SMP捐款350万美元。

金主们之所以对参议院竞选兴趣浓厚，是因为这一块的选情看起来特别焦灼。而总统争夺战收到的捐款少可能反映出令人沮丧的现实——特朗普和拜登都没有激发多少热情。但至少，那些担心华尔街操控华盛顿的人可以聊以自慰——到目前为止，金融家们掏出的钱还没到能影响竞选结果的份上。■



Financial coupling in China

Present tense, future market

As America tries to cut links, China is opening its door to foreign capital

IF YOU WANT a sure-fire way to get rejected, try asking Western financial firms for interviews about how geopolitical tensions have affected their strategies in China. “This topic carries some sensitivities,” one bank demurs. “We don’t want to end up in a Trump tweet,” says another. *The Economist* sought interviews with 15 global banks, insurers and asset managers. All declined to speak—except on background.

Such bashfulness from the swaggering titans of finance is revealing in itself. They are on unfamiliar ground. For years the American government called on China to open up to foreign capital, while China dragged its feet. Suddenly, these roles have been reversed. President Donald Trump’s administration wants global financiers to pull back from China. But China is enticing them in, creating opportunities that few had expected to come so quickly, if ever.

It has made for a disconnect between the political and the financial realms. Many observers focus on the decoupling between America and China. Yet for those managing the trillions of dollars that flow through global markets every day, the main trend looks more like coupling. Consider these moves by investment and commercial banks in the past half-year alone. Goldman Sachs and Morgan Stanley took majority control of their Chinese securities ventures. HSBC acquired full control of its Chinese life-insurance venture. Citi received a coveted custody license to serve institutional investors in China. Among asset managers, BlackRock received approval to sell its own mutual funds in China and Vanguard decided to shift its Asian headquarters to Shanghai.

Even more astonishing are the money flows. Roughly \$200bn has entered China's capital markets from abroad over the past year. Foreign holdings of Chinese stocks and bonds at the end of June were, respectively, 50% and 28% higher than a year earlier (see chart 1). Some of this reflects an inevitable pull as global index compilers such as MSCI add Chinese assets to their benchmarks; fund managers that passively track these benchmarks must allocate cash in line with the new weightings. But it is more than that. China has made it much easier for foreigners to enter its markets, and it offers two things that are rare in the world at the moment: GDP growth and interest rates higher than zero.

Despite talk of a new cold war, there are two reasons to think that coupling, not decoupling, will remain the better description of Sino-American financial ties. The first is China's own actions. It is pursuing what Yu Yongding, a prominent economist, has described as a "linking strategy", seeking to create more connections with foreign companies. Since late 2019 the government has lifted foreign ownership caps on asset managers, securities firms and life insurers. It has belatedly allowed MasterCard and PayPal to enter its payments industry. And it has let foreign ratings agencies cover more Chinese firms.

Even without the linking strategy, China has ample incentive to open its financial system more widely. Its current-account surplus has steadily narrowed as a share of GDP over the past decade (though it will soar this year because of the covid-19 impact); that puts pressure on it to attract more inflows through its capital account. At the same time reformist officials want greater foreign participation in the financial system. Zhou Xiaochuan, China's former central-bank governor, has argued that just as competition from abroad helped make Chinese manufacturers world-class, so it can elevate the finance industry. Regulators also want companies to raise more funding by issuing bonds and stocks, to lessen reliance on bank lending.

China's regulatory relaxation dovetails with the second factor: the interests of foreign financial firms. The Chinese market is simply too big to ignore. The investable wealth of retail clients is projected to grow from about \$24trn in 2018 to \$41trn by 2023, according to Oliver Wyman, a consultancy. And few sophisticated, globally minded asset managers operate in China today.

Foreign institutions know better by now than to assume that the economy's scale will directly translate into business for them. In the early 2000s China began opening its commercial-banking industry to foreigners, but their share of the market, always tiny, has shrunk over time, dipping to just about 1% of domestic-banking assets. They are bit players.

Yet foreigners may fare better in the sectors newly open to them. No global bank can compete for deposits against the likes of Industrial and Commercial Bank of China, which boasts some 15,700 branches. Success in investment banking and asset management, however, is more related to experience than to sheer heft. Can an adviser help structure a cross-border acquisition? Can an asset manager offer the right interest-rate swaps to hedge currency exposure? "These are the areas where foreign firms feel they have an advantage," says Mark Austen, head of the Asia Securities Industry and Financial Markets Association, a group that represents many of the world's biggest financial institutions.

Not that China is going to make it easy. A taste of the potential complications came in the approval granted to BlackRock for a fund-management company. Unlike prior approvals for Chinese-owned entities, the regulator added a condition, demanding adherence to the Internet Security Law. BlackRock will need to store client data within China and authorities could demand access, likely forcing it to segregate its Chinese and global systems.

Foreign firms will also face a ferocious battle with domestic firms on a playing field that is tilted against them. “They’ll never just completely open and be fine with us crushing the locals,” says one banker. State-owned firms will reserve their juiciest deals for domestic banks. The government is engineering mergers to create what it calls an “aircraft-carrier” investment bank to repel foreigners. And global asset managers will have little choice but to distribute their products through domestic banks and tech platforms. Chantal Grinderslev, founder of Majtildig, a Shanghai-based advisory firm, sees a split between foreign firms that commit capital to China for the long haul and those that are less patient. “If you have to be profitable in three years or less, this is not the market to enter,” she says. JPMorgan Chase, she notes, is on track to buy out the local partner in its asset-management venture for \$1bn, a 50% premium over fair value. That is expensive, but it also testifies to the weight that Jamie Dimon, the banking colossus’s chief, places on China. “He is looking to build a real business,” she says.

The political tussle with America looms over these corporate decisions. “Global headquarters asked us to develop optimistic, realistic and pessimistic scenarios,” says the CEO in China of an American bank. “I laughed because there’s no point thinking of things getting better. It’s binary. Either we can continue in China or we can’t.” So far things have clearly remained on the remain-in-China side of the equation. America’s financial measures against China have thrown some sand in the gears but have not stopped them from turning.

The Trump administration has blocked a federal-government pension plan from investing in Chinese stocks. It has threatened to delist Chinese firms from American stock exchanges. And it has placed sanctions on Chinese officials in Hong Kong and Xinjiang. All three moves are, in the grand scheme, mild. The government pension plan that now excludes Chinese stocks represents just 3% of American pension assets. China has until 2022

to stave off the threatened delistings, and has already proposed a compromise, giving American auditors more access to its companies' books. In the meantime, the value of Chinese listings on Wall Street has risen this year (see chart 2). As for the sanctions, they can be painful for individuals, but would have harmed China much more if they had named entire banks.

It is only prudent for firms to prepare for America to take a tougher line against China. But the implications in the financial sector are different from, say, the industrial sector. Factories require a large fixed investment and carefully configured supply chains. Investments in bonds or equities are, by contrast, much easier to adjust—at least so long as China lets investors move cash out of its markets. Even for firms building up brokerages or asset-management operations in China, the investments are small compared with their global footprints. The Chinese securities firm controlled by UBS, for instance, held just 5bn yuan (\$730m) in assets at the end of 2019—bigger than any other foreign-owned securities firm in China but barely 0.2% of UBS's global investment-banking assets.

The one American action that could almost instantaneously derail financial coupling would be to block China from the dollar-payments system. The administration could do so by pressuring SWIFT, a Belgium-based messaging system that underpins most cross-border transfers, to boot out Chinese members. Or it could order the big banks which clear dollar payments in America to stop serving Chinese banks.

Chinese officials, alarmed by these once-unthinkable possibilities, have held meetings in recent months to discuss how they might respond. They have talked about promoting the yuan as an alternative to the dollar and home-grown payment networks as alternatives to SWIFT. In practice, neither would help much. The yuan, constrained by capital controls, remains a weakling in global finance, while China's would-be SWIFT

replacements have failed to gain traction.

The biggest constraint on America is the damage that it would suffer itself. Cutting China off from the dollar would undermine not just Chinese banks but also China-based companies that account for more than a tenth of the world's exports. This would trigger a collapse in international trade, massively disrupt supply chains and, quite possibly, deepen the global recession. The fact that American policymakers must contemplate such consequences is an argument in favour of China's linking strategy. "The only option is more openness," says Larry Hu, head of China economics at Macquarie Group in Hong Kong. "You must create a situation where your counterpart has more to lose." For foreign financiers in China, that, oddly enough, is music to their ears. ■



在中国的金融挂钩

现在的争斗，未来的市场

当美国试图切断联系时，中国向外资敞开大门

要想保证自己的采访被拒绝，你可以请西方金融公司谈谈地缘政治的紧张局势对其中国战略的影响。“这个话题有点敏感。”一位银行家婉拒。“我们可不想出现在特朗普的推文中。”另一位说。本刊向15家国际银行、保险公司和资产管理公司提出了采访请求，它们都拒绝了——除非是以匿名来源发表意见。

本来趾高气扬的金融巨人们变得这么扭捏，本身就很说明问题。它们正面对陌生的局面。多年来，美国政府一直呼吁中国向外资开放，而中国一直拖拖拉拉。突然之间，角色颠倒了。特朗普政府希望全球金融机构撤出中国。但中国却在吸引它们进入，创造出了各种机遇。没人想到会出现这样的机遇，而且还来的这么快。

这造成了政治和金融领域的脱节。许多观察家都在关注中美脱钩。然而，在那些管理着每天在全球市场上流动的万亿计美元的人看来，主要趋势更像是挂钩。来看看投资银行和商业银行单是在过去半年的动向。高盛和摩根士丹利获得了自己在中国的合资证券公司的多数控股权。汇丰的中国人寿保险业务变成了完全独资。花旗拿到了令人垂涎的托管牌照，可以在中国为机构投资者提供服务。在资产管理公司中，贝莱德（BlackRock）获批在中国销售自己的公募基金，而先锋集团（Vanguard）决定将其亚洲总部迁往上海。

资金流动的趋势还要更惊人。过去一年里，约有2000亿美元从国外进入中国资本市场。截至6月底，外国持有的中国股票和债券分别比去年同期增加了50%和28%（见图表1）。随着MSCI等全球指数编制公司将中国资产纳入其基准指数，这些趋势一定程度上反映了中国市场难以避免的吸引力。被动跟踪这些基准的基金管理公司必须按照新的权重分配资金。但中国吸引资金的原因不止于此。中国已经大幅提升了外国人进入中国市场的

便利度，而且还提供了眼下在世界其他地方罕见的两样东西：GDP增长和高于零的利率。

尽管舆论大谈新冷战，但有两个理由可以认为挂钩而非脱钩将仍然是对中美金融关系更恰当的描述。首先是中国自己的行动。它正在奉行著名的经济学家余永定所说的“联系策略”，力求与外国企业建立更多联系。自2019年底以来，中国政府取消了资产管理公司、证券公司和人寿保险公司的外资持股限制。万事达和PayPal终于获准进入中国支付市场。中国也已允许外国评级机构为更多的中国公司评级。

即使没有这种联系策略，中国也有充足的动力进一步开放其金融体系。在过去十年中，中国的经常账户盈余占GDP比例一直在逐步降低（尽管由于新冠疫情的影响今年会大幅上升）；这给中国带来了压力，需要通过其资本账户吸引更多的资金流入。同时，改革派官员希望外国资本更多地参与中国金融体系。中国前央行行长周小川认为，来自国外的竞争帮助了中国制造企业跻身世界一流行列，它同样也可以提升中国的金融业。监管机构也希望企业更多地通过发行债券和股票来融资，减少对银行贷款的依赖。

中国放松监管的趋势与第二个因素相契合——外国金融公司的利益。中国市场实在太大了，它们没法置之不理。根据奥纬咨询（Oliver Wyman）的数据，零售客户的可投资财富预计将从2018年的约24万亿美元增加到2023年的41万亿美元。而现在，很少有经验丰富、具有全球视野的资产管理公司在中国开展业务。

到了今天，外国机构已经更清楚了一点：中国经济规模大并不意味着自己就有了更多业务。本世纪的头几年，中国开始向外资开放自己的商业银行部门，但外资银行的市场份额一直都很小，而且还不断萎缩，直到仅是国内银行资产的1%左右，在市场上无足轻重。

不过，外商在那些新近对它们开放的行业中可能会有更好的境遇。没有一家全球银行可与号称拥有约15,700家分支机构的中国工商银行之类的机构竞争存款业务。但投资银行和资产管理业务的成功更多倚赖经验而非超大

规模。一家咨询公司能协助设计一宗跨国收购案的结构吗？一家资产管理公司能正确运用利率掉期来对冲货币风险吗？“在这些领域里，外国公司认为自己具有优势。”亚洲证券业与金融市场协会（Asia Securities Industry and Financial Markets Association）的负责人马克·奥斯丁（Mark Austen）表示。该协会的成员包括许多全球规模最大的金融机构。

这倒不是说中国会让它们轻易成功。贝莱德在获批设立一家基金管理公司后就感受到了潜在的复杂性。与先前中资控股实体获得的批准不同，监管机构增加了一个条件，要求贝莱德遵守《网络安全法》。贝莱德将需要在中国境内存储客户数据，当局可能会要求访问权限，这可能迫使贝莱德将其中国系统与全球系统分隔开来。

外国公司还将在一个天平向另一方倾斜的环境中与中国公司激烈竞争。“它们永远不会完全开放，任由我们打垮本地企业。”一位银行家说。国有企业将把它们最有利可图的交易留给国内银行。中国政府正在策划合并以创建所谓的“航母级”投行来击退外国竞争者。而且全球资产管理公司别无选择，只能通过中国的银行和科技平台分销产品。总部位于上海的咨询公司Majtildig的创始人尚塔尔·格林德斯列夫（Chantal Grinderslev）认为外国公司可以分为两类，一类基于长期打算对中国投资，另一类没那么多耐心。她说：“如果你一定要在三年或更短的时间内实现盈利，那就不要进中国市场。”她指出摩根大通正在推进以10亿美元收购其资产管理业务中本地合作伙伴的全部股份，溢价50%。这个价格很高，但也证明了这家银行业巨头的CEO杰米·戴蒙（Jamie Dimon）对中国的重视。“他是要打造真正的业务。”她说。

中美政治纷争的乌云笼罩在公司决策之上。“全球总部要求我们分别规划乐观、现实和悲观情境，”一家美国银行的中国区CEO说，“我一听就笑了，因为思考情况会改善是没有意义的。现实非此即彼。我们要么能继续在中国做生意，要么不能。”到目前为止，显然局面还倾向“留在中国”这一端。美国针对中国的金融手段虽然造成了一些不便，但并未让现有体系完全停止运转。

特朗普政府已经禁止一个联邦政府养老金计划投资于中国股票。它威胁要让在美国交易所上市的中国公司退市。它还对香港和新疆的中国官员实施了制裁。总体来看，这三个举措都算温和。现在不能再投资中国股票的联邦政府养老金计划仅占美国养老金资产的3%。在2022年之前还不会有中国公司被退市，而且中国已经提出了一项和解方案，给予美国审计师更多权限来查看中国公司的账目。与此同时，中国公司今年在华尔街上市的总体市值上升（见图表2）。至于制裁，它们会让一些个体感到痛苦，但如果是针对一家家银行整体采取行动，对中国造成的伤害会大得多。

企业需要为美国采取更强硬的对华措施做准备，这是一种谨慎的做法。但是，金融领域受到的影响不同于工业等领域。工厂需要大量的固定投资和精心配置的供应链。相比之下，债券或股票投资调整起来要容易得多——至少在中国允许投资者将资金撤出其市场的情况下是这样。即使是在中国建立经纪或资产管理业务的公司，其投资相比它们的全球资产规模也只是一小部分。例如，瑞银在中国的控股证券公司到2019年底仅持有50亿元（7.3亿美元）的资产，已高于中国其他任何一家外资证券公司，但仅占瑞银全球投行资产的0.2%。

美国有一个几乎可以立即扰乱金融挂钩的行动，就是把中国驱除出美元支付体系。特朗普政府可以向总部在比利时的报文传输系统SWIFT（支持着大多数跨境支付）施压，让它踢走中国会员。特朗普政府也可以下令让在美国结算美元支付的大银行停止为中资银行服务。

这些曾经不可想象的可能性让中国官员感到担忧，他们近几个月多次召开会议讨论对策。他们讨论过推动人民币替代美元，以及推广自己的支付网络替代SWIFT。实际操作起来，两者都帮不了多少忙。受资本管制的限制，人民币在全球金融中的地位仍然较低，而中国想用来替代SWIFT的系统未能获得影响力。

约束美国的最大因素是其措施对自己的反噬。切断中国的美元支付通道不仅会损害中资银行的利益，还会损害占到全球出口额超过十分之一的基于中国的企业。这将引发国际贸易的崩溃，严重破坏供应链，并很有可能加

剧全球经济衰退。美国的政策制定者确实必须掂量这种后果，这一点支撑了中国的联系战略。“唯一的选择就是更加开放，”在香港的麦格理银行（Macquarie Group）的首席中国经济学家胡伟俊说，“必须创造一种让你的对手代价更高的局面。”说来也怪，对于在中国的外国金融家来说，这话却很中听。 ■



Schumpeter

Reconstituted

How to build a better TikTok

“A MAINSTREAM GIANT goes countercultural.” That is how the technology press described the decision in the early 2000s by IBM, then a paragon of corporate IT, to back Linux, an obscure operating system written by a ragtag collection of activist coders. In the event, the unnatural combination wound up being a match made in computing heaven. It turned Linux into a serious rival to Microsoft’s Windows, then the dominant operating system, and justified the decentralised way that Linux had been developed. This benefited IBM and fuelled the rise of cloud computing, which is mostly powered by Linux and similar “open source” software.

The tech industry may soon witness a similarly curious pairing. Microsoft and Oracle, a big software firm, are—along with other, less serious suitors—fighting over TikTok, a Chinese-owned short-video app. Its sale is far from assured. But if a deal were struck it too could prove momentous, this time as a chance to redefine how big online platforms are run. TikTok could become the Linux of social media—and a model for others.

The current debate over platform governance centres on two options, neither of them appealing. Governments tell firms what to do (in part already the case in Germany). Or firms can regulate themselves (as happens in most other places, including America). In a recent paper Dipayan Ghosh and Josh Simons of Harvard University propose a third way, more fitting for what the authors call “algorithmic infrastructure”—utilities for the digital public square. Governments should set a broad framework and let platforms experiment within it, the authors suggest.

TikTok could become just such an experiment. It is a young service

unburdened by an ingrained business model or governance structure. ByteDance, its Chinese owner, has barely begun building these for the American market. None of TikTok's wooers, including Oracle and Microsoft, has much experience running a social-media platform. So each could try something new as TikTok takes on social media's incumbents, notably Facebook and Google.

Start with the business model. Social-media firms make almost all their money from advertising. This pushes them to collect as much user data as possible, the better to target ads. Critics call this "surveillance capitalism". It also gives them every reason to make their services as addictive as possible, so users watch more ads.

The new owner is unlikely to do away with advertising in favour of subscriptions; teenagers are notoriously unwilling to pay for online content. But the new TikTok could offer an ad-free version for those who prefer to pay with cash rather than attention. It could also consider other revenue sources, for example taking a cut from enabling seamless sales of something users see in a clip or charging professional influencers once they have reached a certain prominence (1m followers should be worth at least \$100 a month to TikTok stars). As for ads, TikTok could target only broad categories of users instead of individuals, much as firms once bought ads in newspapers. Advertisers, who love microtargeting, need not necessarily object, so long as TikTok remains popular with its coveted young demographic group.

Respectful management of data offers another business opportunity. TikTok could give users more control, telling them how much their data are worth and managing information on their behalf, as a data trust of sorts. Other firms could tap your TikTok "data account" if you agree and they pay—a model pioneered by startups like digi.me and CitizenMe, which pocket a share of the proceeds from the data deals.

Perhaps most important, the new owner could turn TikTok from a social-media service to a digital commonwealth, governed by a set of rules akin to a constitution with its own checks and balances. User councils (a legislature, if you will) could have a say in writing guidelines for content moderation. Management (the executive branch) would be obliged to follow due process. And people who felt their posts had been wrongfully taken down could appeal to an independent arbiter (the judiciary). Facebook has toyed with platform constitutionalism: it once let users vote on privacy changes (mostly as a PR stunt) and now has an “oversight board” to hear user appeals (a more serious effort). But the social network introduced these only in response to mounting criticisms. Drafting rules at the outset might make them more credible.

| *Linux lessons*

Why would any company limit itself this way? For one thing, it is what some firms say they want. Microsoft in particular claims to be a responsible tech giant. In January its chief executive, Satya Nadella, told fellow plutocrats in Davos about the need for “data dignity”—ie, granting users more control over their data and a bigger share of the value these data create. Brad Smith, Microsoft’s president, last year wrote a book in which he argued that technology firms “must accept greater responsibility for the future”.

Governments increasingly concur. In its Digital Services Act, to be unveiled later this year, the European Union is likely to demand transparency and due process from social-media platforms. In America, ideas for making them more accountable appear on both sides of the partisan divide.

“Citizens who are using these platforms every day should have a say in what content is acceptable,” says Johnnie Moore, an evangelical leader who has the ear of President Donald Trump. Andrew Yang, a former Democratic presidential candidate, has launched a campaign to get online firms to pay

users a “digital dividend”. Getting ahead of such ideas makes more sense than re-engineering platforms later to comply.

Today’s social-media titans will resist change. But they may reconsider, as Microsoft did with Linux. Mr Nadella’s predecessor, Steve Ballmer, once called open-source software “a cancer”. Today, Microsoft is one of the biggest users of and contributors to such projects. Surreal as it sounds, 20 years from now Facebook and Google may have reconstituted themselves for the better, too. ■



熊彼特

立宪重构

如何打造一个更好的TikTok

“主流巨人走上反主流文化之路。”当本世纪初IBM决定支持Linux时，科技媒体做出了这样的评述。当时IBM是企业级IT服务里的模范生，而Linux则是由一群激进程序员的“乌合之众”编写的不知名操作系统。结果，这个反常的组合却成了计算产业的天作之合。它把Linux变成了当时一家独大的微软Windows操作系统的有力竞争对手，证明了Linux去中心化开发方式的合理性。它让IBM受益，也推动了云计算的兴起——云计算主要是由Linux以及与它类似的“开源”软件支撑的。

科技行业可能很快又会出现一个类似的奇特组合。微软和大型软件公司甲骨文正在争夺来自中国的短视频应用TikTok（其他竞购者相对而言希望不大）。TikTok的出售前景远未明朗。但如果最终达成交易，可能同样会显现重大的意义——这一次是有机会重新定义大型网络平台的运作方式。TikTok可能会成为社交媒体界的Linux，并成为其他公司的模板。

目前围绕平台治理的争论聚焦两种方案，但两者都不甚理想。要么由政府指挥企业做什么（德国在一定程度上已经如此），要么让公司自我规范（包括美国在内的大多数其他地方是这样）。哈佛大学的迪帕严·高希（Dipayan Ghosh）和乔什·西蒙斯（Josh Simons）在近期发表的一篇论文中提出了第三种方案，更适用于他们所说的“算法基础设施”也就是数字公众广场中的公用事业。两位作者认为，政府应该建立一个宽泛的框架，允许平台在框架内试验。

TikTok或许恰巧可以成为这样一个试验。作为一个年轻的服务平台，它不受什么根深蒂固的商业模式或治理结构的拖累。它的中国母公司字节跳动才刚刚开始为美国市场建立这些东西。包括甲骨文和微软在内的TikTok的竞购者都没有多少运营社交媒体平台的经验。因此它们在TikTok挑战以Facebook和谷歌为代表的社交媒体霸主时，都可能尝试一些新鲜的打法。

先说商业模式。社交媒体公司的收入几乎全部来自广告。这促使它们尽可能多地收集用户数据，从而更好地定向投放广告。批评者称之为“监视资本主义”。同样因为这种商业模式，它们也会想方设法地让用户上瘾，以求让他们观看更多广告。

TikTok易主后不太可能为了订阅而放弃广告：众所周知，青少年极其抗拒为线上内容付费。但是新的TikTok可以提供一个无广告版本，迎合那些宁愿花点钱而不看广告的用户。它也可以考虑其他收入来源，例如让用户无缝购买在短片中看到的商品，然后从中抽成，或者在专业播主达到一定的知名度后向其收费（对于TikTok网红来说，一百万粉丝至少值得每月支付100美元）。至于广告，TikTok可以面向广泛的用户类型投放，而不是针对个人定向投放，就像当年企业在报纸上刊登广告那样。虽然广告主喜欢精准定向投放，但只要TikTok在其觊觎的年轻群体中仍然大受欢迎，它们未必会反对。

尊重用户的数据管理方式也带来了另一个商机。TikTok可以赋予用户更大的控制权，让他们知道自己的数据的价值，并代表他们管理这些信息，类似某种数据信托。如果你同意，其他公司可以付费使用你的TikTok“数据账户”——这种模式由digi.me和CitizenMe等创业公司首创，它们从这类数据交易中获得收益分成。

也许最重要的是，TikTok的新东家有可能把它从一个社交媒体服务转变成一个数字共和国，遵循一套类似宪法的规则，并有自己的制衡机制。用户委员会（你可以把它看作立法机构）在制定内容审核准则方面有发言权。公司管理层（行政机构）必须遵照正当程序。而那些觉得自己被不当删帖的用户可以向独立的仲裁部门（司法机构）申诉。Facebook也尝试了一些平台宪政：它曾经让用户就隐私政策的修订投票（更多是个公关噱头），现在设立了一个“监督委员会”来听取用户申诉（这是更认真的一步）。但这个社交网络只是为了回应日益增多的批评而推出了这些举措。从一开始就设定规则可能会让规则更可信可靠。

为什么会有公司这样去自我设限？首先，是一些企业声称自己想要这么做。特别是微软，它自称是一个负责任的科技巨头。今年1月，微软的首席执行官萨提亚·纳德拉（Satya Nadella）在大咖云集的达沃斯论坛上指出“数据尊严”的必要性，也就是要让用户对自己的数据拥有更多控制权，从这些数据创造的价值中分得更大的份额。微软的总裁布拉德·史密斯（Brad Smith）去年写了一本书，主张科技公司“必须对未来承担更大责任”。

各地政府也日益认同这一点。在将于今年早些时候发布的《数字服务法》（Digital Services Act）中，欧盟很可能会要求社交媒体平台保证透明度和正当程序。在美国，民主共和两党都有更多地向这些平台问责的想法。“那些每天都在使用这些平台的公民应该有发言权来决定什么内容是可接受的。”特朗普的非官方顾问、福音派领袖约翰尼·摩尔（Johnnie Moore）表示。前民主党总统参选人杨安泽发起了一项运动，要求互联网公司向用户支付“数字红利”。与其日后改造平台来迎合这种思潮，还不如提前部署。

今天的社交媒体巨头会抵制变革。但它们也可能改变主意，就像微软当年对Linux那样。纳德拉的前任史蒂夫·鲍尔默（Steve Ballmer）曾说开源软件是“癌症”。如今，微软已成为开源项目最大的使用者和参与者之一。现在这么说或许难以置信，但20年后Facebook和谷歌可能也已自我重构，焕发新生。■



America v Huawei

Creative destruction

America's war on the telecoms titan may boost Chinese technology

HUAWEI IS ON the ropes. From midnight on September 14th the Chinese technology giant was cut off from essential supplies of semiconductors. Without chips it cannot make the smartphones or mobile-network gear on which its business depends. America's latest rules, finalised on August 17th, prohibit companies worldwide from selling chips to Huawei if they have been made with American chipmaking kit. American semiconductor companies, for which Huawei has been a lucrative customer, have implored their government to extend the deadline, as have their industry bodies.

Huawei now looks likely to follow one of three paths. The first involves Washington granting licences to suppliers so that they can sell chips to the firm in a limited fashion. This would let Huawei stay in business—just about. MediaTek, a Taiwanese chipmaker that is one of its main suppliers, has petitioned America's Department of Commerce (DoC) for such a permit. To keep Huawei's edge blunt, suppliers keen to produce chips designed by its in-house semiconductor unit, HiSilicon, are unlikely to be issued such dispensation.

Even a debilitated Huawei may not satisfy America. The DoC's default setting is to deny permits. That would force the Chinese firm to take more desperate action, such as making its own chips using older technology that could be sourced from supply chains that do not include American firms. Pierre Ferragu of New Street Research, a telecoms-and-technology research firm, expects Huawei to do this within 12 months.

This path has just become rockier. On September 4th Reuters reported that America's Department of Defence has proposed putting Semiconductor

Manufacturing International Corporation (SMIC), China's leading chipmaker, on the same blacklist as Huawei. The Pentagon alleges that SMIC works with China's armed forces, and so poses a threat to national security. A blacklisting would destroy SMIC's business, which relies on American machine tools. Its share price fell by almost a quarter on the news. SMIC denies having military ties and said it is in "complete shock". The threat of such action may dissuade SMIC from teaming up with HiSilicon, as Huawei might have hoped.

This leaves the third eventuality. Huawei may go bust, or be forced to sell off bits of its business. This would not happen immediately: at the end of 2019 it had cash reserves of 371bn yuan (\$53bn), enough to cover operating costs for a year and a half. But if push comes to shove, it may offload HiSilicon. Huawei's chip-design arm is one of the most advanced such outfits in the world. According to IC Insights, a firm of analysts, HiSilicon broke into the global top-ten design companies by revenue in the first half of 2020, the first Chinese firm to do so. Since it will no longer be able to design chips for its owner after September 14th, HiSilicon could profitably focus on doing so for third parties in China. That would generate a new revenue stream for Huawei. If instead Huawei were forced to shut HiSilicon, its laid-off engineers would be snapped up by chip-design teams at other Chinese technology giants like Alibaba, Tencent and ByteDance. Or they could start new design firms of their own; many are said to be slipping out pre-emptively.

Each scenario worries firms like Qualcomm. The big American chip-designer lists Chinese competition as a risk in its annual filings. Last year Chinese sales made up \$11.6bn out of Qualcomm's \$24.3bn in revenue. A HiSilicon liberated from Huawei would threaten those sales.

Huawei is putting on a brave face. It says it will spend over \$20bn on research and development this year, \$5.8bn more than in 2019 and about as

much as Amazon, a firm with double its sales. It hopes to gain new revenue streams less vulnerable to American attacks. These are unlikely to let up even if Joe Biden becomes president next year. But as Uncle Sam tightens the grip, it risks squeezing Chinese technology into a form which it no longer controls. Huawei hopes to hang on until then. ■



美国对阵华为 创造性破坏

美国对这家电信巨头的宣战可能会提升中国科技

华为已经命悬一线。9月15日零时起，这家中国科技巨头的关键半导体供应被切断。没有了芯片，华为将无法制造智能手机或移动网络设备，而这些是它的主要业务。美国于8月17日敲定了华为禁令的最终版，在全球范围内禁止企业向华为出售使用美国设备生产的芯片。华为一直是美国半导体公司的大客户，这些公司及其所在的行业组织此前都恳请美国政府延期实施禁令。

目前看来，华为很可能还剩三条路可选。第一条路是寄望华盛顿向供应商颁发许可证，让它们能在一定限制下向华为出售芯片。这样华为就可以继续经营，但也就是勉强维持。台湾芯片制造商联发科是华为的主要供应商之一，该公司已向美国商务部申请此类许可。为继续压制华为的锋芒，那些很想要生产华为旗下海思半导体公司设计的芯片的供应商不太可能获得这样的豁免。

对美国而言，让华为萎靡不振可能还不够。美国商务部的基本姿态是不予许可。这将迫使这家中国公司更孤注一掷，例如从不包含美国公司的供应链中获取较老旧的技术来自行制造芯片。电信与科技研究公司新街研究（New Street Research）的分析师皮埃尔·费拉居（Pierre Ferragu）预计华为会在12个月内这么做。

这条路刚刚变得更难走了。9月4日，路透社报道称，美国国防部已提议将中国主要芯片制造商中芯国际也列入华为所在的黑名单。五角大楼指中芯国际与中国军方合作，因而对美国国家安全构成威胁。中芯国际的生产依赖美国设备，如果被列入黑名单，其业务可能被毁灭。消息传出后，中芯国际的股价下跌了近四分之一。中芯国际否认与军方有联系，并表示“对此感到震惊”。威胁采取这样的行动可能会让中芯国际退缩，不像华为可能寄望的那样与海思合作。

这样就只剩下第三条路。华为可能走向破产或被迫出售部分业务。这不会立即发生：到2019年底华为有3710亿元的现金储备，足够支撑一年半的运营。但到不得已时，它可能会剥离海思。华为的这个芯片设计部门是全球最先进的设计机构之一。据市场分析公司IC Insights的数据，按2020年上半年营收计算，海思已跻身全球十大芯片设计公司之列，创中国公司之先河。由于9月14日之后无法继续为华为设计芯片，海思可通过专注于替其他中国公司设计芯片而盈利。这将为华为带来新的收入。而假如华为被迫关掉海思，被遣散的工程师将被阿里巴巴、腾讯、字节跳动等其他中国科技巨头的芯片设计团队收入麾下。这些工程师也可能会自己创办新的设计公司，据说不少人已悄悄离职，以求占得先机。

两种情形都令高通这样的公司不安。这家美国大型芯片设计商在其年度报告中将中国竞争列为风险因素之一。去年，在高通243亿美元的营收中，对中国的销售贡献了116亿美元。从华为中释放出海思将对这些销售收入构成威胁。

华为现在还显得泰然自若。它表示今年将在研发上投入超过200亿美元，比2019年时增加58亿美元，与亚马逊相当（亚马逊的销售额是华为的两倍）。华为希望开创不易受美国攻击的新收入来源。即使拜登于明年就任总统，对华为的打压也不大可能放松。但在山姆大叔加紧围堵之时，中国科技或许会被挤压成美国无法掌控的形态。华为希望自己能撑到那个时候。 ■



Free exchange

Parting shot

What can the world learn from Abenomics?

AS AN EXERCISE in political branding, Abenomics has been an unusual success. When Abe Shinzo returned to power as Japan's prime minister in December 2012, he said he would revive the economy by loosing off three "arrows". The first, expansive monetary policy, would banish deflation. The second, flexible fiscal policy, would restrain public debt without jeopardising the recovery. The third arrow, structural reform, would revive productivity and lift growth. The image stuck, even after the government tired of it.

Mr Abe's archery excited keen interest elsewhere. Many other mature economies, after all, look a little Japan-ish. They combine greying populations, faltering growth, high public debt and stubbornly low inflation, despite miserly interest rates. "Yes, we are probably all Japanese now," concluded Jacob Funk Kirkegaard of the Peterson Institute for International Economics, an American think-tank, last year, even before the covid-19 pandemic added to the debt, disinflation and despair. As Mr Abe departs after almost eight years in charge, what lessons can others draw?

The first lesson is that central banks are not as powerful as hoped. Before Abenomics, many economists felt Japan's persistent deflationary tendencies stemmed from a reversible mistake by the Bank of Japan (BoJ). It had combined fatalism with timidity, blaming deflation on forces outside its control, and easing monetary policy half-heartedly. In 1999 Ben Bernanke, later a Fed chairman, called on the BoJ to show the kind of "Rooseveltian resolve" that America's 32nd president showed in fighting the Depression.

Sure enough, in April 2013, the BoJ made a display of new determination, promising to buy enough assets, including government bonds and equities, to raise inflation to 2% within about two years. In 2016 it introduced negative interest rates, a cap on ten-year bond yields and a promise to let inflation overshoot its target (which the Federal Reserve emulated last month). These efforts stopped persistent deflation, a feat that is often forgotten. But they could not lift inflation close to the central bank's target (see left-hand chart).

One reason may be peculiar to Japan: its regular workers are economically monogamous, enjoying long-term employment relationships with a single firm. They are almost impossible to fire but also difficult to poach. Thus, although Abenomics lowered unemployment to just 2.2% by the end of last year, regular workers did not benefit from a bidding war for their talents. Firms instead spent more on part-time workers. Yet because these recruits collect a relatively small share of the country's wages, their improved pay put little upward pressure on prices.

Another threat to the power of central banks could recur elsewhere. Japan's public became so accustomed to unchanging prices, it assumed the future would mirror the past. That assumption, which shaped pay negotiations between unions and employers, then became self-fulfilling. This was a difficult legacy for Abenomics to overcome. Proponents of monetary activism were right to criticise the BoJ for not fighting this mindset earlier. They were wrong to think those past mistakes were easily reversible once Abenomics began. "I was too optimistic and too certain about the ease with which a determined central bank could conquer deflation," admitted Mr Bernanke in 2017.

| *Big is beautiful*

As well as showing that monetary policy is less powerful than hoped, Abenomics has shown that high public debt is less dangerous than feared.

Japan's gross government debt was almost 230% of GDP when Mr Abe took charge and is even higher now. But the cost of government borrowing has remained negligible. Indeed, yields for five-year bonds are negative.

Fiscal scolds point out that yields on bonds are low because the central bank is buying so many of them: its holdings now amount to 99% of GDP, whereas the Fed's equal about 20% of American GDP. The term "financial repression" gets bandied about, as if Japan's central bank is conspiring to let the government spend more than it should, at the expense of the private sector. But that gets things backwards. The central bank is doing everything it can to revive private spending. Until it succeeds, though, the government has to fill whatever gap in demand remains. The shortfall in private spending is what makes government deficits necessary. It is also what makes them so cheap to finance.

What about the third arrow of Abenomics? Before its lost decades, Japan taught the world how to raise productivity in big firms, through "lean manufacturing", just-in-time delivery, and so on. Unfortunately, the country also shows how badly productivity can lag in small firms. Many operate in service industries, where productivity is notoriously low. Yet even in manufacturing, small enterprises are less than 40% as productive as their larger counterparts, according to the Ministry of Finance (see right-hand chart).

Just because a firm is small does not mean it is new or particularly entrepreneurial. In Japan, three-quarters of small firms are over ten years old and two-thirds of the owners of small and middling enterprises will be 70 or older by 2025, according to the OECD. The government provides plenty of support to small firms. It guaranteed loans worth 4.4% of GDP in 2016, compared with an average of just 0.1% in the OECD, a group of mostly rich countries. In a report last year, the group expressed concern that such guarantees weaken the incentive for banks to monitor their borrowers and

push them to improve.

For the many countries that have expanded similar guarantees in response to the covid-19 pandemic, Japan thus provides a useful lesson.

Governments must be careful to ensure that this necessary effort to ensure the survival of small firms in the short term does not permit stagnation in the long term.

Abenomics will almost certainly outlast the prime minister who introduced it. None of Mr Abe's potential successors, including Kishida Fumio, his party's head of policy, Ishiba Shigeru, a former defence minister, or Suga Yoshihide, the chief cabinet secretary, are likely to renounce it. They may, however, be tempted to rebrand it. Suganomics, for example, has a nice ring to it. ■



自由交流

临别赠箭

世界可以从安倍经济学中学到什么？

从打造政治品牌来看，“安倍经济学”异常成功。2012年12月安倍晋三再次出任日本首相，他表示将射出三支“箭”来振兴经济。第一支箭是宽松的货币政策，将消除通缩。第二支是灵活的财政政策，将在不损害经济复苏的情况下控制公共债务。第三支箭是结构性改革，将重振生产率并促进经济增长。这幅图景就这么固定下来，即便后来他的政府自己都厌倦了。

安倍的“箭术”在其他地方引发了浓厚兴趣。毕竟，许多其他成熟经济体的状况看起来都有点像日本。它们同时面临人口老龄化、增长停滞，以及在利率已经极低的情况下公共债务高企且通胀持续低迷。“是的，我们很可能都成了日本。”美国智库彼得森国际经济研究所的雅各布·芬克·柯克加德（Jacob Funk Kirkegaard）在去年总结道。这还是在新冠疫情导致债务、通缩和绝望进一步加剧之前。随着安倍在执政近八年后离任，外人能从中汲取什么经验教训呢？

第一个教训是，央行的影响力并没有大家希望的那么大。在安倍经济学实施之前，许多经济学家认为日本持续通缩的趋势源于日本央行的一个可逆的错误：它怯懦且持宿命论，把通缩归咎于它无法控制的力量，同时在放宽货币政策上敷衍了事。1999年，本·伯南克（后来担任美联储主席）呼吁日本央行拿出“罗斯福式的决心”，也就是美国第32任总统在对抗大萧条时的那种决心。

日本央行在2013年4月确实展现了新的决心，承诺购入足够多的资产，包括政府债券和股票，在两年左右的时间内把通胀提升至2%。2016年，日本央行引入负利率，对十年期债券收益率设置上限，并承诺允许通胀超出设定目标（美联储上月也采取了这一做法）。这些举措遏止了持续通缩——这一成就常被遗忘。但它们没能把通胀提高到接近日本央行的目标水平（见图表左侧）。

有一个原因也许是日本独有的：它的正式员工群体履行经济上的“一夫一妻制”，也就是与同一家公司保持长期雇佣关系。他们几乎无法被解雇，又很难被挖走。因此，尽管到去年年底安倍经济学已令失业率降至仅2.2%，其正式员工群体并未因此而受益于人才争夺战。相反，日本公司在兼职员工上加大了投入。但由于这类雇员的薪资占日本整体工资的比例较小，其工资水平上升给市场价格带来的上行压力很有限。

另一个威胁日本央行影响力的因素却有可能在他国再现。日本民众已经习惯了市场价格稳定不变，以为未来情况会照旧。这种假设主导了工会和雇主的工资谈判，然后假设就会自我应验。这是安倍经济学难以克服的遗留问题。货币激进主义的支持者批评日本央行没有及早改变这种心态，这是对的。但他们认为一旦启动安倍经济学就可以轻易逆转这些过去的错误，却是错的。伯南克在2017年承认：“我以为央行只要下定决心就不难克服通缩，这是太过乐观和绝对了。”

| 大即是美

安倍经济学不仅表明货币政策并没有预期那么大的影响力，还显示公共债务高企也没有人们担心的那样危险。安倍上任时，日本的政府债务总额差不多是GDP的230%，现在甚至更高。但政府的借贷成本一直低到可以忽略不计。实际上目前五年期债券的收益率为负数。

批评财政政策的人指出，债券收益率低是因为日本央行在大举购买债券：目前日本央行持有的债券相当于日本GDP的99%，而美联储的这一比例仅在20%左右。“金融抑制”的说法广为流传，仿佛日本央行是在故意设法让政府支出超过应有水平，而不惜牺牲私营部门。但这把事情说颠倒了。日本央行正在竭尽全力提振私人支出。但在它成功之前，政府必须填补任何剩余的需求缺口。私人支出不足正是政府不得不维持赤字的原因。这也是它的融资成本如此低廉的原因。

安倍经济学的第三支箭又如何？在进入“失落的二十年”前，日本让世界学到了可以通过“精益制造”和准时交付（JIT）等方式提高大企业的生产率。不幸的是，日本也让人们看到小公司的生产率水平可以滞后到什么地步。

许多小公司从事服务业，一个以生产率低下闻名的领域。然而根据日本财务省的数据，即使在制造业中，小企业的生产率也还不到大企业的40%（见图表右侧）。

一家公司规模小并不意味着它就是新公司或特别开创进取。根据经合组织的数据，在日本，四分之三的小企业已经创建十年以上；到2025年三分之二的中小企业主年龄将达到70岁或以上。日本政府向小企业提供了大量支持。2016年，政府为它们担保的贷款占GDP的4.4%，而在成员多为富裕国家的经合组织中这一比例平均仅为0.1%。在去年发布的一份报告中，经合组织表示担心这种担保会削弱银行监督借款人并推动其改善经营的动力。

对于为应对新冠疫情而扩大类似担保的许多国家来说，日本提供了有益的教训。各国政府必须留心，确保这种为让小企业在短期内生存下来而采取的必要举措不会导致经济长期停滞。

几乎可以肯定的是，安倍经济学的寿命会长过提出这套政策的首相在任的时间。可能的继任者，包括自民党政调会长岸田文雄、前防卫大臣石破茂，还有内阁官房长官菅义伟等，都不太可能放弃这一路线。不过他们可能会很想要给它换个名字，比如“菅经济学”，听起来也挺不错。■



The Economist film

Why is the stockmarket rallying in a glum economy?

Most Americans own stock through investment plans like pensions, but the wealth of the rich is far more concentrated in stocks.



经济学人视频

美国经济惨淡，为何美股仍然火热？

多数美国人通过养老金等投资计划持有股票，但富裕阶层的主要财富都集中体现在股市上。



Automation

Walking with robots

A new generation of ambulatory machines is striding to market

THEY MIGHT appear cutesy, but a pair of robots that turned up recently at the Ford Motor Company's Van Dyke Transmission Plant, in Detroit, are practical working machines. They may, indeed, point to the future of automation. Putting robots into factories is hardly a new idea—some 2.4m of them are already at work in plants around the world. But most of these are little more than giant arms, bolted firmly to the ground, that weld and paint things. Those few that have the mobility to manage tasks like delivering components do so by scooting along on wheels. The new devices at Van Dyke are rather different sorts of beasts. They can walk.

This pair of bright-yellow quadrupeds look a bit like dogs, prompting one to be nicknamed Fluffy and the other Spot (which latter moniker is also the official name given to this model of robot by the firm that manufactures them, Boston Dynamics, a subsidiary of SoftBank). The pair are not there to amuse the factory's human workers, though, but rather to perform an important task that Ford hopes will save it a ton of money. With laser scanners mounted on their backs, Fluffy and Spot can scamper around the 200,000 square-metre plant collecting data. Those data will be employed to build a detailed computer model of the entire manufacturing operation. This sort of model is called a digital twin, and Ford's engineers will use it to work out how to rearrange the production line to produce a new gearbox.

Over the years, factory plans get out of date as things are moved around and new equipment is brought in. Surveying the transmission plant by hand would take weeks and cost some \$300,000. Ford reckons that Fluffy and Spot, which can both climb stairs and crawl into hard-to-reach areas, will cut the time required by half and complete the job for "a fraction of the

cost". Although Ford is leasing the robots, Boston Dynamics has now put them on sale for \$75,000 a pop. At that price they would soon pay for themselves doing tasks like the one being undertaken in Van Dyke.

The Spot range is the first of Boston Dynamics's walking robots to be commercialised. More such machines are starting to appear from other firms and research groups. Some are also quadrupeds. Others are bipedal. The two-legged sort can be more agile and, if equipped with arms as well, are better suited to tasks like picking things up or operating controls. What all of these machines have in common is that they represent—forgive the pun—a huge step forward in robot locomotion.

| *Four legs good, two legs better*

If robots are to go where people go, they need to be able to move in the way that people move. Wheels are useless for navigating much of the world—just ask anyone who uses a wheelchair, says Aaron Ames, a robotics expert at the California Institute of Technology (Caltech). "We can make robots walk really well now," he says. Such robots can, though, look a little odd. When a torso with two legs attached strolls out of Dr Ames's laboratory it causes a bit of a sensation on Caltech's campus. But this is something people are going to have to get used to, because many more are coming.

Problems remain, and improvements are needed. "But once we get there, we are going to have millions of walking robots in human environments," says Jonathan Hurst, co-founder of Agility Robotics, a firm based in Albany, Oregon. It has just launched Digit, a bipedal, two-armed robot which has the look of an ostrich about it. At present, Digit costs \$250,000. But it is early days. As more walking robots are put to work their development will accelerate and their production volumes increase, bringing the cost of a machine like Digit down to the tens of thousands of dollars.

This process is similar to the emergence of flying drones. They once cost

millions, and had limited uses, until researchers worked out how to make small aircraft hover using multiple co-ordinated rotors. These devices could fly easily and autonomously. Prices fell to \$500 or less, and multi-rotor drones are now employed for all manner of jobs, from cinematography to aerial surveying to delivering packages. Some in the field of robotics think walking robots have started down a similar path.

What changed? “We now understand the mathematics of locomotion to a much greater degree,” explains Dr Ames. Old-school walking robots, such as Asimo, a famously cheesy android unveiled in 2000 by Honda, a Japanese carmaker, have stilted gaits. They shuffle along, placing one foot forward, checking their balance, moving the other foot, rechecking their balance, and so on. “When you are walking, you don’t do that,” he says. “Your feet are just coming down and catching yourself.”

| *Stroll on!*

The way that humans walk is sometimes described by biomechanists as controlled falling. Making a stride involves swinging a leg out and placing it down with small subconscious corrections to maintain stability as the mass of the body above it shifts forward. Each leg works like a spring. These movements are predictable, and in recent years researchers have found out how to model them mathematically. Together with better actuators to operate a robot’s limbs, and sensors which can measure things more accurately, these models have made it possible to recreate this style of walking in robots. It does not require any fancy machine learning or artificial intelligence to do so, just good old-fashioned computation, adds Dr Ames.

The difference between Asimo’s gait and that of the new breed of bot is striking. Whereas Asimo’s chunky legs look leaden, Digit strides confidently along on a lean pair of limbs, happily swinging its arms as it goes. Atlas (pictured), an experimental humanoid made by Boston

Dynamics, is more capable still. It can walk, run, jump and even perform backflips. Asimo did a lot of celebrity photo-ops, but it never went into production. Honda quietly stopped work on the project in 2018, to concentrate on more “practical” forms of robotics, such as mobility devices for the elderly.

It is easy to conclude, as many do, that these new walking robots simply mimic nature. But that is not quite the case. A quadruped, being a stable platform, is a good starting point from which to design a walking robot. After co-ordinating the four limbs, getting a good balance and fitting a system of vision that lets the robot work out where to put its feet, Spot’s designers ended up with a dog-oid. Michael Perry, head of business development for Boston Dynamics, says that is not surprising because nature has been developing efficient designs for a long time.

Another example of art evolving to imitate nature occurred during the design of Digit. This inherited its ostrich looks from Cassie, a two-legged torso which Agility sold to a number of research groups. Cassie’s developers had to find a way to stop some of the robot’s actuator motors from working against each other. Their solution turned out to look like a pair of bird’s legs.

Cassie subsequently acquired arms and evolved into Digit as the result of the engineers’ attempts to solve another problem. When it swung a leg forward Cassie’s body twisted a little, which sometimes caused the robot to fall over if it was walking quickly. In nature, some animals use tails to improve their balance when manoeuvring at speed. Borrowing this idea, Agility’s researchers attached a pair of tail-like appendages, one on each side of the robot’s torso, to improve its mobility. That worked. Then they turned the appendages into a pair of arms. These can catch the robot should it fall, and help it get up again.

The arms can perform other useful tasks, too, such as moving boxes in a warehouse. Digit can carry up to 20kg. Distributing and delivering goods is likely to be an important application for walking robots, reckons Dr Hurst, especially now that e-commerce has boomed as a result of restrictions imposed in the wake of covid-19. Some automated distribution centres are set up for conventional fixed and wheeled robotic systems, but these have usually been built this way from scratch. Most warehouses are designed around people. Robots with legs, which move in a similar way to human workers, would fit right in.

With further development, walking robots will undertake more complex tasks, such as home deliveries. Ford is working on this with a Digit robot that rides in the back of a van. Though robots with wheels already make some deliveries, reaching many homes is tricky, and may involve climbing steps or stairs. “Legs are how you would want to get up to most front doors to deliver a package,” observes Dr Hurst.

Exactly how this might be done remains to be seen. Unless they are on a preprogrammed mission, most mobile robots require an operator to provide basic instructions to, say, proceed to a certain point. The robot then walks there by itself, avoiding obstacles and climbing or descending steps and stairs along the way. This means a walking robot making door-to-door deliveries might need some kind of digital map of the neighbourhood, to know in advance the paths it can traverse and the flower beds it should avoid. That might involve a big data-acquisition effort, much like those used to build digital maps for driverless cars. Similarly, in a factory or a warehouse, a walking robot would need to be shown the ropes by a human being before it was let loose to work on its own.

| *Self determination*

A fully autonomous robot that could walk into an unknown environment and decide for itself what it needed to do remains a long way off. One of the

hardest tasks for such a device would be caring autonomously for someone at home. The robot would have to be able to make numerous complex decisions, such as administering the correct medicine, deciding whether or not to let strangers into the house or knowing when to take the dog for a walk. Yet many roboticists think they will get there, or at least close to it, one day.

In the meantime, the new generation of robots now being developed will keep building up the machines' capabilities. At Boston Dynamics Mr Perry reckons that, besides surveying, Spot will find many roles in inspection and maintenance. Such robots can, for instance, enter hazardous environments like electrical substations without them having to be taken off the grid, as is necessary whenever a human engineer goes inside.

Instead of just looking for problems, Spot's next trick will be to take action to resolve them, such as throwing a switch or turning a valve. It will do this with a single manipulator arm which makes it look less like a dog and more like a long-necked *Brachiosaurus*. A prototype of this configuration is already running around the company's offices, opening and shutting doors.

This version of Spot should go on sale next year. As for Atlas, Boston Dynamics's humanoid, that is currently too expensive to spawn a commercial version. But the lessons being learnt from it will help provide the engineering needed for other robots to come, says Mr Perry.

Some of these walking robots of the future may not be deployed on this world. At Caltech, Dr Ames thinks robots with legs will have advantages in planetary exploration—negotiating difficult terrain and entering caves, for example. Meanwhile, back on Earth, he and some colleagues at other institutions are using the new knowledge of robotic locomotion to develop lightweight prosthetic devices for those unable to walk easily, and powered exoskeletons for those who cannot walk at all. In a world not made for

wheels, this raises the tantalising prospect that walking robots will one day help rid the world of wheelchairs. ■



自动化

与机器人同行

新一代能行走的机器正大步迈向市场

虽然可能看上去很蠢萌，最近出现在福特汽车位于底特律的范戴克变速箱工厂（Van Dyke Transmission Plant）的这对机器人可是真正干活的机器。实际上，它们可能显现了自动化的未来。在工厂部署机器人并不是什么新主意，世界各地的工厂中已有约240万台投入使用。但它们大多数都只是牢牢固定在地面上、专事焊接和刷油漆的巨大机械臂。少数能够四下移动来完成传送零件等任务的机器人不过是被放到了轮子上。范戴克工厂的新设备却是截然不同的家伙。它们能行走。

这对亮黄色的四足机器人看上去有点像狗，因此一个被昵称为毛球（Fluffy），另一个叫点点（Spot，它们的制造商、软银子公司波士顿动力[Boston Dynamics]也用这个昵称正式命名了这款机器人）。它们可不是去工厂逗工人一乐的，而是执行一项重要任务，福特希望能借此省一大笔钱。毛球和点点的背上扛着激光扫描仪，可以在大约20万平方米大的工厂里到处奔走收集数据。这些数据将用于构建反映整个生产运营过程的详细的计算机模型。利用这种人们称之为数字孪生体的模型，福特的工程师将研判如何重新布置生产线来生产一种新的变速箱。

经年累月，工厂里的设备会改变位置，也会引入新设备，因此工厂的布局会过时。对变速箱工厂做人工测绘需要花费数周，耗资约30万美元。毛球和点点能爬楼梯，也能进入人员难以抵达的区域，福特认为使用它们可以将所需时间减半，而且“费用只是原来的一个零头”。尽管福特是租用了这两台机器人，但现在波士顿动力已为它们标出每台7.5万美元的售价。以这个价格，买家能通过让它们完成像范戴克工厂里那样的任务很快收回成本。

点点系列是波士顿动力研发的步行机器人中第一款商业化的产品。其他公司和研究团队也开始推出更多此类机器。其中一些也是四足的。还有一些

是两足的。两足军团会更敏捷，并且如果再装上手臂，就更适合捡拾东西或操作控制之类的任务。所有这些机器的共同点是，它们代表着机器人移动技术向前迈出了一大步（别介意这里还是用了这个双关语）。

| 四条腿好，两条腿更好

如果机器人要去人去的地方，它们得要能像人那样移动。靠轮子是去不了太多地方的，问问坐轮椅的人就知道了，加州理工学院（Caltech）的机器人专家亚伦·埃姆斯（Aaron Ames）说。“我们现在可以让机器人走得很好。”他说。不过这种机器人看起来有点怪。当一个带着两条腿的躯干从埃姆斯的实验室慢悠悠地走出来时，在加州理工学院的校园里引发了些许轰动。但人们将来不得不要习惯它们，因为有更多正在纷至沓来。

问题仍然存在，还需要继续改进它们。“但等问题解决了，我们将在各种人类环境中使用成百上千万台行走机器人。”乔纳森·赫斯特（Jonathan Hurst）说。他是总部位于俄勒冈州奥尔巴尼（Albany）的敏捷机器人公司（Agility Robotics）的联合创始人。这家公司刚刚推出了两足、两臂、看上去像鸵鸟的机器人Digit。目前，Digit售价25万美元。但现在还只是这类产品的初期阶段。随着越来越多的行走机器人投入使用，研发速度将加快，产量将增加，Digit这类机器人的成本会降至几万美元。

这个过程类似于无人机的兴起。一架无人机的售价曾经高达几百万美元，而且用途有限，直到研究人员找到用多个协同的旋翼让小型飞行器悬停的方法后，情况才发生变化。这样的无人机可以便捷地自主飞行。其价格跌至500美元或更低。如今多旋翼无人机已被用于摄影摄像、航空测量和递送包裹等各种各样的工作任务。机器人行业的一些人士认为行走机器人已经走上了一条类似的道路。

那么是什么改变了？“我们对行走动作的数学原理的理解大幅提高了。”埃姆斯解释说。老式的行走机器人走路就像踩高跷，例如日本汽车制造商本田在2000年推出的机器人Asimo就出了名的笨拙。它们前进的时候先迈一只脚，然后检查平衡状态，接着再迈另一只脚，然后再次检查平衡，就这么一步一步地慢慢挪。“人走路的时候不这样，”他说，“人脚自然落地就

能稳住身体。”

| 信步前行!

生物力学家有时将人的行走方式描述为受控的跌落。跨步走时先迈出一条腿，随着上身重量向前移动，通过微弱的潜意识在脚落地时做出矫正以保持稳定。每条腿动起来都像一根弹簧。这些运动是可预测的，并且近年来研究人员找到了对它们进行数学建模的方法。再加上能更好地操纵机器人肢体的致动器，以及能更精确地测量运动的传感器，在机器人身上重现这种行走方式就成为了可能。它不需要任何花哨的机器学习或人工智能，只需做高质量的老式运算就行了，埃姆斯补充说。

Asimo与新型机器人在步态上的差异很惊人。Asimo的粗腿看上去很沉重，而Digit用一对纤细的大长腿自信地跨步，边走边协调地摆动双臂。由波士顿动力研发的试验人形机器人Atlas（如图）的功能更加强大。它能行走、奔跑、跳跃甚至后空翻。尽管做了很多高调的宣传，但Asimo从未投产。本田在2018年悄悄地停止了该项目，转而专注于更“实用”的机器人技术，例如老年人出行辅助设备。

很容易就此得出这些新型的行走机器人只是在模仿自然的结论，很多人也正是这么想的。但事实并非完全如此。四足是一种稳定的平台，是设计行走机器人一个合适的出发点。点点的设计师们在协调了机器人的四肢、取得了良好平衡，并安装了能让机器人确定往哪落脚的视觉系统后，最终创造出了一款狗形机器人。波士顿动力的业务发展主管迈克尔·佩里（Michael Perry）说这并不奇怪，因为大自然一直都在发展有效的设计。

工艺设计不断演变去模仿自然的另一个例子可以在Digit的设计过程中找到。Digit那鸵鸟式的外观传承自机器人Cassie，这款由敏捷机器人公司设计的双足加躯干机器人卖给了许多研究团队。Cassie的开发人员必须找到一种方法来阻止机器人的一些致动器马达相互对抗。他们拿出的解决方案看上去像是鸟的两条腿。

后来，Cassie因为工程师要解决另一个问题而获得了双臂，演变成了

Digit。Cassie向前迈腿时，身体会轻微扭转，有时会导致它在快速行走时跌倒。在自然界中，有些动物在快速运动时会利用尾巴来改善平衡。敏捷机器人公司的研究人员借鉴了这一点，在Cassie躯干的两侧各加了一个尾状附件，以提高其行动稳定性。这个设计挺管用。后来他们把这对附件变成了两条手臂。如果机器人摔倒了，它能用它们撑住身体并站起来。

手臂也可以执行其他有用的任务，比如在仓库中搬箱子。Digit最大承重20公斤。赫斯特认为，配送货物很可能会是行走机器人的一个重要应用，尤其是新冠肺炎爆发后实施的限制措施推动了电子商务蓬勃发展。一些自动化配送中心围绕常规的固定式和轮式机器人系统而建，但它们通常从一开始就是这么设计的。大多数仓库都是围绕人设计的。有腿的机器人能像人类工人那样移动，因此可以直接参与进去。

随着进一步的改进，行走机器人将承担起送货上门等更复杂的任务。福特正在做这方面的探索，在它的货车车厢里带上一台Digit机器人。尽管轮式机器人已经承担了一些送货的工作，但很多地方要送货上门还有困难，而且还可能需要上下台阶或楼梯。“要把包裹送到大多数人的家门口都得用腿。”赫斯特说。

具体如何实现还要拭目以待。除非是在执行预先编程的任务，否则大多数行走机器人都需要操作员提供基本指令，比如前往某个特定地点。然后，机器人自己走去那里，在沿途避开障碍物，上下台阶和楼梯。这意味着送货上门的行走机器人可能需要某种社区数字地图，以便提前知道可以穿越的道路和需要绕开的花坛。这可能需要大量的数据采集工作，就像为无人驾驶汽车制作数字地图一样。同样，在工厂或仓库中，行走机器人将需要先接受人类的指导才能开始自行工作。

| 自主自决

要研发出完全自主、能走进未知环境并自己决定该做什么的机器人，还有很长一段路要走。对于这种机器人来说，最艰巨的任务之一将是在家中自主照顾人。机器人将必须能够做出大量复杂的决定，比如正确用药，决定是否让陌生人进屋，或者知晓何时该去遛狗了。不过，许多机器人专家都认

为机器人有朝一日将能做到这些，或者至少接近于做到。

与此同时，正在开发的新一代机器人将继续加强功能。波士顿动力的佩里认为，除测绘外，点点还将在检查和维护工作中发挥多种作用。例如，可以让这样的机器人进入变电站这类危险的环境，就不必像人类工程师进入变电站时那样必须先切断设施电源。

除了要找出问题，点点的下一个本领将是采取行动解决问题，例如扳动开关或转动阀门。它将用单条机械臂来完成这样的操作，这会让它看起来不大像狗了，而更像脖子长长的腕龙。这种构造的一个原型已经在波士顿动力的办公区使用，负责开门关门。

这个版本的点点应该会在明年上市。至于波士顿动力的人形机器人Atlas，它的价格目前还过于昂贵，不能量产商用版。但从它身上吸取的经验教训将有助于提供研发其他机器人所需的工程技术，佩里说。

有些未来的行走机器人可能不会用在地球上。加州理工学院的埃姆斯认为带腿的机器人在行星探索中会具有优势，比如它们可以穿越困难的地形、深入洞穴。与此同时，在地球上，埃姆斯和其他机构的一些同事正在利用机器人运动的新知识为行走不便的人开发轻巧的假肢设备，为完全无法行走的人开发动力外骨骼。在一个不能靠轮子通行无阻的世界里，这展现了诱人的前景：有朝一日，行走机器人将让这个世界不再需要轮椅。■



Palantir Technologies

A prickly patriot

A secretive software-maker says hello to the stockmarket—and waves goodbye to Silicon Valley

“ONE NEVER really knows who one’s enemy is.” The words of Jürgen Habermas, a noted Frankfurt School philosopher, are a good point of departure for understanding Palantir Technologies. On August 25th the controversial software firm, named after a magical orb in J.R.R. Tolkien’s “Lord of the Rings” that lets users see and speak across space and time, filed the paperwork to list on the New York Stock Exchange. Its direct offer of existing shares to public investors, without raising fresh capital, could happen within a month.

The company sells programs that gather disparate data and organise them into something usable for decision-makers, from soldiers in Afghanistan to executives at energy firms. More than a technological project, it is a philosophical, even political one. In the early 2000s its co-founder and boss, Alex Karp (who used to sit on the board of *The Economist’s* parent company), wrote a dissertation about aggression in politics at Frankfurt’s Goethe University, though not under Mr Habermas, as is often claimed. And Palantir itself is a child of the 9/11 terrorist attacks of 2001, which America’s sundry law-enforcement outfits failed to avert because they did not share data. In a preface to the prospectus, bleak by the upbeat standards of the genre, Mr Karp writes of government agencies that “faltered” and crises that “expose the systemic weaknesses of the institutions on which we depend”. Fixing these shortcomings is the company’s *raison d’être*. It could prove lucrative. But it invites attacks from rivals and critics.

Like most startups that plan to go public these days, Palantir is haemorrhaging red ink. The 17-year-old firm has yet to turn a profit. Last

year it lost \$580m on revenue of \$742m. It spends more on sales and marketing than on research and development (see chart). But its venture-capital backers, who have poured \$3bn into the firm over the years, most recently valuing it at perhaps \$26bn, can draw comfort from things moving in the right direction. In the first half of 2020 revenue rose by 49%, year on year, while losses got smaller. Sales may exceed \$1bn for the full year, thanks to the use of Palantir's products to analyse pandemic data. It will vie with Snowflake, another data business about to list, for the year's biggest software flotation.

Palantir's longer-term prospects are murkier. Successful corporate-software firms develop programs and services that can be offered without much customisation to many clients. This is trickier in the data business, where every company has a unique digital footprint. When Palantir got going, it was in effect a professional-services firm, chiefly creating bespoke data-analysis systems for the likes of the CIA and the Department of Defence. In recent years it has developed more generic products for corporate clients. But its scepticism of standardisation means it continues to deploy plenty of engineers to tweak them. This increases costs and is likely to limit how big and profitable it can get, says Mark Moerdler of Bernstein, a brokerage.

Palantir's origins bring other challenges, too. Because it came of age before the rise of computing clouds, its software often still inhabits customers' data centres, making it less nimble than younger cloud-based rivals like C3.ai and Databricks. Working for the government, particularly its spookier agencies, has also created a secretive and proprietary culture that is not an easy fit with the sort of partnerships that other tech firms often successfully use to expand their business. And it remains heavily reliant on government contracts. Between January and June 55% of revenue came from official sources, up from 45% in the same period last year. It has only 125 clients, with the biggest three (unnamed) ones accounting for nearly a third of sales.

Closeness to the state also points to Palantir's biggest risk: politics. From its post-9/11 beginnings it has seen itself as an instrument of national security. "If we are going to ask someone to put themselves in harm's way, we believe that we have a duty to give them what they need to do their job," Mr Karp writes in his missive. One of his co-founders is Peter Thiel, a famed venture capitalist of strong libertarian bent with an authoritarian streak—and an occasional supporter of President Donald Trump.

This—combined with work for Immigration and Customs Enforcement, a federal agency despised by progressives for its heavy-handed treatment of migrants, or the Pentagon's Project Maven, to analyse drone footage—has made Palantir one of the most hated firms in left-leaning Silicon Valley. "I've had my favourite employees yell at me," said Mr Karp earlier this year, from a barn in New Hampshire where he was self-isolating even before the pandemic. Some engineers have left. Others are demanding high salaries to remain; in the first half of the year Palantir paid \$182m in stock-based compensation, 38% of revenue. Though being in bed with America's law enforcers and spies won't scare off other government customers, corporate clients may take fright, particularly abroad. As the prospectus concedes, "Our reputation and business may be harmed by news or social media coverage."

Palantir, which has recently decamped from Silicon Valley to Denver, is trying to make a virtue of the culture clash. It paints itself as a patriotic problem-solver, eschewing the techno-Utopian pretensions of the West Coast's engineering elite. They may know more than most about software, Mr Karp writes. "But they do not know more about how society should be organised or what justice requires." That, he implies, is the role of elected governments; the prospectus rules out dealing with Communist China. An unusual sales pitch in tech. But a plausible one. ■



Palantir科技

复杂的爱国者

一家神秘的软件公司向股市问好，并挥手告别硅谷

“你永远无法真正知道自己的敌人是谁。”要理解Palantir科技（Palantir Technologies），法兰克福学派著名哲学家尤尔根·哈贝马斯（Jürgen Habermas）这句话是一个很好的出发点。8月25日，这家备受争议的软件公司递交了在纽约证券交易所上市的申请。Palantir这个名字源自托尔金小说《指环王》里的一个魔球，用这颗球能跨时空会面交谈。它可能会在一个月内直接向公众投资者发售现有股票，而不会筹集新资金。

这家公司销售的程序可以汇集互不相干的数据，把它们整理成决策者可用的信息，服务对象既有驻阿富汗士兵，也有能源公司的高管。这不仅是一个技术项目，更是一个哲学甚至是政治项目。本世纪初，公司的联合创始人及老板亚历克斯·卡普（Alex Karp，曾是《经济学人》母公司的董事）在法兰克福歌德大学写了一篇关于政治中的侵略性的博士论文，虽然这篇文章并不像人们常说的那样由哈贝马斯指导。而且Palantir本身是2001年911恐怖袭击事件的产物，当时美国形形色色的执法机构因为没有共享数据而没能避免这场灾难。以招股书一贯乐观积极的口吻衡量，Palantir的这份可说阴暗沉重。卡普在序言里描写了“摇摇欲坠”的政府机构和“暴露了我们所依赖的机构的系统性弱点”的危机。纠正这些缺陷是这家公司存在的意义。这也许会带来丰厚的利润，但它招来了竞争对手和批评人士的攻击。

像最近大多数计划上市的创业公司一样，Palantir也在大笔亏损。这家17岁的公司还没开始盈利。去年该公司营收7.42亿美元，亏损5.8亿美元。它在销售和市场营销上的投入高于研发（见图表）。风险投资商多年来向该公司投入了30亿美元，最近对它的估值可能在260亿美元。或许能让他们稍觉安慰的是，有些事情正朝着对的方向走。今年上半年，公司收入同比增长了49%，亏损也减少了。Palantir的产品被用来分析疫情数据，这可能有助于其全年销售额突破10亿美元。它将与另一家即将上市的数据公司雪

花（Snowflake）竞争年度规模最大的软件公司上市案。

Palantir的长期前景更看不清楚。成功的企业软件公司开发的程序和服务无需太多定制就能提供给众多客户。但这在数据这一块更加棘手，因为每家公司都有自己独特的数字足迹。Palantir成立之初实则是一家专业服务公司，主要为美国中情局和国防部等机构定制数据分析系统。近年它为企业客户开发了更多通用产品。但它对标准化持怀疑态度，这就意味着要继续安排大量工程师来微调产品。经纪公司盛博的马克·默尔德勒（Mark Moerdler）认为，这增加了成本，很可能会限制其规模和盈利能力。

Palantir的出身背景也带来了其他挑战。因为它在云计算兴起之前就已经成熟，所以它的软件往往仍安装在客户的数据中心里，相比C3.ai和Databricks这样基于云计算的年轻竞争对手，它没那么灵活。为政府尤其是那些鬼魅般的情报机构工作，也生成了一种神秘而专有的文化，这和其他科技公司经常成功用来扩展业务的那种合作关系并不容易契合。此外它仍然严重依赖政府合同。今年1月至6月，公司收入的55%来自政府渠道，高于去年同期的45%。它只有125个客户，其中最大的三家（未透露名称）占到销售额的近三分之一。

与政府关系密切也体现出Palantir最大的风险：政治。自它在911恐袭事件后诞生开始，它就自视为维护国家安全的工具。“如果我们要请某人把自己置身于危险境地，我们相信我们有责任为他们提供他们工作所需的东西。”卡普在招股书里写道。他的联合创始人之一彼得·泰尔是著名的风险投资家，在强烈的自由意志主义倾向中带着些独裁色彩，有时会支持特朗普。

除此之外，它为移民和海关执法局（ICE，一个因为严苛对待移民而被进步人士鄙视的联邦机构）服务，而且还为五角大楼的Maven项目（Project Maven）分析无人机视频，都让它在左倾的硅谷成了最招人恨的公司之一。“有些我最喜欢的员工对着我大喊大叫。”卡普在今年早些时候提到。当时他在新罕布什尔州的一个谷仓里办公，疫情爆发之前他就已经在那里自我隔绝了。有些工程师已经辞职走人。剩下的要求拿高薪才肯留下：今

年上半年Palantir支付了1.82亿美元的员工股权激励，占公司收入的38%。尽管与美国的执法者和间谍同床共枕不会吓跑其他政府客户，却可能会吓到企业客户，尤其是国外企业。正如招股说明书里承认的，“新闻或社交媒体报道可能会损害我们的声誉和业务”。

最近从硅谷搬到丹佛的Palantir想要利用文化冲突。它把自己描绘成一个能解决问题的爱国者，弃绝西海岸精英工程师那种技术乌托邦式的自命不凡。他们可能比大多数人都更了解软件，卡普写道。“但对于应该如何组织社会，或者实现正义需要什么，它们可不比别人懂得多。”他暗示，这正是民选政府的作用；招股说明书排除了和共产党治下中国打交道的可能。在科技行业，这是一种不同寻常的推销手法。不过确实能言善道。■



Chaguan

System, heal thyself

Party praise for covid-fighting doctors does little to fix China's ailing health system

THE CHINESE LANGUAGE is rich in concise, sardonic sayings, many of which reflect universal truths. It also includes lots of phrases steeped in a world view that is distinct to China. One such is *yi buguo erdai*, meaning “no doctor’s child becomes a doctor”. This may be accompanied by a cynical shrug, perhaps after reading about the latest Chinese hospital boss arrested for bribe-taking or a fresh scandal involving fake medicines. The saying is also used on hearing news outlets describe another stabbing or assault of a doctor at work—for fully two-thirds of doctors told the Chinese Medical Doctor Association in 2017 that they had been attacked or threatened in a hospital, often by their patients’ angry relatives. Small wonder that in one survey after another, few want their children to be doctors.

Elsewhere, doctoring is such a family business that journals of medical ethics devote papers to the subject. One such study found that one in five American medical students has a parent who is a physician. In China the profession is neither very prestigious nor especially well paid: even senior doctors typically earn just over 100,000 yuan (\$14,500) a year—hardly a fortune in a big city.

Then came covid-19. Communist Party leaders have declared their handling of the virus a triumph, and are willing to give doctors and nurses a share of the credit. Much of China feels normal now, even celebratory. Case numbers are so low that authorities are easing strict lockdowns and border closures imposed months ago, though they are in no hurry to dismantle digital tracing systems that oblige urbanites to scan QR codes with a smartphone when entering a public building or taking a train or aeroplane.

Early cover-ups, which saw officials in the city of Wuhan conceal the severity of the outbreak for weeks, punishing doctors who sounded the alarm, have no place in official narratives. Medals and honours have, however, been bestowed upon selected, state-approved doctors and scientists who prodded the central authorities to act. A new art exhibition at the National Museum in Beijing, devoted to covid-fighting medics, opens with a giant portrait of Zhong Nanshan, a celebrated 83-year-old lung doctor who used his seniority to reveal in late January, on national television, that covid-19 was spreading between people. The doctor, depicted against a stormy sky, his eyes brimming with tears, is captioned: “Communist Party member, Zhong Nanshan”. Another artwork depicts young doctors from an elite Beijing hospital taking a break from volunteer service in Wuhan to express their patriotic fervour in a letter to the party chief, Xi Jinping. The show is reserved for Chinese nationals, so Chaguan has seen only photographs of his favourite work, a Tibetan scroll-painting, or *tangka*, showing three figures in traditional robes prodding leering, cartoon-like coronavirus spheres into a fiery pit, watched by a yak in a face-mask.

Propaganda about heroes in white coats has filled state media for months. It seems to have resonated. Zhang Shuyang, dean of China’s most highly regarded medical school, Xiehe, told state television that applications to her college and its sister academy at Tsinghua University, also in Beijing, are up 30% since last year.

Yet other experts on China’s health system express caution. Praising heroic doctors from well-known, elite hospitals does nothing to solve the big, structural problem with China’s health system, and may even make it worse. Access to good care is shockingly uneven, with a vast gulf of quality between big-city hospitals and the rest. That prompts the public to seek care at a few, overcrowded urban hospitals, sometimes queuing for days to see a doctor for a 90-second consultation. What China really needs is

clinics in small towns and villages that people actually want to use.

Distrust of local medicine is well founded. In 2016 just 0.2% of rural doctors in village clinics held at least a bachelor of science degree in medicine. Even in township-level health centres, only just under half of doctors in general practice (known as family medicine in America) are university graduates.

China's best medical colleges are trying to set eight years of training as a norm. But despite schemes offering tuition-free medical education to those willing to work in rural areas, most graduates want jobs in large cities. "You have got to develop adequate incentives for medical graduates to go back to the countryside and serve the people," says Tang Shenglan of Duke University in North Carolina. Perhaps a third of medical graduates never practise as doctors. Big-city hospital jobs are hard to land, and county general hospitals struggle to recruit new graduates, who can earn more as pharmaceutical sales reps. In the profession overall, "morale is not high, honestly speaking", says Professor Tang. Until China reforms the way that hospitals are financed, even doctors with "good hearts" will face pressure to earn revenues for their department (and performance-related pay for themselves and their colleagues) by over-prescribing drugs, tests and surgical operations.

| *First, do no harm*

Liu Tingfang, a professor of hospital management at Tsinghua University, worries that relations between anxious patients and harried hospital doctors are "not nice any more". To repair them, the public needs to believe that hospitals care about more than making money, he says. For doctors to be respected, they must be better paid and allowed to seek more than one legal income source, as in the West. Otherwise, post-covid, "things will go back to where they were," the professor frets.

Another Chinese saying holds that “seeing a doctor is hard and expensive”. Working patiently to retire that phrase is not as exciting as staging patriotic exhibitions about covid-fighting heroes. But it is the key to reducing cruel inequalities that too often make sickness a financial catastrophe, and poverty a death sentence. For years China’s priority has been shiny high-speed trains, Olympic stadiums and aircraft-carriers to awe the world. A true superpower would build a health system to match. ■



茶馆

体系，先治好你自己

党表彰抗疫医生对祛除中国医疗体系的弊病无甚用处

中文富含句式精炼、意含讥讽的谚语，其中很多都表达普遍真理。它也有大量洋溢着中国特色世界观的短语。其中一句是“医不过二代”，意思是“医生的子女都不会从医”。说这句话时，人们可能会冷冷地耸耸肩，也许是读到又有哪家医院的高层涉贿被抓了或者哪里又爆出了假药丑闻。也可能是听闻媒体报道又有医生在工作时被人捅了或打了——2017年足足有三分之二的医生告知中国医师协会自己在医院里被袭击或威胁过，袭击者往往是患者愤怒的亲属。难怪一次又一次调查显示，没什么人希望自己的孩子也当医生。

在其他地方，从医却显然是一种家族事业，以至于医学伦理学方面的期刊会专门就这个议题发表论文。其中一项研究发现，美国每五个医学生就有一个父母中有人是医生。在中国，医生这个职业的名望不算非常高，薪酬也不算特别好：资历较高的医生年收入一般也才刚过10万元人民币——这在大城市可算不上一笔巨款。

然后新冠疫情来了。共产党领导人宣布当局对病毒的应对是一场胜利，并愿意将它部分归功于医护人员。中国大部分地区现在已恢复正常，甚至在庆祝。由于病例数量很低，当局正在逐步放松几月前开始实施的严格封锁和边境关闭政策，不过他们并不急于撤销数字追踪系统，该系统规定城市居民在进入公共建筑或乘坐火车或飞机时须用智能手机扫描二维码。

在疫情爆发之初，武汉市官员在长达数周的时间里试图隐瞒疫情的严重性，对发出警报的医生施以惩戒，这在官方叙事中并没有出现。勋章和荣誉转而颁给了一部分敦促中央采取行动的、受国家承认的医生和科学家。在北京的国家博物馆举办的一场新美术作品展以致敬抗疫医护工作者为主题，以钟南山的巨幅肖像开篇。83岁的钟南山是一位著名的胸肺科医生，1月下旬他利用自己的资历在国家电视台上披露新冠肺炎人传人。在这幅

题为《中国共产党员——钟南山》的画中，他在暴风骤雨的天空下眼含泪光。另一幅作品描绘了来自北京一家著名医院的年轻医生们在武汉志愿支援抗疫期间，利用片刻休息时间在给总书记习近平的一封信中抒发爱国热情。这次展览只对中国公民开放，所以本专栏作者只看到了自己最喜欢的作品的照片，这是一幅西藏卷轴画（也叫唐卡），画中三个身穿藏袍的人把邪笑着的、卡通化的冠状病毒球体推进一个火坑，一头戴着口罩的牦牛在火坑旁看守着。

几个月来，关于白衣天使抗疫英雄的宣传充斥官方媒体。这似乎已经产生了回响。中国最受推崇的医学院北京协和医院的院长张抒扬告诉国家电视台，她所在的学院及其姊妹院校清华大学医学部的申请人数自去年以来已增加了30%。

不过，其他研究中国医疗体系的专家认为需要警惕。表彰来自著名重点医院的英勇的医生对解决中国医疗体系的结构性问题毫无帮助，甚至还可能加剧问题。由于大城市的医院与其余医疗机构之间的水准差距悬殊，人们在获得优质医疗方面存在极严重的机会不均。这促使民众一窝蜂地挤进城里人满为患的医院看病，有时排上几天的队只为能和医生聊上一分半钟。中国真正需要的是人们真的愿意去使用的城镇和乡村诊所。

对地方上医疗的不信任有充分的理由。2016年，在村级诊所中，只有0.2%的乡村医生拥有医学学士以上学位。即使在镇级医疗中心，全科医生（在美国称为家庭医生）中仅略少于一半的人是大学毕业生。

中国最顶尖的医学院正在试图将八年制培训设为标准。但尽管一些方案为愿意到农村工作的人提供免学费的医学教育，大多数毕业生还是想在大城市就业。北卡罗来纳州杜克大学的汤胜蓝说：“你必须制定充分的激励措施，才能让医科毕业生返回农村为人民服务。”也许有三分之一的医科毕业生根本不会从医。大城市医院的职位很难获得，而县级综合医院很难招到新的毕业生，因为他们去做医药销售代表可以挣到更多钱。汤教授说，在整个行业，“坦白说，士气不高”。在中国改革医院融资方式之前，即便是“心地善良”的医生也面临压力，要通过多开药、多做检查和手术来为自

己的科室赚取收入（也为自己和同事赚取绩效挂钩报酬）。

| 首先，别制造伤害

清华大学医院管理学教授刘庭芳担心，焦虑不安的患者和不胜烦扰的医院医生之间的关系“不再美好”。他说，要修复这种关系，公众需要能相信医院不是只关心赚钱。医生若想得到尊重，他们必须像在西方国家那样，改善待遇，并被允许寻求不止一种合法收入来源。否则，疫情过后，“一切还会回到老样子”，刘教授忧心忡忡地表示。

中文里还有一句话，“看病难，看病贵。”孜孜不倦地改革以让这句话消失不见，不及办一场歌颂抗疫英雄的爱国主题展览来得激动人心。但它是减少残酷的不平等的关键，这种不平等往往把生病变成财务灾难，把贫困变成死刑判决。多年来，中国追求的优先项是光鲜亮丽的高铁、奥运场馆和航空母舰，以期惊艳世界。一个真正的超级大国会建立与之相匹配的医疗体系。■



Energy utilities

Lit

Businesses compete to battle California's blackouts

DEPENDING ON WHOM you ask, California is a leader in clean energy or a cautionary tale. Power outages in August prompted stern critiques from Republicans. “In California”, Donald Trump tweeted, “Democrats have intentionally implemented rolling blackouts—forcing Americans in the dark.” In addition to provoking outrage and derision, however, the episode is also likely to inspire investment.

The Golden State has long been America’s main testing ground for green companies. Californians buy half of all electric cars sold in America. Theirs is the country’s largest solar market. As California deals with heat waves, fires and a goal of carbon-free electricity by 2045, the need for a reliable grid is becoming ever more obvious. For years firms competed to generate clean power in California. Now a growing number are vying to store and manage it, too.

August’s blackouts have many causes, including poor planning, an unexpected lack of capacity and sweltering heat in not just California but nearby states from which it sometimes imports power. Long before the outages, however, electricity operators were anxious about capacity. California’s solar panels become less useful in the evening, when demand peaks. In November state regulators mandated that utilities procure an additional 3.3 gigawatts (GW) of capacity, including giant batteries that charge when energy is abundant and can sell electricity back to the grid.

Too few such projects have come online to cope with the surge in demand for air-conditioning in the scorching summer. But more are sprouting across the state. On August 19th LS Power, an electricity firm backed by

private equity, unveiled a 250-megawatt (MW) storage project in San Diego, the largest of its kind in America. In July the county of Monterey said Vistra Energy, a Texan power company, could build as much as 1.2GW of storage.

The rooftop solar industry stands to benefit from a new Californian mandate that requires new homes to install panels on their roofs from this year. Sunrun, the market leader, is increasingly pairing such residential installations with batteries. In July, for instance, the company said it had won contracts with energy suppliers in the Bay Area to install 13MW of residential solar and batteries. These could supply power to residents in a blackout or feed power into the grid to help meet peak demand. Sunrun is so confident in its future that it has bid \$3.2bn for Vivint Solar, its main rival.

Another way to stave off outages is to curb demand. Enel, a European power company, has contracts with local utilities to work with large commercial and industrial clients. When demand rises, Enel pays customers to reduce energy consumption, easing demand on the grid. A company called OhmConnect offers something similar for homeowners.

Even as such offerings scale up, the need for reliability means that fossil fuels will not disappear just yet. On September 1st California's regulators voted to delay the retirement of four natural-gas plants in light of the outages. The state remains intent on decarbonising its power system over the next 25 years. But progress may not move in a straight line. ■



能源公用事业

照亮前路

企业竞相迎战加州大停电

加州到底是清洁能源的引领者还是反面教材，答案取决于你问的是谁。8月的大停电引来了共和党人的尖锐批评。特朗普在推特上写道：“在加州，民主党人故意实施轮流停电，迫使美国人陷入黑暗。”然而，这一事件除了激起愤怒和嘲弄，也很可能催生投资。

长期以来“黄金州”都是美国绿色企业的主要试验场。全美售出的电动汽车有一半是被加州人买走的。这里也是美国最大的太阳能市场。随着加州应对热浪、火灾以及要实现到2045年无碳发电的目标，对电网可靠性的需求日益突显。多年来，企业争相在加州生产清洁电力。现在，越来越多的公司又围绕电力储存和管理展开竞争。

八月停电的原因很多，包括计划不周、出人意料的装机容量不足，以及酷暑——不仅仅是加州，周边几个有时为加州供电的州也遭遇了高温。不过，在此次停电发生前很久，电力运营商就已经在为容量问题忧心忡忡。加州的太阳能面板在傍晚用电高峰时段用处不大。去年11月，州监管机构要求电力公司额外添置3.3吉瓦容量，其中包括巨型蓄电池，它们可在电力充足时充电，稍后再把电力卖回给电网。

已经投入运营的此类项目太少，没能满足今年炎夏飙升的空调用电需求。但越来越多项目正在加州各地涌现。8月19日，获私募基金投资的电力公司LS Power在圣地亚哥建成了250兆瓦的储能系统，在全美此类项目中规模最大。蒙特利县在7月表示，德州电力公司Vistra Energy可能将建设高达1.2吉瓦的储能容量。

加州政府规定从今年起新建房屋必须在屋顶安装太阳能面板，这势必令屋顶太阳能产业受益。这个市场的领头羊Sunrun在安装这类住宅太阳能系统时已开始越来越多地搭配蓄电池。例如，该公司在7月表示已经赢得了旧

金山湾区能源供应商的合同，将安装13兆瓦的住宅太阳能系统和电池。这些设备可以在停电时为居民供电，也可以向电网输出电力，帮助满足高峰期需求。Sunrun对自己的未来信心十足，已经出价32亿美元收购主要竞争对手Vivint Solar。

要避免停电，另一种方法就是抑制需求。意大利国家电力公司（Enel）这家来自欧洲的电力公司与加州本地的公用事业公司签订合同，与大型工商业客户协调用电水平。当用电需求上升时，Enel会向客户付费换取它们减少耗电，从而缓解电网的压力。一家名为OhmConnect的公司针对房主提供类似的协调方案。

在这些措施不断扩大规模的同时，要保证持续可靠的供电意味着化石燃料还不会那么快退出舞台。9月1日，在此次停电事故带来新的权衡后，加州监管机构投票决定推迟关停四家天然气电厂。加州仍然决心在25年内实现电力系统脱碳。但这个过程恐怕不会一帆风顺。■



Lebanon's insurers

Broken cover

The explosion at Beirut's port will also blow a hole in insurers' balance-sheets

A HOMEOWNER IN Achrafieh does not care if the investigation is a sham, only that it rules that the explosion was an accident. Otherwise his insurance policy will pay nothing. The owner of a ruined boutique down the hill in Mar Mikhael would prefer the opposite result: her policy covers terrorism, unlike most, and will compensate her for an estimated \$100,000 in repairs and lost inventory. The manager of a car-rental firm wonders if his explosion cover will include one of the largest non-nuclear explosions in history, since his vehicles were flattened by falling debris, not the blast itself.

The explosion that ripped through Beirut on August 4th, caused by 2,750 tonnes of ammonium nitrate stored improperly for years at the port, devastated much of the city centre. More than 200 people are dead or missing, thousands wounded, and an estimated 300,000 are homeless. The damage to property could reach \$15bn. A chunk of that will land on insurance companies in Lebanon, with consequences for banks and foreign reinsurers.

In 2018 Lebanese insurers paid out around \$90m to settle property and casualty claims. Insured losses at the port alone could now run to \$250m. Victims have filed 2,500 claims for \$425m in damages across the city, according to Raoul Nehme, the caretaker economy minister. Insurers expect the number of claims to quadruple and the final price tag to hit \$3bn. That is almost double the annual revenue of Lebanon's 52 insurers, which wrote \$1.7bn in gross premiums in 2018.

Claims are frozen until the government finishes investigating the blast.

Insurers would largely be off the hook if it were a deliberate act (there is no evidence to suggest it was). An act of war would trigger *force-majeure* clauses, and most policies do not cover terrorism. The worst scenario for insurers is also the most likely: that the blast was an accident. That would trigger another set of claims, as insurers seek to collect from the owners of the warehouse where the ammonium nitrate was stored.

Whatever the final bill, some Lebanese insurers will struggle to pay it. Written premiums fell by 4% in 2019 as an economic crisis forced some policyholders to drop their coverage. This year has been worse. Several insurers are subsidiaries of the country's insolvent banks. Arope, one of the ten biggest non-life insurers, is owned by Blom, Lebanon's second-largest bank, which saw net profits fall 77% last year. Other lenders in the country, such as Byblos and Credit Libanais, also offer insurance products.

Foreign reinsurers will be stuck with part of the bill. Hannover Re expects to book a "major loss", an event with more than €10m (\$11.8m) in claims. Sven Atloff, a member of its board, says it is still impossible to tell whether the total cost will be in the low tens of millions of euros, or even exceed €100m. The firm's net income was already down by 39% in the first half of 2020 because of covid-related losses. Munich Re also expects a sizeable hit.

For Lebanese firms there is an added wrinkle: whether they can get the cash to pay claims, many of which must be paid in dollars. (Though still officially pegged to the greenback, the Lebanese pound has lost 80% of its value on the black market in recent months.) A banking crisis that began in October has left dollars scarce; foreign-currency withdrawals are tightly restricted. The central bank may have to stop subsidising wheat and fuel imports in November because it is close to its minimum required reserves.

Several policyholders say their insurers have offered to pay them with bank cheques, which can still be freely deposited. But the cheques lose up to

two-thirds of their value once withdrawn from banks in devalued local currency, typically converted at a “quasi-official” rate, and converted to dollars on the black market. After months or years of delay, the policies of many of the blast’s victims may give them a payment barely worth the paper they are written on. ■



黎巴嫩的保险公司

自身难保

贝鲁特港大爆炸还会把保险公司的资产负债表炸出个大窟窿

阿什拉菲耶区（Achrafieh）的一名房主并不在乎调查是否装模作样，只在乎它是否会将这场爆炸判定为意外。如果不是意外事故，他的保险不会赔偿一分钱。马尔米哈尔街区（Mar Mikhael）山脚下一家严重受损的时装店的店主倒希望调查结果正相反，因为她买的保险和大多数保险不同，涵盖了恐怖袭击，预计会赔偿她10万美元的维修费和库存损失费。一家租车公司的经理寻思着自己投的爆炸险到底会不会赔付这次史上最大的非核爆炸之一，因为自己的车都是被坠落物压扁，而不是被爆炸本身击碎的。

发生在8月4日、殃及贝鲁特全城的爆炸是由在港口不当储存多年的2750吨硝酸铵所致，摧毁了市中心的大部分地区。超过200人死亡或失踪，数千人受伤，估计30万人无家可归。财产损失可能高达150亿美元。其中相当大一部分将会落到黎巴嫩的保险公司头上，并冲击银行和国外的再保险公司。

黎巴嫩的保险公司在2018年为财产损失和人员伤亡赔付了约9000万美元。如今仅贝鲁特港的保险损失可能就高达2.5亿美元。黎巴嫩看守政府经济部长拉乌尔·内赫姆（Raoul Nehme）称，贝鲁特各地的受害者已经提出了2500项索赔，总额达4.25亿美元。而保险公司预计索赔数量还会增长三倍，最终的赔付总额将高达30亿美元。这几乎是黎巴嫩52家保险公司年收入的两倍。2018年它们的总保费收入为17亿美元。

在政府对爆炸的调查结束之前，索赔不会被受理。如果爆炸是蓄意行为（目前没有证据表明是如此），保险公司倒是多半会逃过一劫。战争行为将触发不可抗力条款，而且大部分保险都不对恐怖袭击承保。对保险公司来说最坏的也是最有可能的情况就是爆炸是场意外。这将引发另一组索赔，因为保险公司会寻求让硝酸铵储存仓库的所有者补偿损失。

不管最终的账单数字是多少，一些黎巴嫩保险公司都将不堪承受。2019年，黎巴嫩的经济危机导致一些投保人不得不停止买保险，保险公司的保单保费下降了4%。今年的情况更糟糕。好几家保险公司的母公司都是黎巴嫩资不抵债的银行。十大非寿险公司之一的Arope的母公司、黎巴嫩第二大银行布洛姆银行（Blom）去年的净利润下滑了77%。黎巴嫩的比布鲁斯银行（Byblos）、信贷银行（Credit Libanais）等其他贷款机构也提供保险产品。

外国再保险公司将不得不承担部分费用。汉诺威再保险公司（Hannover Re）预期自己将录得一次“重大损失”，即索赔金额超过1000万欧元（1180万美元）的事件。该公司董事斯文·阿特洛夫（Sven Atloff）表示，目前仍无法确定总损失是在小几千万欧元，还是会甚至超过一亿欧元。受新冠肺炎的影响，该公司的净收入在今年上半年已经下降了39%。慕尼黑再保险公司（Munich Re）同样预计自己会受到相当大的冲击。

黎巴嫩的保险公司还面临另外一个问题：是否能获得支付索赔的现金，其中许多索赔必须以美元支付。（尽管黎巴嫩镑的官方汇率仍盯住美元，但近几个月它在黑市上已贬值了80%。）自去年10月爆发的银行业危机导致美元紧缺，外汇提款目前受到严格限制。黎巴嫩央行可能不得不在11月停止对小麦和燃料进口的补贴，因为它的外汇储备已经接近法定最低水平。

几名投保人表示，他们的保险公司已经提出用仍可自由存储的银行支票来支付赔款。但这些支票一旦以贬值的本国货币从银行取出——通常是按“半官方”汇率，再到黑市上兑换成美元——就会损失掉高达三分之二的价值。如果再拖上几个月或几年，此次爆炸事件的众多受害者拿到的赔偿可能已所剩无几。■



Stock exchanges

Big fish

Twenty years ago the world's elite exchanges were clubby and obscure. Now their tentacles spread far and wide

THE HONG KONG Stock Exchange (HKEX) resembles a financial estuary, says Charles Li, its boss. China's capital flows mix with the open seas of global markets. In 2014 HKEX sought to ride the waves by launching Stock Connect, a conduit allowing offshore and mainland punters to invest in each other's markets. Later it eased its listing rules for firms with dual share classes. All that has helped make HKEX more hospitable to the tech firms that exchanges covet. It has just landed another big catch. On August 25th Ant Group, the fintech affiliate of Alibaba, a Chinese e-commerce giant, filed for a listing that may raise \$30bn in Hong Kong and Shanghai. That would make it the largest initial public offering ever.

The news made a splash. But it is easy to forget that, in the two decades or so since they themselves listed, HKEX and other exchanges have become big fish too, by exploiting the benefits of network effects, data and scale that Big Tech is best known for. The London Stock Exchange, which was worth less than \$2bn when it went public in 2001, now has a market capitalisation of \$41bn. The New York Stock Exchange (NYSE) is now part of Intercontinental Exchange (ICE) which is worth \$57bn (see chart 1). HKEX's market capitalisation has grown nearly sixty-fold, to \$61bn. Their revenues similarly boomed.

Once crusty monopolies, exchanges have continually stretched their business models. They still run the match-making infrastructure that allows billions of shares and trillions of dollars to change hands daily. Stacey Cunningham, who helms NYSE, says it received over 300bn messages across its systems on peak days this spring; that is more than 50

times the number of daily Google searches. But after two decades of epic bidding wars and political drama, exchanges are also remarkably powerful financial conglomerates, controlling everything from the software powering banks' back offices to the data pored over by investors. The race for dominance means that, today, a small group of elite exchanges are far ahead of the rest.

Stock exchanges used to be owned by their members, which were mostly banks and brokers. When the biggest went public in the 2000s, they earned their crust by charging fees on equity issuance and transactions. The exchanges sought to diversify by expanding abroad and becoming trading venues for other assets, like derivatives and currencies. Most moved into clearing and settlement facilities, too.

For much of that period, “eat or be eaten” was the industry’s motto. In 2007 NYSE bought Euronext, a group that included the Amsterdam and Paris exchanges. ICE bought NYSE in 2013 (and spun out Euronext). Yet the strategy soon came up against antitrust and political vetoes. Attempts to marry Toronto’s stock exchange with LSE, LSE with Deutsche Börse, Deutsche Börse with NYSE, have all collapsed. Most recently, in 2019, an opportunistic bid by HKEX for the LSE fell through.

With deals proving tricky the firms have found crafty ways to expand. As passive funds came to prominence, trading venues set their sights on benchmarks tracked by these funds. In 2010 Chicago Mercantile Exchange (CME), a big derivatives market, acquired Dow Jones, which assembles many of America’s most widely followed indices. LSE has a number of benchmarks that cover both sides of the Atlantic. (Updates to such indices—like the ejection of ExxonMobil, an oil firm, from Dow’s flagship index on August 25th—can cause mountains of money to shift).

Now the elite exchanges have turned their attention to data. On August 6th

ICE said it had agreed to pay \$11bn for Ellie Mae, which tracks the mortgage industry. LSE is awaiting approval of its \$27bn bid for Refinitiv, a market-data firm. The hunt, says David Schwimmer, LSE's boss, is only beginning. Whereas trading volumes are cyclical, indices and data are typically sold via more stable subscriptions. Oliver Wyman, a consultancy, expects trading revenues to stagnate or even decline, but those from crunching data to grow by over 5% annually in coming years.

Twenty years ago the fear was that new entrants would eventually topple the exchanges' de facto monopolies. But the incumbents have kept the challengers at bay. Customer complaints about their fat fees once enticed startups, such as IEX, an exchange that pledges fairer pricing. The rise of "dark pools"—venues that match buyers and sellers anonymously—also posed a threat. But seven years since it was founded, IEX's market share is stuck at 1.8%. The share of trading volume accounted for by dark pools in America has stabilised at 12%.

The result is a pyramidal hierarchy, a good gauge of which is an exchange's revenues. At the base are the minnows, in poor countries or small developed ones, which lack liquidity or scale and are struggling to diversify. Some should merge or close, but governments will keep them alive. "Every nation wants to have a strong airline, a good beer and a stock exchange," says Nick O'Donnell of Baker McKenzie, a law firm.

The next tier consists of exchanges with regional heft, and revenues exceeding \$500m. Their reliance on trading in an era of tensions between America and China means they must team up or play to their strengths as neutral turf in order to thrive. On August 20th Singapore Exchange said it would work with LSE's benchmark business to develop index derivatives focused on Asian and emerging markets. Euronext has acquired Nord Pool, a power market.

At the top of the food chain, with revenues at or exceeding \$3bn, sit the giants: CME, Deutsche Börse, ICE and LSE. These have assured demand for big volumes, and will continue to reap the rewards of diversification. Two candidates are on the verge of promotion into the top league. Nasdaq, once famous only for its tech listings, now makes software that powers more than 130 other exchanges. HKEX enjoys the strongest tailwinds. It stands to win from China's capital-market liberalisation, its growing tech nous and mainland firms' desire to be closer to their home market. Geopolitics could also help, as Ant's decision not to list in America may already show.

In time, Mr Li reckons, "almost all" Chinese companies listed in America will come back to Asia. Stock Connect, which makes up 7-8% of daily trading on HKEX, could end up accounting for a quarter of it. Being at the confluence of China's rivers of capital and the sea of global funds should be a lucrative business. ■



证交所 大鱼

二十年前世界顶尖交易所排外而低调。如今它们的触角四处蔓延

香港交易所总裁李小加说，港交所就像一个金融入海口。中国的资本流在这里汇入全球市场的公海。2014年，港交所顺势而为，启动先后推出“沪港通”和“深港通”，允许境外和中国大陆投资者通过这个渠道投资对方市场。后来，它又针对双重股权结构公司放宽了上市规则。这些举措都让港交所更积极接纳被一众交易所觊觎的科技公司。最近它刚钓到了又一条大鱼。8月25日，中国电商巨头阿里巴巴的金融科技子公司蚂蚁集团申请在香港和上海两地上市，计划融资300亿美元。这将使其成为史上最大的IPO。

这条消息引发了轰动。但人们很容易忘记的是，在港交所等交易所自己上市后20年左右的时间里，它们同样通过网络效应、数据和规模优势这些原本是科技巨头最为人熟知的手段，让自己也长成了大鱼。伦敦证券交易所（LSE，简称“伦交所”）于2001年上市时市值还不到20亿美元，如今已达到410亿美元。纽约证券交易所（NYSE，简称“纽交所”）现在已被洲际交易所（ICE）收购，后者市值为570亿美元（见图表1）。港交所的市值增长了近60倍，达到610亿美元。它们的收益同样暴涨。

交易所曾是顽固封闭的垄断企业，把自己的商业模式不断用到极致。它们现在仍然经营着撮合交易的基础设施，每天易手的股票数量以十亿计，成交额以万亿美元计。纽交所的掌门人斯泰西·坎宁安（Stacey Cunningham）表示，今年春季高峰时段旗下系统每天收到3000多亿条报文。这是谷歌日搜索量的50倍还多。但是，在经历了20年的收购大战和政治大戏之后，交易所如今也是非常强大的金融企业集团，掌控着从银行后台软件到被投资者反复钻研的数据等方方面面。一场争夺统治地位的赛跑已经让一小批顶尖交易所遥遥领先。

股票交易所过去由会员所有，主要是银行和券商。当本世纪头十年最大的

交易所纷纷上市时，它们通过对股票发行和交易收取费用来赚钱。交易所向海外扩张，并成为衍生品和货币等其他资产的交易场所，以求实现业务多元化。它们大部分还进入了清算和结算业务领域。

在那个时期的大部分时间里，“弱肉强食”是这个行业的座右铭。2007年，纽交所收购了包括阿姆斯特丹交易所和巴黎交易所的泛欧交易所（Euronext）。洲际交易所于2013年收购了纽交所（并分拆了泛欧交易所）。但这种策略很快遭到反垄断和政治上的否决。多伦多证交所与伦交所、伦交所与德意志证交所（Deutsche Börse，简称“德交所”）、德交所与纽交所的合并尝试均告失败。最近一次失败的是2019年港交所对伦交所的投机性收购要约。

并购变得障碍重重后，交易所灵活应变，另觅扩张途径。随着被动型基金的崛起，交易所盯上了这些基金追踪的基准。2010年，大型衍生品市场芝加哥商品交易所（CME，简称“芝商所”）收购了汇编许多美国最受关注指数的道琼斯。伦交所也提供一系列涵盖欧美市场的基准。（此类指数的更新可能导致巨量资金转移，8月25日道琼斯从其旗舰指数中剔除了石油公司埃克森美孚便是一例）。

如今，顶尖交易所又将目光投向了数据。8月6日，洲际交易所表示已同意以110亿美元收购跟踪抵押贷款行业的Ellie Mae。伦交所出价270亿美元收购市场数据公司路孚特（Refinitiv），目前正等待批准。伦交所老板大卫·史威默（David Schwimmer）表示，竞购大战才刚刚打响。证券交易会周期性涨跌，但指数和数据通常都是通过更稳定的订阅服务销售的。奥纬咨询（Oliver Wyman）预计，未来几年交易收入将停滞不前甚至下降，但来自数据分析的收入每年将增长5%以上。

二十年前，交易所还在担心新进入者最终将颠覆它们事实上的垄断地位。但老牌交易所还是成功地将挑战者挡在了门外。客户对高额收费的抱怨一度吸引了一些创业公司冒头，例如承诺更公平定价的交易所IEX。“暗池”是一种匿名匹配买卖双方的交易场所，它的兴起也构成了一定威胁。但已成立七年的IEX的市场份额一直卡在1.8%。美国暗池交易的份额也稳定在

12%。

结果就形成了一个金字塔型的层级结构，从交易所的收入水平就能清楚显示其所处位置。位于底部的是贫穷国家或小型发达国家的小鱼小虾，它们缺乏流动性，也不成规模，正在艰难地追求多元化。有些应该合并或关闭，但政府还是会让它们生存下去。“每个国家都想拥有一家航空巨头、一款好啤酒和一个股票交易所。”贝克麦坚时律师事务所（Baker McKenzie）的尼克·奥唐纳（Nick O'Donnell）说。

往上一层是具有区域影响力的交易所，收入超过五亿美元。它们对交易的高度依赖意味着，在中美关系紧张的时代，它们必须联合起来或者发挥自己作为中立地的优势才能蓬勃发展。8月20日，新加坡交易所宣布将与伦交所的基准指数业务合作，开发专注于亚洲和新兴市场的指数衍生品。泛欧交易所也收购了电力市场北欧电交所（Nord Pool）。

雄踞食品链顶端的是收入达到或超过30亿美元的巨头：芝交所、德交所、洲际交易所和伦交所。它们有对大宗交易的确切需求，并将继续通过多元化获得丰厚回报。另外两家交易所也有望很快跻身顶层团队。纳斯达克曾经只以科技股上市闻名，如今它开发的软件已为130多家交易所提供支持。港交所受到最强劲的顺风推动。随着中国资本市场不断开放、技术头脑不断增强，再加上中国大陆企业希望更贴近本土市场，它必将从中获益。地缘政治也可能成为助推因素，这从蚂蚁集团决定不在美国上市或许就已显现出来。

李小加认为，“几乎所有”在美国上市的中国公司未来都会回归亚洲。沪港通和深港通现在占港交所日交易量的7%至8%，最终可能会扩大到四分之一。身处中国资本之河与全球资金之海的汇流处，理应钱途广阔。■



The Economist film

Stock markets v economy: what you need to know

Why is the value of the American stock so seemingly cut off from current events, and what does this tell us about the wider economy?



经济学人视频

美股与经济

美股表现为何看起来与美国的现实如此脱节？这反映了宏观经济的哪些问题？



Dubai

Navigating the storm

Can the Middle East's largest financial centre adapt to a world that is less globalised and less tolerant of tainted money?

THE DEAL to normalise relations between Israel and the United Arab Emirates (UAE), announced on August 13th, was a diplomatic coup. Might it be a commercial one too? Moneymen in Dubai, the UAE's largest financial centre, are hoping to cash in on increased investment and travel between the two countries. Israelis are expected to join the hordes of well-heeled foreigners who have opened businesses or bought swanky pads in the coastal emirate.

Dubai, one of seven emirates that make up the UAE, will be glad of the custom. Its media may be full of feel-good financial stories—drooling, for instance, over the recent foundation-pouring for the world's tallest hotel, set to rise to 82 storeys, and the unveiling of “the world's highest infinity pool”—but closer to earth things look less impressive. Thanks to overbuilding, property prices remain far below peaks reached six years ago. Covid-19 has clobbered an economy built largely on retail and hospitality. Low oil prices have strengthened the headwinds: Dubai is not hydrocarbon-rich but its economy feeds on petrodollars.

Adding to the challenges, Dubai faces increasing international pressure to clean up its act. It has long been less than discerning about the provenance of money flowing in. Its property market is heavily stained with laundered loot. If Dubai is forced to tighten standards, that would dent business in the short term, complicating its efforts to push its way into the premier league of financial centres.

Viewed over a longer timeline, Dubai's growth has been spectacular. In the

1950s, as the City of London was about to ride the Eurodollar boom, Dubai was little more than a fishing village, with 20,000 souls and no airport. Today it is a metropolis. Its financial centre, which first began to take off in the 1990s, is a super-regional champion, serving as a gateway for investment from and to the Middle East, South Asia and Africa. Underpinning this is its stable polity and high quality of life: it offers the region's ritziest penthouses, finest dining and best shopping and entertainment.

Strong trade and transport links support its financial offering. The city has the world's largest man-made harbour and the Middle East's busiest port, with enough space for 22.4m twenty-foot containers. Its airport is—or was, at least, until the pandemic—a key east-west transit point. In 2019 it was the world's busiest airport for international passengers. Dubai is, in short, the closest thing its region has to a Singapore- or Hong Kong-style entrepot.

According to the Global Financial Centres Index, which since 2007 has ranked cities according to a range of financial, economic and quality-of-life measures, Dubai has steadily closed the gap with the top tier (see chart 1). It now hovers just outside the top ten. The next highest Middle Eastern centre is Tel Aviv in 36th place, followed by Abu Dhabi, the capital of another emirate (and the UAE) in 39th.

The heart of Dubai's financial ecosystem is the Dubai International Financial Centre (DIFC), a 110-acre "free zone" in the city centre set up in 2004 to boost Dubai as both financial waystation and investment destination. The DIFC has grown into an impressive cluster of banks, fund managers, and law and accounting firms, with over 2,500 registered companies—820 of them financial—and 25,000 professionals.

The DIFC says it hosts 17 of the world's top 20 banks; eight of the ten leading global law firms; and six of the ten biggest asset managers. Many of them

have their regional headquarters there. The banks have around \$180bn of assets booked there; DIFC firms arranged an additional \$99bn of lending last year. Some specialise in trade finance and infrastructure lending. The DIFC's fund managers have assets of \$424bn. Its financial firms are restricted to foreign-currency transactions. Some Dubai-based banks have operations in the zone too, but conduct dirham-denominated business from branches outside it.

The DIFC's appeal lies largely in its bespoke tax regime and regulation. Like the other 40-odd free zones in the UAE, it sets its own rules. It is tax-light, allows foreigners full ownership (outside zones this is capped at 49%) and sets no local-hiring quotas. It has its own regulator, the Dubai Financial Services Authority, run by a former bank supervisor for America's Office of the Comptroller of the Currency. Financial firms outside free zones fall under the central bank and other national authorities.

The DIFC has its own judicial system too, based on common law and with courts that hear cases in English. (By contrast, the UAE's system is based on civil law.) The DIFC passes its own laws: one on data protection, based on EU regulations, took effect on July 1st.

This autonomy is prized especially by investors whose home countries' legal systems are less dependable. Indians flock to it because of Mumbai's clogged, clunky and capricious courts; some joke that Dubai and Singapore are India's real financial capitals. In a big boost, Dubai's judgments became enforceable in India in January.

The DIFC's judicial system has grown quickly. In 2019 its courts heard a record 952 commercial cases, 43% more than in 2018. It has a growing reputation as a regional arbitration centre, helped by a joint venture with the London Court of International Arbitration, and the hiring of judges from Australia, Britain and elsewhere.

The DIFC has navigated the coronavirus crisis well. It even managed to sign up 310 new companies in the first half of 2020—a six-month record. This followed a record year in 2019, in which 493 new companies joined, among them an insurance arm of Berkshire Hathaway and the asset-management division of State Street.

This unlikely growth was, the DIFC says, largely driven by interest from Asian firms and fintechs. Having invested heavily to launch a fintech “accelerator”, Dubai claims to be home to over half of all fintechs in the Middle East and North Africa. The January-June registration numbers were probably helped by a speedily assembled relief package for DIFC clients, unveiled in March, including licensing-fee waivers, lease-payment deferrals as well as three-month rent forgiveness for retailers.

Still, covid-19 has taken a heavy toll on Dubai. It is more vulnerable than the region’s other economies because of its reliance on retail and recreation, both highly susceptible to physical-distancing and travel restrictions, says Ehsan Khoman, head of Middle East research at MUFG, a bank. Its equity market has fallen further than others in the Gulf this year (see chart 2).

Moreover, Dubai was struggling to shake off several pre-existing conditions when the virus struck. A debt and building binge had left it exposed during the financial crisis of 2007-09. It took a \$10bn bail-out by Abu Dhabi to stave off the threat of sovereign default. But Dubai’s “government-related entities” (GRES)—conglomerates with tentacles across the economy, such as Dubai World (from ports to leisure) and Dubai Holding (telecoms, property and more)—remain heavily burdened, and there is talk of another debt crisis. Capital Economics, a consultancy, reckons total public debt is \$153bn, of which GRES owe \$89bn, equivalent to 140% and 81% of GDP respectively. Their repayment schedule is gruelling, with over 60% of their debt due in the next four years. They had topped up their borrowing to fund projects ahead of the World Expo, which had been scheduled for October,

hoping for a flurry of deals and up to 25m visitors. But the event has been pushed back a year because of covid-19.

Dubai's property market, too, was in pain well before the pandemic because of oversupply. Residential property prices have fallen in recent years, as have occupancy rates at hotels (see chart 3). The number of visitors to Dubai from elsewhere in the Gulf fell by 10% between 2016 and 2019. Developers were cutting back before the virus; now some fear for their survival. In July S&P, a rating agency, downgraded the debt of two of Dubai's biggest property companies to junk. It also expects the economy to shrink by 11% this year.

As it seeks to shake off these ailments and recover from the effects of its covid-induced lockdown (which was among the world's strictest), Dubai faces longer-term challenges. One is the slowing and possible reversal of globalisation as trade tensions rise and populist policies spread. Having redesigned its economy around the flow of people, goods and capital, Dubai was a big beneficiary of globalisation, and used its strategic location to punch above its weight. Now the model looks like a vulnerability. (The consequences are not clear-cut, though. Entrepôts sometimes benefit when big powers squabble, as dealmaking moves to neutral ground. And if global trade turns more parochial, then regional hubs like Dubai could pick up some types of business even as they lose others.)

Protracted weakness in the oil price could also cause problems. Oil-related activities make up just 1% of Dubai's nominal GDP, according to MUFG. Still, its prospects are entwined with oil-price fluctuations. A lot of the finance in Dubai involves reinvesting oil money from the region. Its property boom was largely built on regional petrodollars. And many of its tourists come from oilier Gulf countries.

Another question is whether Dubai can stay ahead of regional rivals that

covet its crown. Oil-rich Abu Dhabi, a 90-minute drive away, is a frenemy: it is both a source of bail-outs and a would-be usurper. It attracts a smattering of foreign investment managers, keen to work with its sovereign-wealth fund, the UAE's biggest. But its financial district is not a patch on the DIFC.

Riyadh could prove a more serious competitor, especially if Saudi Arabia's social liberalisation continues and attracts more fun-loving expats. The completion of the 59-tower King Abdullah Financial District, a banking hub in the Saudi capital, has taken on more urgency under Muhammad bin Salman, the country's crown prince. Hints have been dropped that foreign banks that open an outpost there may be better placed to win Saudi mandates, says one banker.

The biggest long-term threat, however, comes from within: Dubai's attitude to corrupt capital. Of all the big global financial centres, it is the shadiest—not only a haven for clean money seeking investments or fleeing turmoil elsewhere, but also for the dirty stuff. It is used by kleptocrats, money-launderers, arms-smugglers, sanctions-busters and other criminals. The UAE and Iran are the only Gulf countries on America's list of "major money-laundering jurisdictions"; its moneymen are under scrutiny for suspected financial ties to Syria's president and his cronies. And it doesn't just take the bad guys' money; a flock of fugitives, alleged fraudsters and disgraced public figures live in Dubai, including a suspect in the massive "cum-ex" tax-fraud case (who denies wrongdoing).

Not surprisingly then, the UAE scores poorly in a leading index of money-laundering risk—worse, in fact, than several notoriously shady sunny places, including the Seychelles (see chart 4). That score and its size together make Dubai the biggest single hole in the global anti-money-laundering (AML) system, say some experts. The UAE's finance ministry and central bank declined to comment.

Much of the dodgy cash goes into luxury flats and villas. A leak of property records in 2016 revealed 800 Dubai properties, worth \$400m, linked to over 300 Nigerian “politically exposed persons” (current or former officials, their relatives or associates). Another channel is Dubai’s 30 or so free zones. Though economically important, some hubs are opaque and, investigators and anti-corruption NGOs suspect, misused by money-rinsers.

Corporate malfeasance is not restricted to secretive shell companies or trading firms. Thanks to weak governance and a culture of self-dealing, the UAE has more than its fair share of once-high-flying companies that were felled by financial scandals—among them Abraaj, once the Middle East’s top private-equity firm, and NMC Health, a company once included in the FTSE 100, Britain’s stockmarket index.

Dubai’s weaknesses in combating illicit finance are “a feature, not a bug” of its political economy, as a recent report by the Carnegie Endowment, a think-tank, puts it. When international rules designed to root out tax evaders took effect a few years ago, the UAE offered inveterate dodgers ways to invest in its companies and property that circumvented the rules (it tightened up after the EU cried foul).

Another sign of this is Dubai’s lack of co-operation with foreign governments probing suspected corruption with Dubai links. According to the Financial Action Task Force (FATF), which writes and polices global AML standards, between 2013 and 2018 Dubai’s public prosecutor received around 300 such “mutual legal assistance” requests, but acted on only 89 of them.

One reason Dubai has got away with such foot-dragging is that it has been shrewd, for instance by paying lip service to reform at moments of international scrutiny, then doing nothing much when the pressure eases. Another reason is its strategic importance: the UAE is a key ally for Western

powers. As a result, the FATF, over which those powers hold great sway, has pulled its punches.

There are signs the tide is starting to turn. The FATF issued a (by its standards) stinging report on the UAE earlier this year, and reportedly placed it under year-long observation to ensure that it implements recently passed AML laws. If it does not, it could be added to the FATF's "grey list", joining the likes of Syria and Zimbabwe. That is one naughty-step away from blacklisting, which would, in effect, require international banks to disengage.

It almost certainly will not come to that. Dubai's rulers may seem impervious to international criticism, but "will act very quickly" to weed out the dodgiest business if Dubai's financial links are threatened, says a well-connected Emirati financier.

They are, he adds, also confident they can secure new sources of revenue if cleaning up cuts off business. He also notes that, as long as the UAE remains stable and its region volatile, it will benefit from capital flight. The Arab spring was high season for Dubai's deposit-takers. Now they are doing brisk business with clients from Lebanon.

Other new business takes more effort. The UAE's political and business leaders have worked tirelessly over the past couple of years to strengthen links with China, signing deals in logistics, chemicals, finance and more. Not for them the moral high ground or bans on Huawei. They are beginning to reap the benefits. The DIFC is the regional headquarters for China's four largest banks as well as several big firms. Though the UAE is not a key player in China's Belt and Road initiative, Dubai is becoming the hub of choice for Chinese expansionism in the region. Ever ambitious, the DIFC has talked of tripling in size by 2030. Its burgeoning eastern connections make that seem a little less fanciful. ■



迪拜

风暴中航行

中东最大的金融中心能否适应一个不那么全球化也不那么容忍脏钱的世界？

以色列与阿联酋关系正常化的协议于8月13日公布，这是外交上的重大突破。在商业上会不会也一样呢？阿联酋最大的金融中心迪拜的金融家希望从两国之间不断增加的投资和往来中获利。预计以色列人将和其他大批富有的外国人一样，在这个沿海酋长国开办企业或购买豪华公寓。

组成阿联酋的七个酋长国之一的迪拜会为他们的光顾而高兴。其媒体可能会充斥让人感觉良好的财经报道，例如赞叹将有82层楼的全球最高酒店近期完成了桩基灌注、“世界上最高的无边际泳池”揭幕等。但在离地面更近的地方，景观就没那么亮眼了。由于过度建设，房地产价格仍远低于六年前的峰值。新冠疫情重创了主要依靠零售和酒店服务业的经济。低油价又雪上加霜：迪拜的石油储量并不丰富，但其经济依赖石油美元。

除了这些挑战，迪拜还面临着国际社会日益要求它“端正行为”的压力。长期以来，迪拜一直没有严格甄别流入资金的来源。它的房地产市场脏钱汇聚。如果迪拜被迫收紧标准，短期内将影响其生意，让它争取跻身顶级金融中心行列的努力复杂化。

回顾更久远的过去，迪拜实现了惊人的增长。上世纪50年代，伦敦金融城即将迎来欧元热潮，而迪拜差不多只是个渔村，人口两万，没有机场。如今它已发展成一个大都市。自上世纪90年代开始腾飞的迪拜金融中心是一个超级区域领头羊，是投资进出中东、南亚和非洲的门户。稳定的政体和高品质的生活支撑了这种地位：迪拜拥有该地区最豪华的顶层公寓、最高档的餐厅，还有最好的购物和娱乐场所。

迪拜四通八达的贸易和运输支持了金融服务的发展。这个城市拥有世界上最大的人工港口和中东最繁忙的港口，可容纳2240万个标准集装箱。它的机场是（至少在疫情发生前一直都是）东西方关键枢纽。2019年，它以国

际客运量计是全球最繁忙的机场。简而言之，迪拜在该地区最像新加坡或香港的中转港。

根据自2007年起用金融、经济和生活质量一系列指标给城市排名的全球金融中心指数（Global Financial Centres Index），迪拜一直在稳步缩小与全球顶尖金融中心的差距（见图表1）。如今它已经在前十的门口徘徊了。中东排名第二高的金融中心特拉维夫位列第36位，在它之后另一个酋长国的首府（同时也是阿联酋的首都）阿布扎比排名第39位。

迪拜金融生态系统的核心是迪拜国际金融中心（Dubai International Financial Centre，以下简称DIFC），这个在市中心占地110英亩的“自由区”建于2004年，目标是推动迪拜成为金融中转站和投资目的地。DIFC的发展令人瞩目，聚集了银行、基金管理公司、律师和会计师事务所，有2500多家注册公司（其中820家为金融公司）和2.5万名专业人士。

据DIFC称，全球20大银行中的17家、十大律师事务所中的八家、十大资产管理公司中的六家都已进驻。其中许多都把地区总部设在这里。银行在DIFC约有1800亿美元的账面资产；DIFC企业安排的贷款去年增加了990亿美元。有些公司专门从事贸易融资和基础设施贷款。DIFC的基金管理公司管理着4240亿美元的资产。金融公司在DIFC仅可从事外币交易。迪拜的一些银行也在自由区内经营，但是以阿联酋货币迪拉姆计价的业务仍通过自由区之外的分支机构进行。

DIFC的吸引力主要在于其特定的税收制度和法规。和阿联酋其他40多个自由区一样，它自行设定规则。这里税率低，允许外商拥有百分之百的所有权（自由区之外的外资持股上限为49%），并且不设置雇用本地员工的比例。它有自己的监管机构——迪拜金融服务管理局（Dubai Financial Services Authority），由美国货币监理署（Office of the Comptroller of the Currency）的一名前银行监管人掌管。自由区外的金融公司则由央行和其他国家主管部门监管。

DIFC还运行以普通法系为基础的独立司法体系，法院用英语审理案件。

（而阿联酋是大陆法系。）DIFC自己立法，一项基于欧盟法规的数据保护法规于7月1日生效。

本国法律制度不那么可靠的投资者尤其看重这种自主性。印度人之所以蜂拥而至，就是因为孟买的法院案件堆积，效率低下，反复无常。有人开玩笑说迪拜和新加坡才是印度真正的金融之都。迪拜的判决自今年1月起可在印度强制执行，这是一大助力。

DIFC的司法体系发展迅速。2019年，其法院审理了创纪录的952起商事案件，比2018年增加了43%。DIFC与伦敦国际仲裁法院（London Court of International Arbitration）合作成立了仲裁院，并从澳大利亚、英国等地聘请法官，推动DIFC作为区域仲裁中心的声誉不断提高。

截至目前DIFC很好地扛过了新冠疫情。2020年上半年它甚至成功签约了310家新公司，创下了六个月入驻数的新纪录。2019年已经是创纪录的一年，当时有493家新公司入驻，其中包括伯克希尔·哈撒韦（Berkshire Hathaway）旗下的保险公司和道富银行（State Street）的资产管理公司。

DIFC表示，这种不可思议的增长主要源于这里吸引到了亚洲企业和金融科技公司的兴趣。迪拜已投入巨资启动了一个金融科技“加速器”，它声称这里已经汇集了中东和北非一半以上的金融科技公司。1月至6月有那么多新公司注册，可能是得益于3月对DIFC客户快速推出的刺激计划，其中包括免许可费、延期支付租金，以及对零售商免收三个月租金。

但疫情毕竟还是给迪拜带来了严重损失。三菱日联金融集团（MUFG）中东研究负责人埃桑·霍曼（Ehsan Khoman）表示，迪拜依赖极易受社交疏离和旅行限制影响的零售和休闲娱乐业，因此比该地区的其他经济体更容易受到冲击。今年，迪拜股票市场的跌幅超过了海湾地区的其他市场（见图表2）。

此外，新冠病毒来袭时，迪拜正在努力摆脱一些原有的问题。先前的一轮借贷和建设狂潮让它在2007至2009年金融危机来袭时遭受重创，靠阿布扎比提供的100亿美元援助才渡过了主权债务违约的危机。但是，触角延

伸至迪拜经济的各个方面、被称为“政府相关实体”（GRE）的企业集团仍然背负沉重债务，例如迪拜世界（Dubai World，业务横跨港口、休闲业等）和迪拜控股（Dubai Holding，业务包括电信、房地产等）。人们议论着又一次债务危机的可能性。咨询公司凯投宏观（Capital Economics）估计，迪拜的公共债务总计为1530亿美元，其中GRE的债务为890亿美元，分别相当于GDP的140%和81%。偿还期限紧迫，超过60%的债务将在未来四年到期。为了在原定于10月举行的世博会之前为项目提供资金，迪拜追加了贷款，本来希望世博会能达成一系列协议并吸引多达2500万游客。但由于疫情爆发，世博会被推迟一年。

迪拜的房地产市场也因为供过于求而早在疫情之前很久就已经水深火热。近年来，住宅价格下降，酒店入住率也在下滑（见图表3）。2016年至2019年间，从海湾地区的其他地方到访迪拜的游客数量下降了10%。开发商在疫情之前就已经在后撤，现在有些公司担心自己活不下去。7月，评级机构标准普尔将迪拜两家最大的房地产公司的债务评级降至垃圾级。它还预计今年迪拜的经济将萎缩11%。

迪拜试图摆脱这些弊病，并从疫情导致的封锁措施（是世界上最严格的之一）的影响中恢复过来，与此同时它还面临着长期挑战。一是随着贸易紧张局势的加剧和民粹主义政策的扩散，全球化正在放缓并可能逆转。迪拜围绕人员、货物和资本的流动重新设计了经济结构，是全球化的一大受益者，并利用其战略位置实现了超常发展。现在，这样的发展模式看起来成了软肋。（不过后果尚不明确。由于大国相争时交易活动会转至中立国，中转港地区有时会受益。而且，如果全球贸易变得更地区化，迪拜等区域枢纽在失去一些业务的同时可能会收获另一些类型的业务。）

石油价格长期疲软也可能引发问题。三菱日联金融集团称，与石油有关的经济活动仅占迪拜名义GDP的1%。但迪拜的经济前景仍与油价波动紧密交织。迪拜的很多资金都来自该地区石油资金的再投资。它的房地产热潮主要是靠海湾地区石油美元的推动。它的许多游客也都来自石油储量更多的海湾国家。

另一个问题是迪拜能否保持住被区域内竞争对手觊觎的领先地位。石油资源丰富的阿布扎比距迪拜仅90分钟车程，亦敌亦友：它既是纾困资金的来源，又是潜在的篡位者。阿布扎比吸引了少量外国投资管理公司，这些公司渴望与它的主权财富基金（在阿联酋规模最大）合作。但阿布扎比的金融区远不及DIFC。

利雅得可能会是一个更有力的竞争者，尤其是如果沙特阿拉伯社会能继续自由化进程、吸引到更多爱玩乐的外国人的话。沙特首都的银行业中心阿卜杜拉国王金融区（King Abdullah Financial District）将有59栋高楼，在王储穆罕默德·本·萨勒曼（Muhammad bin Salman）的领导下其落成变得更加急迫。沙特已经给出暗示，在那里开设分行的外国银行可能更容易得到政府授权项目，一位银行人士说。

然而，最大的长期威胁来自内部，即迪拜对待不法资金的态度。在所有大型全球金融中心中，迪拜是最见不得光的，它不仅是合法资金寻求投资或逃离别处动荡的安全港，也是脏钱的庇护所。腐败官僚、洗钱者、军火走私商、违反制裁者和其他不法分子都会利用迪拜来处理资金。阿联酋和伊朗是美国“主要洗钱管辖区”名单中仅有的海湾国家；由于涉嫌与叙利亚总统及其亲信有财务往来，阿联酋的金融人士正受到审查。而且，迪拜不仅是资金的窝藏地，还有大量逃犯、欺诈嫌疑人和名誉扫地的公众人物生活在那里，其中包括涉案金额巨大的“cum-ex”税务欺诈案的一个嫌疑人（他否认有不法行为）。

因此毫不出奇，阿联酋在一个主要的洗钱风险指数中得分很低。实际上，它比包括塞舌尔在内的几个阳光灿烂却臭名昭著的地方得分还低（见图表4）。一些专家说，这样的低分加上自身的规模使迪拜成为全球反洗钱系统中最大的一个漏洞。对此，阿联酋财政部和央行拒绝置评。

大部分来路不明的现金都流向了豪华公寓和别墅。2016年流出的房产记录显示，迪拜价值四亿美元的800处房产与300多个尼日利亚“政治敏感人物”（现任或前任官员、他们的亲属或同事下属）有关联。不法资金的另一个流向是迪拜的约30个自由区。尽管这些中心在经济上很重要，它们中

有一些的运作不透明，调查人员和反腐败非政府组织怀疑它们被洗钱者滥用。

公司不法行为不仅限于隐秘的空壳公司或交易公司。由于治理薄弱和内部交易的文化，阿联酋有太多曾盛极一时但最终因金融丑闻而垮台的公司，其中包括曾是中东顶级私募股权公司的Abraaj，以及曾被纳入英国富时100指数的NMC Health。

迪拜在打击非法金融方面的薄弱是其政治经济体制的“特征而非漏洞”，智库卡内基基金会（Carnegie Endowment）最近的一份报告指出。几年前，当旨在揪出逃税者的国际税务法规生效时，阿联酋向避税老手提供了在投资迪拜公司和物业时绕过新规的方法（在欧盟强烈抗议后有所收紧）。

这种特征的另一个表现是当外国政府调查与迪拜有关的涉腐案件时，迪拜不够合作。根据制定和监管全球反洗钱标准的金融行动特别工作组（FATF）的数据，迪拜的检察机关在2013年至2018年间收到了约300个此类“司法互助”的请求，但仅对其中89个采取了行动。

迪拜拖延不改却不被追究，一个原因是它很精明，比如在国际社会聚焦之际口头许诺改革，但在压力缓解之后又无所作为。另一个原因是它的重要战略地位：阿联酋是西方强国的重要盟友。因此，受这些国家支配的FATF一直对迪拜手下留情。

有迹象表明趋势开始逆转。FATF今年早些时候发布了一份（按其自身标准来说）措辞严厉的报告，并据说将对迪拜观察一年，以确保它切实执行近年通过的反洗钱法律。如不执行，它可能会被列入FATF的“灰名单”，与叙利亚和津巴布韦等国同列。灰名单与黑名单仅一步之遥，它实际上会要求国际银行从当地退出。

几乎可以肯定事情最终不会走到这个地步。迪拜的统治者看似对国际批评无动于衷，但如果迪拜的金融连接受到威胁，他们“将很快采取行动”清除最见不得光的业务，一位人脉广阔的阿联酋金融家表示。

他补充说，如果清理市场中断了某些业务，他们也有信心可以获得新的收入来源。他还指出，只要阿联酋保持稳定而海湾地区继续动荡，它就会从资本外逃中受益。阿拉伯之春让迪拜收获了大量存款。现在，这里与黎巴嫩的客户之间生意繁忙。

有些新业务需要费更多力气。过去两三年里，阿联酋的政商领袖不懈地加强与中国的联系，在物流、化工、金融等领域签署了一系列协议。他们才不管道德高地或华为禁令。如今他们开始收获回报。DIFC是中国的四大行以及几家大公司的地区总部。尽管阿联酋不是中国“一带一路”倡议的主要参与者，但迪拜正在成为中国扩张主义在该地区的首选枢纽。一贯雄心勃勃的DIFC大谈在2030年前将自身规模扩大两倍。它与东方迅速发展的联系让这个目标看起来不那么不切实际了。■



Hollywood and China

Red carpet

China's box office is poised to become the world's biggest. What does that mean for Hollywood—and America's soft power?

HORDES OF INVADERS gallop into China, armed with sinister, supernatural powers. As they thunder towards the capital, it falls to a simple country girl to foil the attack. Over mountains and across deserts, dodging arrows and unleashing batteries of fireworks, in 115 action-packed minutes plucky Hua Mulan sees off the dastardly foreigners and brings honour to China.

“Mulan”, which opens on September 4th, is a tale of invasion in more ways than one. Disney, Hollywood’s biggest film studio, has spent five years and \$200m on the live-action remake of its 22-year-old animation, in the hope of conquering the Chinese box office. The film is calibrated to appeal to Asian as well as American audiences, from its plot (Mulan’s sidekick, a wisecracking dragon who irritated the Chinese, was written out of the story) to its promotional campaign (Disney touted its release in the form of a classical Chinese poem). “Shang-Chi and the Legend of the Ten Rings”, Disney’s first Chinese-themed superhero movie, is due next year. There is already talk of a “Mulan” sequel.

Hollywood has reason to look across the Pacific. In the past 15 years China’s box-office takings have risen 35-fold, to \$9.7bn. That is not far off America’s \$11.1bn. This year receipts have sunk as covid-19 forced cinemas to shut. But they may fall a bit less precipitously in China, which after early cover-ups has controlled the virus better than America, where most theatres remain closed (and where “Mulan” is going straight to streaming). China may emerge from the pandemic with the world’s biggest box office (see chart 1).

The country was becoming central to Hollywood's business before covid-19. America's blockbusters have increasingly relied on Chinese audiences to recoup their vast production budgets and American studios have tapped Chinese investors for finance. Between 2010 and 2019 Disney's share of revenues from Asia nearly doubled to 11.5% and now rivals that from Europe. Hong Kong and Shanghai each has a Disneyland. Universal (owned by Comcast, a cable giant) is building a theme park in Beijing. Sony, a Japanese conglomerate with a big entertainment division that includes Columbia Pictures, last year earned 10.2% of its revenues in China, up from 6.7% five years earlier.

However, Hollywood's desire to capture both Eastern and Western imaginations—and wallets—increasingly faces two sets of problems in China. First, mainland studios are giving Tinseltown a run for its money on their home turf. And China's censors are becoming more active in shaping the tales that Hollywood tells, imbuing America's soft power with Chinese characteristics and angering American politicians. The great screen romance between Hollywood and China is turning into more of a drama.

China raised the curtain on regular Hollywood releases in 1994. The market was tiny—"The Fugitive", the first American film to be shown in cinemas that year, made just \$3m—and the bureaucracy stifling. Imports were limited to ten a year. Their makers were allocated just 13% of a film's box-office takings. The rest reserved for cinemas and distributors.

Slowly the rules were relaxed. In 2001 the foreign-film quota doubled to 20. A decade later it rose to 34, and producers' revenue share went up to 25%. Foreign studios also discovered co-production. Movies made in partnership with a Chinese company qualify as domestic and are thus exempt from the quota system. They also entitle the studio to as much as 43% of the box office and better release dates; usually only domestic films are awarded slots during the four main holidays—spring, summer, national

day and Chinese new year—when around half the year’s tickets are sold.

At the same time, China’s growing middle class was developing a taste for cinema. In 2005 China had 4,000 theatre screens, slightly more than Britain at the time. Last year it had nearly 70,000, according to Omdia, a market-research company, almost equal to America and Europe combined.

| *Blow-Up*

By 2007 American studios ruled the Chinese box office, making 16 of the 25 highest-grossing films, according to Box Office Mojo, part of IMDbPro, a data company. In 2013 “Pacific Rim”, a robots-versus-monsters romp produced by Legendary Pictures, became the first American blockbuster to take more money in China than at home. After that, recalls Peter Loehr, former head of Legendary’s China division, Hollywood studios that did not yet have offices in China quickly established them.

As Chinese audiences flocked to watch American films, Chinese media and tech companies rushed to invest in them. In 2016 Dalian Wanda Group, a conglomerate, bought Legendary for \$3.5bn. It also snapped up real estate next to the Beverly Hilton hotel in the heart of Tinseltown. In 2013, at the launch of its own huge studio in Qingdao, the Oriental Movie Metropolis, Dalian Wanda paid stars including Leonardo DiCaprio and Nicole Kidman to attend. This marked the start of a “three-year feeding frenzy, where everybody was happy to take these idiots’ money”, recalls one former Hollywood bigwig. Like the Japanese and the Arabs before them, he says, the Chinese discovered that when you hand out dosh, “people here will take it from you, in exchange for allowing you to come to a party with some semi-famous people”.

In the past few years, though, Chinese studios have grown less infatuated with Hollywood—and more sophisticated. They have splurged on sound stages and other studio infrastructure. Hengdian World Studios in

Zhejiang, Shanghai Film Studio and August First Film Studio in Beijing, as well as Dalian Wanda's Movie Metropolis, have been enlarged and upgraded. Co-productions with Americans have sharpened Chinese filmmakers' skills and given them international contacts, notes Wendy Su of the University of California, Riverside. Special effects, where the West remains in the lead, can be farmed out. "The Eight Hundred", a recently released war drama produced by Beijing-based CMC Pictures, subcontracted its visual effects to companies including DNEG, a British firm, and Rising Sun Pictures, an Australian one.

Rao Shuguang, secretary-general of the (Communist Party-led) China Film Association, says that along with "substantial" improvement in quality, China is exploring new genres. Last month film authorities issued new guidelines for science-fiction films, which they used to frown upon. Sci-fi is to "disseminate scientific thought" and "raise the spirit of scientists".

Chinese films, sci-fi or otherwise, are certainly getting more entertaining. "The Wandering Earth", a sci-fi thriller made by the China Film Group Corporation (CFG) took around \$700m last year. So did Beijing Enlight Pictures' "Ne Zha", an animated tale of demons and spirits based on a 16th century novel. These slick, home-grown blockbusters pushed Disney's "Avengers: Endgame"—the highest-grossing movie in history by worldwide receipts—into third place at China's box office. In a reversal of fortunes from a decade ago, 17 of the 25 highest-grossing films in China were Chinese, including eight in the top ten; only eight were American (see chart 2).

Audiences in big Chinese cities like Beijing and Shanghai can relate to Western fare, says Lei Ming of ABD Entertainment, an audience-analysis firm, but people in smaller, provincial cities do not. And they are the fastest-growing audience: third-tier and fourth-tier cities, roughly those with fewer than 3m residents, account for 40% and rising of China's box

office, according to Maoyan, a ticketing platform.

Now Hollywood's commercial challenges are increasingly compounded by political ones. Peter Shiao, who in 1998 produced the first Sino-American co-production, "Restless", talks of a "climate of increasing suspicion on both sides".

Under Xi Jinping, China's party chief since 2012, a period of relative openness to outsiders has given way to a more nationalistic sentiment. In an effort to make China a "strong cultural nation", Mr Xi's government has not only put the brakes on extravagant foreign investments, forcing Dalian Wanda to sell its Hollywood digs, among other things, but also made it harder for American studios to do business in China. It is strictly enforcing rules that require co-productions to have at least one-third of their investment from Chinese partners, at least one scene shot in China and a cast that is at least one-third Chinese.

These days co-productions are "almost impossible to approve", Mr Shiao laments. Disney, which had hoped its Shanghai theme park might buy it more access to Chinese television, has been disappointed. In 2016 Netflix tried to enter China but hit snags with technology and, above all, content control; for instance, censors considered "BoJack Horseman", a cartoon about an alcoholic, anthropomorphic horse, an example of "funeral culture". "The Chinese have no intention whatsoever of allowing non-Chinese media brands to operate in China," sighs one person involved in that unhappy experiment. One American producer fears that China might target Hollywood in retaliation for President Donald Trump's swipes at Chinese companies like Huawei, a telecoms giant, and TikTok, a hit video app. Mr Trump's campaign to force TikTok's sale to American investors led its American boss, Kevin Mayer (himself a former Disney executive) to quit last week after only three months in the job.

| *Good Will Hunting*

For American critics the biggest concern is over China's attempts to bend Hollywood's stories to its will. Communist censors have long harried filmmakers, banning not just the "three Ts" of Tiananmen, Tibet and Taiwan, but themes such as time-travel and the supernatural; China blocked "Pirates of the Caribbean: Dead Man's Chest", objecting not to the piracy but to the ghosts. Films that break these or other unwritten rules may be banned, sent back for edits or, for lesser offences, get a duff release date or curtailed advertising budget, the size of which is regulated in China. In an internal email from 2014 disclosed by WikiLeaks, a senior Sony executive wrote of "censorship really hassling us" about a scene in "RoboCop" where the cyborg hero's human remains are exposed. "Don't think we can make a stand on it either way, too much money on the line," he summed up.

Some censor-pleasing tweaks are harmless, like Paramount Pictures' removal of dirty laundry from a Shanghai skyline in "Mission: Impossible III" (2006). Others can be consequential. "Abominable" (2019), an animated co-production by DreamWorks and Pearl Studio about a lost yeti, featured a map endorsing China's bogus claim to the South China Sea but no mention of Tibet—never mind that the entire film is about a journey to Mount Everest. Then there are films that are not being made. "Not many people are going to want to go out and make any movies about the Uighurs," admits one former Hollywood executive, referring to China's persecuted Muslim minority.

In July William Barr, America's attorney-general, accused Hollywood of handing China "a massive propaganda coup", citing Paramount's decision to remove a scene in "World War Z" in which characters speculate that a deadly virus may have originated in China. Ted Cruz, a Republican senator, has proposed that studios which kowtow to the Chinese Communist Party should be banned from filming with America's armed forces. Stan Rosen, a China expert at the University of Southern California, wonders if studio

chiefs may soon be called to give evidence before Congress.

Studio executives complain privately that every industry dealing with China faces ethical dilemmas, and that bashing liberal Hollywood is just Republican electioneering. But criticisms are not limited to conservative voices. In July PEN America, a free-speech organisation, concluded in a report that “Hollywood’s decision-makers are increasingly envisioning the desires of the CCP [Chinese Communist Party] censor when deciding what film projects to greenlight, what content these films contain, who should work on the films, and what messages the films should implicitly or explicitly contain.”

China may be especially keen to shape Hollywood’s storytelling because it struggles to break through with its own narratives beyond its borders. Since the early 2000s American studios have made more money at the international box office than at home. These days about two-thirds of their ticket revenues come from abroad. Chinese productions, by contrast, seldom make much money outside China. “Wolf Warrior 2” (2017), China’s highest-grossing film, produced by CFGC and others, took less than 2% of its \$870m haul overseas. (Its tagline—“Anyone who offends China, no matter how remote, must be exterminated”—will not have helped.)

Global audiences will not flock to Chinese blockbusters soon. For one thing, there may be fewer of them to see in the coming years. Cecilia Yau of PwC, a consultancy, expects investments in film-making to decline as a result of covid-19. Chinese films make 80-90% of their money at the cinema, estimates Mr Lei of ABD Entertainment, so lower theatre attendance means lower returns for investors.

In America, by contrast, a film’s takings at the theatre are usually eclipsed by what it earns through television rights, merchandising, video-game licensing and so on. It therefore makes sense for American studios to

produce films and send them straight to streaming, as Disney is doing with “Mulan” in many markets. Disney’s films are in effect merely the intellectual-property engine that drives a much larger machine. Before social-distancing edicts obliterated businesses that rely on crowds, it made an annual operating profit of \$2.7bn directly from its films and another \$6.8bn from the parks, cruises and products that piggyback off them. These profits should return after the pandemic.

That ought to put American studios in a better position than Chinese rivals to keep telling stories in a world of declining cinema attendance—a trend that long predates covid-19. The average American visited the cinema 3.5 times last year, down from five times at the turn of the century. In China ticket sales have begun to slow as more people plump for local streaming services such as iQiyi and Tencent Video.

| *Project Power*

What the shift to streaming means for American soft power is less clear. One possible effect is that East and West will consume less culture in common. At the cinema audiences often soak up stories from all over the world. As they turn to streaming they could do the same; Netflix is replete with local productions. But they more often consume content tailored to their country—and in China, almost exclusively so. The cultural and commercial tussle for global imaginations goes on for now. But one day it may see Americans and Chinese mutually retreat to their own, national, small screens instead. ■



好莱坞与中国

红毯

中国的电影票房即将晋升全球第一。这对好莱坞以及美国的软实力意味着什么？

拥有邪恶超自然力量的外族大举进犯中原，就在他们逼近都城之际，一位质朴的乡村少女肩负起了击退敌军的重任。她翻越高山，跨过荒漠，挡避箭矢，点燃成排的焰火。在打斗不断的115分钟里，英勇的花木兰最终击退了邪恶外族，为中原扬威。

于9月4日上映的《花木兰》是一个关于入侵的故事——不止于电影的内容。好莱坞最大的电影公司迪士尼花了五年时间、投资两亿美元，把22年前自家制作的同名动画片翻拍成了真人电影，以期征服中国票房。为同时取悦亚洲和美国观众，该片从剧情到宣传都做了精心“校准”，比如花木兰的贫嘴伙伴“木须龙”因为中国观众不喜欢而被删掉，在上映宣传时使用了中国古诗。迪士尼首部中国超级英雄电影《尚气与十戒传奇》（Shang-Chi and the Legend of the Ten Rings）订于明年上映。据说《花木兰》也将推出续集。

好莱坞放眼太平洋彼岸是有原因的。过去15年，中国票房收入增长了35倍，达到97亿美元，与美国的111亿美元相距不远。今年由于新冠疫情爆发，电影院被迫关闭，票房收入下降。但相比而言，在中国的降幅可能比美国略小，因为尽管中国在最初对疫情有所隐瞒，但之后对疫情的控制好过美国，而美国大多数影院目前仍处于关闭状态（《花木兰》在美国直接改在线上放映）。疫情过后，中国的电影票房可能跃升全球第一（见图表1）。

在疫情以前，中国在好莱坞的生意中就已经变得至关重要。美国大片越发依赖中国观众来赚回高昂的制作成本，美国的电影公司也通过中国投资者融资。2010年至2019年间，迪士尼的亚洲收入占比几乎翻了一番，达到11.5%，目前与在欧洲的收入相当。香港和上海都有迪士尼乐园。美国有线电视巨头康卡斯特（Comcast）旗下的环球影业（Universal）正在北京

建造主题公园。娱乐业务庞大且拥有哥伦比亚电影公司（Columbia Pictures）的日本企业集团索尼去年10.2%的收入源自中国，而五年前为6.7%。

然而，好莱坞要想同时抓住东西方观众的想象力——以及他们的钱包——在中国却日益面临两大难题。首先，中国大陆的电影公司正在本土市场上挑战好莱坞。其次，中国的审查员正在更加积极地干预好莱坞的叙事，给美国软实力灌注中国特色，这激怒了美国政客。好莱坞与中国的这场银幕情缘正变得更富戏剧性。

中国大陆在1994年拉开了定期上映好莱坞电影的帷幕。当时的市场规模很小，首部进入大陆的美国大片《亡命天涯》（The Fugitive）仅取得了300万美元的票房，而且审批手续让人不胜其烦。当时引进外国影片的数量限定为每年十部。票房收入中，制片方仅拿到13%，其余归影院和发行商。

后来规则逐渐放宽。2001年，引进片配额翻倍至每年20部。十年后又增至34部，制片方分成上调至25%。外国电影公司还发现了合拍片这条路。与中国公司合拍的电影可算作国产片而不受配额限制，制片商还可分得高达43%的票房收入，此外也能拿到更好的档期——通常只有国产电影可在寒假、暑假、国庆和春节这四个主要假期（约占全年总票房的一半）上档。

同时，中国不断壮大的中产阶级越来越喜欢看电影。2005年，中国有4000块大屏幕，略高于当时英国的数字。根据市场研究公司Omdia的数据，到去年中国已经有近七万块，接近美国和欧洲的总和。

| 放大

数据公司IMDbPro旗下票房统计网站Box Office Mojo的数字显示，到2007年，美国电影公司已雄霸中国市场，在票房最高的25部电影中占了16部。2013年，由传奇影业（Legendary Pictures）制作的机器人大战怪兽的科幻片《环太平洋》（Pacific Rim）成为首部中国票房高于本土票房的美国大片。在这之后，尚未在中国设立分支机构的好莱坞电影公司纷纷前来设点，传奇影业的中国业务前CEO罗异（Peter Loehr）回忆道。

随着中国观众蜂拥观看美国电影，中国的媒体和科技公司也争相投资好莱坞。2016年，大连万达集团以35亿美元的价格收购传奇影业。该集团还把好莱坞核心地段比弗利希尔顿酒店附近的房地产收归囊中。2013年，大连万达在青岛的大型影视产业项目东方影都启动，请来了莱昂纳多·迪卡普里奥和妮可·基德曼等明星参加。这标志着一个“三年狂潮的开始，所有人都乐于赚这些傻瓜的钱”，一位前好莱坞大佬回忆称。他说，就像之前的日本人和阿拉伯人那样，中国人发现，只要肯掏钱，“这里的人就会收下，然后让你参加一些二三线名人的聚会”。

不过，过去几年里，中国电影人对好莱坞不再那么痴迷，他们变得更成熟老道了。他们不惜重金打造摄影棚及其他拍摄基础设施。浙江横店影视城、上海电影制片厂、北京八一电影制片厂，以及大连万达的东方影都纷纷扩建升级。加州大学河滨分校（University of California, Riverside）的苏文迪（音译）指出，与美国人合拍电影让中国电影人提升了技术，并在国际电影圈拓宽了人脉。西方在电影特效制作上仍然领先，中国电影可以把这一块外包出去。由北京的华人影业制作、最近上映的战争片《八佰》就把视觉特效分包给了英国的DNEG和澳大利亚的Rising Sun Pictures等公司。

（由中国共产党领导的）中国电影家协会的秘书长饶曙光表示，除了质量“显著”提高，中国电影还在探索开拓新类型。8月，中国国家电影局提出了有关促进科幻电影（它以往并不支持）的新指导意见，指出科幻片要“传播科学思想”和“弘扬科学家精神”。

中国制作的电影，无论是科幻片还是其他类型，无疑都更好看了。由中影集团出品的科幻惊险片《流浪地球》去年斩获了约七亿美元的票房。北京光线影业制作的《哪吒》（一部改编自16世纪民间小说的关于神灵妖精的动画电影）同样火爆。这些制作精良的本土大片令全球影史总票房最高的电影、迪士尼的《复仇者联盟4：终局之战》在中国的票房退居第三。与十年前的情形相反，现在中国最卖座的25部电影中有17部是华语片，前十名中有八部是华语片；美国片只有八部（见图表2）。

观众分析公司ABD爱梦娱乐的雷鸣表示，北京和上海等中国大城市的观众能与西方电影那一套共鸣，但较小的地级市的观众则不然，而后者是增长最快的观众群体。票务平台猫眼的统计显示，三四线城市（大概就是那些人口不到300万的城市）占到中国票房的40%，而且比例还在不断上升。

眼下，好莱坞受到的商业挑战还因为政治上的挑战而愈加复杂。在1998年出品首部中美合拍片《夏日情动》（Restless）的萧培寰提到“两边猜忌的氛围都越来越浓”。

自2012年习近平担任中共中央总书记以来，原本对外比较开放的氛围被更民族主义的情绪所取代。为使中国成为“文化强国”，习近平政府不仅刹住大手笔对外国投资的势头，例如迫使大连万达出售在好莱坞购入的地块等，还对美国电影公司在中国开展业务设置更多限制。管理部门严格执行规则，要求合拍片必须至少有三分之一投资来自中国合作方，至少有一个场景在中国拍摄，而且主要演员至少有三分之一来自中国。

现在合拍“几乎不可能获批”，萧培寰叹道。迪士尼原本希望通过上海的主题公园进一步打开中国的电视市场，结果大失所望。奈飞（Netflix）在2016年试图进入中国，但遭遇技术障碍，还有最重要的问题——内容管控。例如，审查员认为动画片《马男波杰克》（BoJack Horseman，以拟人化方式讲述一匹爱喝酒的马的故事）是“丧文化”的体现。一位参与了这场不愉快试验的人士叹着气说：“中国人根本不想让非中国媒体品牌在国内开展业务。”一位美国制片人担心中国会把矛头对准好莱坞，以报复特朗普对电信巨头华为和热门视频应用TikTok等中国公司的打击。特朗普威逼TikTok向美国投资者出售业务的行动导致其首席执行官、美国人凯文·梅耶尔（Kevin Mayer，曾任迪士尼高管）上任仅三个月后就在上周宣布辞职。

| 心灵捕手

在美国评论家看来，最大的担忧是中国要按自己的意愿扭曲好莱坞的故事。共产主义审查员一直烦扰着电影人，不仅禁止涉及天安门、西藏和台湾这三大问题，时空旅行和超自然现象这类主题也不能碰。《加勒比海盗

2: 《聚魂棺》没能在中国上映，不是因为海盗主题，而是因为涉及鬼魂。违反这些或其他不成文规定的电影可能被禁映或发回重新剪辑，违反规定但不算严重的会被分配较差的档期或缩减广告预算——在中国，电影宣传的规模是受管制的。在维基解密公开的一封2014年内部电子邮件中，索尼的一位高管提到《机械战警》（Robocop）中机器人主角的人形遗体裸露那一幕，“过审的问题实在叫我们头痛”。“别以为删或不删我们都能捍卫立场，这里头牵扯的钱太多了。”他总结道。

有些为过审而做的微调倒也无妨，比如派拉蒙影业（Paramount Pictures）在《碟中谍3》（2006年上映）中删掉了上海天际线中出现的晾晒衣服的镜头。但其他调整有可能事关重大。美国梦工场和中国东方梦工厂合拍的动画电影《雪人奇缘》（Abominable, 2019年上映）讲述一个迷途雪人的故事，其中出现的地图承认了中国宣称的南海主权，却没有标出西藏，而整部电影的内容正是一次前往珠峰的旅程。还有一些电影没被制作出来。一位前好莱坞高管承认“没有多少人会愿意跑去制作一部有关维吾尔族的电影”，他指的是在中国受压迫的穆斯林少数民族群体。

美国司法部长威廉·巴尔（William Barr）7月指责好莱坞在助力中国开展“大规模宣传战”，援引的例子是派拉蒙决定删除《僵尸世界大战》（World War Z）中有人推测一种致命病毒可能源自中国的情节。共和党参议员特德·克鲁兹（Ted Cruz）提议禁止那些对中国共产党卑躬屈膝的好莱坞电影公司与美国军方合作拍片。南加州大学的中国研究专家斯坦·罗森（Stan Rosen）猜测电影公司高层是否很快就会被传唤到国会作证。

电影公司高管私下抱怨说，和中国打交道的每个行业都面对道德困境，而拿自由主义的好莱坞开刀只不过是共和党的竞选策略。但是，批评他们的声音不仅仅来自保守派政客。自由言论组织美国笔会（PEN America）7月发布的一份报告中总结道：“在拍板电影项目、影片内容、演职人员，以及电影应隐含或明示什么信息上，好莱坞的决策者越来越多地在设想中国共产党审查的喜好。”

中国可能特别想要影响好莱坞的叙事，因为它难以凭借自己的故事在国外取得突破。从本世纪初开始，美国电影公司的国际票房收入超过了本土票房。如今它们约三分之二的票房来自国外。相比之下，中国电影很少能在中国以外的地方大笔赚钱。中影集团等公司制作的电影《战狼2》（2017年上映）是中国票房最高的电影，斩获了8.7亿美元的收入，但海外票房还不到2%（片中的口号“犯我中华者，虽远必诛”肯定无益于此。）

短时间内，全球观众还不会蜂拥追捧中国大片。一个原因是未来几年中国大片的数量可能会减少。据咨询公司普华永道的邱丽婷预计，受疫情影响，电影制作投资将减少。ABD爱梦娱乐的雷鸣估计，中国电影有80%至90%的收入来自票房，因此上座率下降就意味着投资者拿到的回报减少。

相比之下，在美国，电影的票房收入往往不及电视播放权、周边商品、电子游戏许可等收入。因此对美国电影公司而言，把电影做出来后直接送上流媒体同样可行，正如迪士尼在很多市场上对《花木兰》的处理。迪士尼的电影实际上只是一个知识产权引擎，驱动着一台大得多的机器。在社交隔离措施摧毁那些依赖人流量的生意前，迪士尼每年从其电影中直接赚得27亿美元的营业利润，此外还有68亿美元来自主题公园、邮轮和周边产品。疫情过后，这些利润应该会恢复。

因此，在一个影院上座率不断下降的世界里——在疫情爆发前很久这一趋势就已经出现——美国电影公司应该比中国对手处于更有利的条件来把故事继续讲下去。去年，美国人均观影次数是3.5次，低于在世纪之交时的5次。在中国，随着更多人转向爱奇艺和腾讯视频等本土流媒体服务，电影票销售已经开始放缓。

| 超能计划

观众转向流媒体对美国软实力有何影响还不太清晰。一种可能性是东西方消费的共通的文化会变少。在电影院，观众常常吸收来自世界各地的故事。他们转向流媒体后仍可能如此：奈飞上就有大量来自不同地方的制作。但他们更多时候还是会选择那些迎合本国口味的内容——而在中国就更几乎完全如此了。这场对全球想象力的文化与商业之争目前还在继续。

但也许有一天，结局会是美国人和中国人各自退守到本国的小屏幕前。 ■



Buttonwood

Foam party

Bubble-hunting has become more art than science

UPON BEING sucked into investing during the South Sea Bubble, Sir Isaac Newton reflected that he could “calculate the motions of the heavenly bodies but not the madness of people”. From tulip mania in 17th-century Amsterdam to railway fever in Victorian Britain, history is littered with tales of investors who lost their heads shortly before they lost their shirts, in the grip of mass delusions described by Alan Greenspan, a former chairman of the Federal Reserve, as “irrational exuberance”.

These delusions seem obvious with the cold clarity of hindsight. Spotting them in real time, however, is trickier—especially when the usual measures of frothiness are out of action. Wall Street types typically pore over price-to-earnings ratios, which compare a firm’s value with its profits, or free-cashflow measures, which look at the cash firms crank out after investment. Warren Buffett targets firms with a high return on capital, which compares their profits with the size of their balance-sheets. But the covid-induced economic slump has caused earnings to sink even as the Fed and other policymakers have helped buoy share prices. The obvious gauges of frothiness are not much use.

This poses a problem for investors confronting the startling fact that the S&P 500, a share-price index of America’s biggest public companies, reached an all-time high on August 18th in the middle of perhaps the sharpest ever economic downturn. Without hard numbers to count on, they must interpret the market’s unusual behavioural signals in order to spot the froth.

One such sign is the mystifying moves in some stocks. On August 19th

Apple became the first American company to touch a valuation of \$2trn. Tesla, a carmaker that is undertaking a stock split at the end of August, has quadrupled in value so far this year. It is now worth \$354bn, more than Ford, Toyota and Volkswagen combined. Nikola, an electric-truck firm (that has yet to make any lorries), has tripled in value since May. Even more perplexing was investors' fondness for Hertz, a car-rental firm. Its share price rose tenfold after it declared bankruptcy (though this bubble has since popped).

Anecdotally at least, this frothiness seems linked to a second phenomenon: a zeal for retail investing. Take, for instance, the popularity of Robinhood, a trading platform, which has opened 3m accounts since the end of 2019, taking its users to 13m. Or consider "r/wallstreetbets", a forum on Reddit, which encourages its readers to make "YOLO" (you only live once) bets on short-dated speculative options (akin to lottery tickets) in order to earn "tendies" (short-term gains). The number of subscribers to it has nearly doubled since January to over 1.4m, edging out its staid cousin, "r/investing", which preaches the virtues of punting on diversified baskets of low-cost index funds.

That exuberance has been matched by a third behavioural oddity: companies' enthusiasm for issuance. Dealogic, a data provider, finds that stock issuance in America has jumped by 85% year-on-year so far in 2020. Part of that may be a result of the pandemic; many companies have raised capital to build up war-chests. But issuance is also compelling in bubblier times, because it allows firms to capitalise on lofty valuations. Hertz tried to raise up to \$1bn in new equity after it had filed for bankruptcy, before regulators intervened.

Moreover, after a hiatus in the first half of the year, tech firms are rushing to list. Special-purpose acquisition companies (SPACs)—listed shell companies that then merge with private firms, offering a speedy, back-door

route to going public—are all the rage. SPACs were once a dirty word on Wall Street, thought fit only for firms unworthy of an initial public offering. But now they are in favour with firms and investors. They have raised \$12bn so far this year, just shy of the amount raised in all of 2019.

What to do, in the face of all this enthusiasm? Other assets may start to seem more alluring. On August 14th Berkshire Hathaway, Mr Buffett's investment firm, said that it had sold chunks of its stakes in banks and bought up shares in Barrick Gold, a mining company. But gold and other assets have also shot up in value this summer.

As markets rise further it may become even harder to resist joining the fray. Some investors may pile in, and exit with a profit. But even the most brilliant minds can be bamboozled. Sir Isaac spotted the bubble early and liquidated his holdings—only to be sucked back in at the very peak. ■



梧桐

泡泡派对

辨认泡沫已经变得更像一门艺术，而非科学

回想自己被卷入南海泡沫的投资潮时，艾萨克·牛顿爵士说自己可以“计算天体的运动，却无法计算人的疯狂”。从17世纪阿姆斯特丹的郁金香狂热，到英国维多利亚时代的铁路狂潮，历史上充斥着投资者丢了理智后很快就丢了衬衫的故事。前美联储主席艾伦·格林斯潘把这种裹挟他们的群体性妄想描述为“非理性繁荣”。

事后冷静地看，这样的妄想似乎一眼就能看穿。然而要在当下识别它们就没那么容易了，特别是在通常用以衡量泡沫的方法失效的情况下。华尔街人士通常会仔细研究市盈率（比对公司的市价与盈利）或自由现金流指标（衡量公司投资后剩余的现金）。沃伦·巴菲特专看那些资本回报率（比对公司的利润与资产负债表规模）高的公司。但新冠疫情引发的经济衰退已导致收益下降，而与此同时美联储和其他政策制定者帮助提振了股价。那些公认的衡量泡沫的标准已没有多大用处。

这就给投资者带来了一个难题。他们此刻面临一个惊人的事实：尽管可能正在经历史上最严重的经济衰退，涵盖美国最大上市公司的股价指数标普500却在8月18日创下历史新高。在没有确凿的数据依据之时，他们必须解读市场上的异常行为信号来辨认泡沫。

其中一个信号是一些股票令人困惑的走势。8月19日，苹果成为首个估值达到2万亿美元的美国公司。汽车制造商特斯拉于8月底进行了股票分拆，今年迄今股价已翻了两番。目前它的市值为3540亿美元，超过了福特、丰田和大众的总和。一辆卡车都还没生产出来的电动卡车公司尼古拉（Nikola）自5月以来市值已增长了两倍。投资者对汽车租赁公司赫兹（Hertz）的钟爱还要令人费解。这家公司宣布破产后，股价上涨了九倍（尽管之后这个泡沫已破裂）。

至少据坊间传言称，这种泡沫似乎还与第二种现象有关：散户投资热。以交易平台Robinhood的高人气为例，该平台自2019年底以来新增了300万个账户，用户数达1300万。或者再看看Reddit上的一个论坛“r/wallstreetbets”，它鼓励读者“潇洒走一回”，在短期投机期权（类似于彩票）上下注，以赚取“短期收益”。自1月以来，该论坛的订阅人数几乎翻了一番，至超过140万，把它古板的“表亲”“r/investing”论坛挤到了一边。后者宣扬押注于多元化低成本指数基金组合的好处。

这种过度繁荣还伴随着第三种行为反常：公司对发行股票的热情。数据供应商Dealogic发现，2020年迄今美国的股票发行量同比增长了85%。疫情可能是部分原因：许多公司通过融资来补充“战备”。但是，在泡沫更大的时候发行股票本身就很有吸引力，因为这能让公司利用高估值获利。赫兹在申请破产后曾试图发行新股，以筹集最多达10亿美元的资金，后遭到监管机构干预。

此外，在经历了上半年的中断之后，科技公司正争相上市。特殊目的收购公司（SPAC）风行一时，它们先以空壳公司上市，然后再与私人公司合并，从而为上市提供了一条快捷的旁门左道。SPAC在华尔街曾是个犯忌的词，被认为只适用于那些配不上IPO的公司。但现在它们受到了企业和投资者的青睐。今年以来它们已筹集了120亿美元，仅略低于2019年全年的筹集金额。

面对这样热火朝天的情景该做些什么？其他资产可能会开始变得愈加诱人。8月14日，巴菲特的投资公司伯克希尔·哈撒韦表示它已大幅减持银行股，转而收购矿业公司巴里克黄金（Barrick Gold）的股份。但今年夏天黄金和其他资产的价格也已大幅上涨。

随着市场进一步上扬，要忍住不加入这场角逐可能会变得更难。一些投资者可能会一拥而上，然后获利离场。但即使是最聪明的头脑也可能被蒙蔽。牛顿一早就发现了泡沫并变现了所持资产，结果在泡沫最盛之时又被卷了回去。■



More Sino-American decoupling

The nuclear option

How America might wield its ultimate weapon of mass disruption

PRESIDENT DONALD TRUMP'S sabre-rattling against corporate China has had a real but, so far, limited impact on relations between the world's two biggest economies. That could change if he decided to go all out and cut China off from the global payments system, which America controls thanks to the dollar's status as the world's reserve currency and lubricant of commerce.

Mr Trump has three main ways to constrain another country financially. He can refuse its banks access to CHIPS, a New York-based clearing house through which 95% of all dollar transactions are routed. He can try to force SWIFT, a Belgium-based messaging system which 11,000 banks worldwide use to make cross-border payments, to expel members from the offending state. And he can slap an embargo on its financial system, threatening to punish any foreign or domestic financial institution that uses dollars—as virtually all do—but continues to transact with the embargoed firms.

These tactics have been tested on Iran, North Korea, Venezuela and Myanmar—small economies with which America had few dealings. Mr Trump's predecessor, Barack Obama, stopped short of deploying them against Russia after its invasion of Crimea in 2014. Doing so against China, with which America trades \$560bn-worth of goods annually and whose four mega-banks are the world's largest by assets, with large dollar loan books and liabilities, looks incomparably more fraught.

What would happen if Mr Trump nevertheless tried it? A huge shock wave would hit financial markets, already knocked about by the pandemic. The Chinese currency, along with those which track it, such as the Taiwanese

dollar or the South Korean won, would suffer, says Claire Huang of Amundi, an asset manager. Hong Kong would run down its dollar reserves to try to support its peg with the greenback. Money would pour into gold.

In response, China would increasingly resort to its home-grown alternative to SWIFT, called CIPS. It would also try to persuade America's allies in Europe and elsewhere that Washington was behaving irresponsibly. Many would not take much convincing. CIPS and the yuan, currently of marginal importance in international finance and commerce, would gain in stature at America's expense.

China would also retaliate. It could shut its markets to Western banks and firms, block them from its infrastructure projects and limit America's access to natural resources and basic goods it controls. And it, too, has a last-ditch deterrent: selling its \$1.1trn stock of American treasury bills, equivalent to 4% of the total outstanding. America's highly liquid bond markets may prove capable of absorbing the shock. Then again, they might not. Most observers do not consider dumping its T-bills a serious option for China, which has little interest in destabilising its system of currency reserves. But America is not the only country capable of self-harm apparently in the service of national security. ■



中美脱钩加剧 核选项

美国可能会如何使用其终极大规模破坏性武器

美国总统特朗普对中国商界耀武扬威，对世界上两个最大经济体之间的关系产生了切实的影响，但就目前来看影响也有限。如果他决定火力全开，把中国排除在全球支付体系之外——美国通过美元作为世界储备货币和商贸润滑剂的地位控制着这个体系——情况可能就不同了。

特朗普主要有三种方式从金融上限制另一个国家。他可以拒绝该国银行访问纽约清算所银行同业支付系统（CHIPS），95%的全球美元交易都通过这一系统清算。他可以尝试迫使总部位于比利时的报文传输系统SWIFT驱除这个冒犯了美国的国家的成员银行，全球1.1万家银行使用SWIFT做跨境支付。他还可以对该国的金融体系实施交易禁令，威胁惩罚国内外任何使用美元但继续与被禁企业做交易的金融机构，而几乎所有金融机构都使用美元。

这些策略已经在伊朗、朝鲜、委内瑞拉和缅甸这些与美国鲜有经贸往来的小型经济体上试验过。特朗普的前任奥巴马在2014年俄罗斯入侵克里米亚之后险些对俄罗斯动用这些招数。而如果拿它们来对付中国，看起来就令人担忧得多了，因为美国每年与中国的贸易额高达5600亿美元，而且中国的四大行以资产计位居全球前四，有大量美元计价的贷款和负债。

如果特朗普仍要放手一试，会怎样？本就已受到疫情打击的金融市场将迎来一轮巨大的冲击波。人民币以及与人民币联动的新台币和韩元之类的货币都会受损，资产管理公司东方汇理（Amundi）的资产经理克莱尔·黄（Claire Huang，音译）表示。为保持与美元挂钩，香港将耗尽美元储备。大量资金会涌向黄金。

对此，中国会日益多地使用自己建立的SWIFT替代系统：人民币跨境支付系统（CIPS）。它还将竭力说服美国在欧洲和其他地方的盟友相信华盛顿

的做法不负责任。许多国家不需要费力说服。目前在国际金融和商业中还不成气候的CIPS和人民币的地位将提升，而美国的地位会相应下降。

中国还会展开报复。它可能会对西方银行和公司关闭中国市场，禁止它们参与基建项目，并限制美国获得那些由中国把控的自然资源和基本商品。而且，它同样可以祭出最后大招：出售其持有的1.1万亿美元的美国国债——相当于美国国债总量的4%。美国高流动性的债券市场也许可以吸收这一冲击。但也可能吸收不了。大多数观察人士认为，抛售美国国债对中国而言不算一个真正的选项，因为中国也不会想要破坏自己货币储备体系的稳定性。但美国不是唯一一个能为了看似是国家安全的诉求而自残的国家。 ■



Schumpeter

Supply chained and bound

Forced labour in China presents complex dilemmas for fashion brands

THE WORLD has few more Orwellian conglomerates than the Xinjiang Production and Construction Corps (XPCC), a nearly 3m-strong paramilitary-style business in western China. It was set up in 1954 to spur an influx of demobbed soldiers from the Han majority into an area dominated by Muslim Uighurs. It retains a militia of 100,000, charged with rooting out extremism. The militiamen and others help the XPCC furnish the world with a panoply of goods. About 400,000 XPCC farmers harvest a third of China's cotton. Others are part of Xinjiang's tomato-exporting business. From pyjamas to passata, XPCC products penetrate global supply chains.

America's State Department says that it also uses forced labour. In late July the US Treasury hit XPCC with sanctions, alleging a connection with human-rights abuses in Xinjiang where at least 1m Uighurs and members of other ethnic minorities have been held in detention camps. That followed a memo from President Donald Trump's administration advising firms to sever any connection they may have with forced labour within and outside the autonomous region. Some retailers, such as PVH Corp, whose brands include Calvin Klein and Tommy Hilfiger, publicly said they would cut ties with Xinjiang, out of concern for labour practices. Supply-chain auditors for Western makers of electronics and footwear say there are numerous "red flags" indicating Uighurs may have been forcibly transferred to factories in other Chinese regions.

Assessing the treatment of workers is nothing new for big firms sourcing materials from places of poverty and repression. But in China these problems are compounded by the power of the state, the size of the

economy and tensions with America. At a time when covid-19 has forced many companies to consider reducing their Chinese supply chains, concerns over Uighur forced labour have added “gasoline to the fire”, says one executive.

Western firms thus face several conundrums. How can they prove that their supply chains are free of forced labour when auditing in Xinjiang is taboo? How do they respond to labour-rights worries publicly without enraging either Beijing or Washington? And how do they ensure that overzealous scrutiny of their workplaces does not make life even worse for Uighurs? These are moral, political and social questions that businesses feel they should not have to answer alone.

Start with traceability. Xinjiang is at the heart of China’s cotton, yarn and textile industry, the world’s biggest. The region supplies 84% of the country’s cotton. Its extra-long staple variety is coveted; it produces fabric that is whiter and less knotty than other sorts, making it a favourite for dress shirts sold around the world. It contains spinning factories belonging to some of China’s most advanced shirtmakers, under contract to Western brands.

Until recently, when those brands fretted about labour conditions in Xinjiang, they sent auditors to inspect the factories. That stopped when they began to be monitored by Xinjiang authorities, “as if doing something wrong”, says one. Without audits, Xinjiang has become a black hole in the supply chain, making it almost impossible for Western firms to retain suppliers there. Furthermore, even outside Xinjiang, its cotton is a staple ingredient of Chinese yarn, where it may be mixed with other varieties, including imported stuff, and exported all over the world. Verifying the provenance of that cotton to show that none of it is from Xinjiang is “the hardest work we have ever done,” an auditor laments.

The second big problem is geopolitical. Navigating the Sino-American stand-off is getting tougher. Big international firms say that even if they reduce their dependence on supply chains within mainland China, they have no desire to pull out completely. But keeping Chinese factories, if only to supply domestic consumers, risks using tainted Xinjiang raw materials. And the Chinese government is so hostile to any criticism about human rights in Xinjiang, especially from outsiders, that Western firms must rely on Chinese suppliers to lobby on their behalf, a delicate endeavour.

In America, meanwhile, penalising the repression of Uighurs has bipartisan support that is unlikely to wane whoever wins the elections in November. But American brands feel that politicians have put them on the front line to safeguard human rights in China, without backup from Uncle Sam. They have little diplomatic support when negotiating with China, and the Twitter court of public opinion can be harsh. As one aggrieved executive puts it: “It is like the old witching days. The bar of guilt is incredibly low. The bar of innocence is extremely high.” It is easy to point fingers.

All of this leaves global firms feeling ultra-cautious—and poses a final dilemma. Averting a backlash from activists (and, potentially, consumers) requires removing Uighur employees from supply chains simply because it is so hard to prove whether they were coerced or not. Ultimately, it may necessitate breaking ties with Chinese suppliers with any links to Xinjiang—ie, most of them—even if a relationship of trust goes back decades. That can end up hurting the Uighurs, whom Western firms would gladly offer decent jobs, directly or indirectly.

| *A stitch in time*

Textile firms believe technology may provide an answer. Pilot programmes exist to test DNA and other things to verify the source of cotton in yarn and fabric. Patricia Jurewicz of the Responsible Sourcing Network, an NGO, says

fashion brands are studying how tech firms like Apple responded to a part of America's Dodd Frank Act of 2010 to ensure no conflict minerals from the Democratic Republic of Congo entered their supply chains.

Of course a T-shirt is cheaper than a smartphone, and traceability costs money. The ideal solution would be for the Chinese government to stop persecuting its Muslim minority. As a businessman notes, the irony is that the more heavy-handed its tactics in Xinjiang are in an attempt to preserve stability, the more economically unstable the region risks becoming. ■



熊彼特

供应链枷锁

中国的强迫劳动给时尚品牌带来复杂的困境

世界上没有几个比新疆生产建设兵团更奥威尔式的企业集团了。这是中国西部一个拥有近300万人的准军事式企业。它成立于1954年，目的是促使大量汉族复员军人涌入以维吾尔族穆斯林为主的地区。它维持着10万名民兵，负责根除极端主义。民兵和其他人帮助兵团为世界提供了众多商品。大约40万兵团农民收获了中国三分之一的棉花，还有人参与新疆的番茄出口业务。从睡衣到番茄酱，建设兵团的产品渗透了全球供应链。

美国国务院说兵团还使用了强迫劳动。7月下旬，美国财政部对兵团实施了制裁，指控它涉及新疆侵犯人权的行为，在那里有至少100万维吾尔族和其他少数民族被关押在拘留营中。在此之前，特朗普政府的备忘录建议企业切断与新疆内外的强迫劳动之间的任何联系。一些零售商，如PVH公司（其品牌包括卡尔文·克莱因 [CK] 和汤米·希尔费格 [Tommy Hilfiger]）公开表示，出于对劳工使用方面的担忧，他们将切断和新疆的联系。西方电子和鞋类制造商的供应链审计师说，有许多“危险信号”表明维吾尔族人可能已被强行转移到了中国其他地区的工厂。

对于从贫困和受压迫地区采购物料的大公司而言，评估工人的待遇并不是什么新鲜事。但是在中国，国家权力、经济规模以及与美国的紧张关系让这些问题变得更加复杂。一位高管表示，在新冠肺炎迫使许多公司考虑缩减其中国供应链之时，对维吾尔族强迫劳动的担忧是“火上浇油”。

西方公司因此面临着几个难题。当在新疆开展审计会触犯禁忌时，它们如何证明在自己的供应链中没有强迫劳动？他们如何公开回应对劳工权利的担忧，而不会要么触怒北京要么触怒华盛顿？他们如何确保对工作场所的过度审查不会使维吾尔族人的生活变得更糟？面对这些道德、政治和社会问题，企业觉得自己不应该孤军奋战。

先说可追溯性。中国的棉花、纱线和纺织工业是全世界最大的，而新疆就是这个工业的心脏。该地区供应了中国84%的棉花。它的长绒棉备受追捧；它生产的布料比其他布料更白且不易起球，因此成为畅销全球的正装衬衫的最爱。它还有一些纺纱厂，隶属于中国最先进的、与西方品牌签有合同的衬衫制造商。

然而最近，这些品牌开始对新疆的劳动条件感到不安，派出审计师来检查工厂。一位审计师说，这在新疆当局开始监视他们就停下来了，“就好像我们在做坏事”。没有审计，新疆已经成为供应链中的黑洞，让西方公司几乎不可能留用那里的供应商。此外，即使在新疆之外，新疆的棉花也是中国纱线的重要成分，它可以和其他品种（包括进口原料）混合起来并出口到世界各地。一名审计师慨叹道，核实棉花的来源以证明其中没有一种来自新疆，是“我们做过的最艰巨的工作”。

第二个大问题是地缘政治上的。要应对中美僵局变得越来越难了。大型国际公司表示，就算减少对中国大陆供应链的依赖，它们也没打算完全退出。但是，即便仅仅为了供应中国国内消费者而保留中国工厂，仍可能用到有污点的新疆原材料。而中国政府对有关新疆人权状况的任何批评都怀有极大的敌意（对外国批评尤甚），以至于西方公司必须依靠中国供应商代表他们进行游说，而这是一项微妙而艰苦的尝试。

与此同时，在美国，惩罚对维吾尔族的镇压得到了两党的支持，这一点无论谁赢得了11月的大选都不太可能消退。但是美国品牌感到政客们把它们放到了维护中国人权的前线，背后却没有山姆大叔的支持。它们在与中国谈判时几乎没有什么外交支持，而推特这个舆论法庭却可能十分严厉。正如一位愤愤不平的高管所说：“这就像过去那个猎巫时代：罪恶的门槛极低，而清白的门槛却异常地高。”指责总是很容易。

所有这些都使全球公司极为小心翼翼，而这带来了最后一个困境。要避免维权人士（可能还有消费者）反应强烈，就必须将维吾尔族雇员排除出供应链，原因仅仅是很难证明他们是否受到胁迫。到头来，有可能需要和与新疆有任何联系的中国供应商——也就是大部分供应商——断绝关系，哪

怕其中的信任已经建立了几十年。这最终可能伤害维吾尔族，而西方公司本来很乐意为他们直接或间接地提供体面的工作。

| 小洞快补

纺织公司认为技术可能会提供解决方案。已经有了通过测试DNA和其他东西来验证纱线和织物中棉花来源的试验性方案。非政府组织“尽责采购商网络”（Responsible Sourcing Network）的帕特里夏·尤里维奇（Patricia Jurewicz）说，时尚品牌正在研究苹果等科技公司当初如何应对《2010年美国多德·弗兰克法案》的部分条款，而确保了刚果民主共和国的违规矿产不会进入其供应链。

当然，T恤衫比智能手机便宜，而可追溯性是要花钱的。理想的解决方案是中国政府停止迫害其穆斯林少数群体。正如一位商人指出的，讽刺的是，新疆为维稳所采取的做法越严厉，该地区的经济可能会变得越不稳定。 ■



Working hours

Weekend plans

A powerful German union is pushing for a four-day week

A RECESSION IS not a good time to ask your boss for a pay rise. So IG Metall, Germany's biggest trade union, is mulling other perks its metal-bashing members might extract from employers. On August 15th its boss, Jörg Hofmann, told the *Süddeutsche Zeitung* newspaper he would push for firms to adopt a four-day working week.

German workers should not make Friday leisure plans just yet. Employers have not responded—it is mid-August, after all—but they are likely to put up a fight. Nonetheless, Mr Hofmann's salvo ahead of collective-bargaining talks later this year points to a new stage in European labour relations—and a culmination of decades of pushing for working hours to be cut.

If you think no worker would object to a three-day weekend, think again. Even fans fret about trade-offs. Workers could face longer hours from Monday to Thursday, or a cut in pay. Some employers, notably technology startups, already dangle longer weekends to recruit sought-after brainboxes, or offer flexible hours. But a five-day slog will probably remain the norm in lower-paid jobs, where productivity gains from more rest are less obvious.

IG Metall's timing is not coincidental. Its members agreed to forgo a pay rise in the covid-19 crisis. Around 6m Germans currently participate in the *Kurzarbeit* furlough scheme, estimates IFO, a think-tank. The 12-month scheme now looks likely to be extended to 24 months. Hubertus Heil, Germany's labour minister, said truncated working hours—and a trimmed payslip—could be “an appropriate measure”. State top-ups of the wages of employees who go down to four days a week might be painted as part of the

extension.

German workers face problems beyond covid-19. The car industry that underpins blue-collar jobs has been slow to shift to electric vehicles, let alone driverless ones. IG Metall thinks cutting hours will allow firms to retain expertise needed for the transition, without the expense and bad publicity of sacking workers, only to have to rehire some later if prospects improve.

Where IG Metall goes others often follow, in Germany and beyond. Its members were striking for a 35-hour week long before it became law in France. A four-day week equates to around 30 hours. If union bosses pull that off without causing big cuts to workers' pay, they truly will deserve an extra day of rest. ■



工作时长

周末计划

一个强大的德国工会正在推动四天工作制

经济衰退期不是向老板提加薪的好时机。所以德国最大的工会金属行业工会（IG Metall）正在琢磨它那些敲铜打铁的会员们还能从雇主那里争取到什么别的福利。8月15日，工会主席约尔格·霍夫曼（Jörg Hofmann）告诉《南德意志报》（Süddeutsche Zeitung），他将推动企业施行每周四天工作制。

德国工人也别急着制定周五休闲计划。雇主们还没有做出回应，毕竟这会儿才8月中旬，但他们很可能会抵抗。尽管如此，霍夫曼在今年早些时候的劳资集体谈判启动之前突然开出这一炮，表明欧洲的劳资关系进入了一个新阶段，几十年来推动削减工时的努力也达到了顶峰。

如果你觉得没有员工会反对“三休日”周末，再想想。就连支持者也还在权衡利弊。员工可能要在周一到周四工作更久，或者减薪。有些雇主，尤其是科技创业公司，已经在以更长的周末为诱饵招募那些抢手的聪明人，或是提供弹性工作时间。但在薪水较低的工种中，五天的辛苦劳作可能仍将是常态，因为这些岗位休息更久对提高生产率的作用更不明显。

IG Metall选择的时机并非巧合。它的会员在疫情期间同意了放弃加薪。据智库IFO估算，目前约有600万德国人参加了“短时工作制”（Kurzarbeit）。这个为期12个月的方案现在看来很可能会延长到24个月。德国劳工部长胡贝图斯·海尔（Hubertus Heil）表示，缩短工时——由此也削减了工资——可能是“一项适宜的举措”。政府为每周工作减至四天的员工提供工资补贴或许可被描绘成延长计划的一部分。

除疫情之外，德国工人还面临其他问题。支撑蓝领工作岗位的汽车工业向电动汽车的转变一直很缓慢，更不用说无人驾驶汽车了。IG Metall认为缩短工时可以让公司保留过渡期所需的专业技能，而不用承担解雇工人产生

的费用和负面公共影响，只需要等前景好转时重新雇一些人。

IG Metall一行动，德国的其他工会乃至其他国家经常都会跟上。在法国立法确立每周35小时工作制之前很久，IG Metall的会员就在罢工争取这个工作时长了。而四天工作制相当于每周工作30个小时左右。如果工会领袖们能在不大幅削减工人工资的情况下实现这个时长，那他们真的配得上多休息一天。 ■



Entertainment

A big-sum game

China's streaming wars may end with a duopolistic peace

LAUNCHED IN 2010, iQiyi has grown used to the foreign press calling it “the Netflix of China”. Not the worst nickname, given the videostreaming pioneer’s success. But Gong Yu, iQiyi’s founder and boss, insists that his firm is more accurately described as “Netflix plus”. A bold claim for a loss-making business worth one-fifteenth as much as America’s (cash-generating) entertainment powerhouse with a market value of \$214bn. Still, Mr Gong has a point.

Like Netflix, iQiyi offers customers a deep catalogue of licensed and original content. Unlike Netflix, which relies almost entirely on subscription fees, iQiyi has multiple revenue streams. “Membership fees”, which start from 19.8 yuan (\$2.87) a month, accounted for just over half of iQiyi’s 7.4bn yuan in revenues in the second quarter. The rest came mainly from an online store (which sells “entertainment-related merchandise”), a nascent mobile-gaming arm, an e-book business and advertisements; iQiyi operates a “freemium” model which allows stingier users to stream some content free of charge provided they agree to watch ads.

Conveniently for iQiyi, which does little business outside its home market, Netflix is blocked in China, under laws that ban a lot of foreign content. But that is not to say that China is free from the streaming wars of the sort that pits Netflix against rivals like Disney, HBO (owned by AT&T) and NBCUniversal (belonging to Comcast). Far from it. Mr Gong is battling Tencent Video, part of the eponymous technology conglomerate. It overtook iQiyi at the end of June with 114m video subscribers to iQiyi’s 105m (see chart). Mr Gong’s firm shed 14m subscribers in the most recent quarter while Tencent Video, which also runs a freemium model and

charges subscribers 20 yuan a month, added 2m.

iQiyi insists the setback was down to one-off factors, such as virus-induced disruption to film production, which temporarily emptied the content pipeline. Perhaps. But Tencent Video offers a richer selection of English-language content, including hit television series like “Chernobyl” and “Silicon Valley”. More important, the rivalry between Tencent Video and iQiyi is a proxy war between mighty Tencent and fading Baidu, a search firm that is iQiyi’s majority owner. Indeed, iQiyi seemed to concede as much in its latest annual report, writing that “competitors include well-capitalised companies that are capable of offering compensation packages more attractive to talents.”

Still, as Westerners who pay for a few video subscriptions can attest, streaming is not a zero-sum game. Gigi Zhou of BOCOM International, a broker, reckons the Chinese market will soon be big enough to sustain both iQiyi and Tencent Video, which also has yet to make money. Ms Zhou expects 400m Chinese to subscribe to video-streaming platforms by 2023, up from some 300m in 2019. So long as no new rival emerges, each firm could capture around 150m, helping them spread costs over more subscribers and so turn a profit.

Before streaming peace can break out, iQiyi faces another fight. On August 13th it said it was under investigation by America’s Securities and Exchange Commission after a short-seller accused it of inflating sales data, a charge it denies. If found guilty, it may have to delist from New York’s Nasdaq exchange. The firm’s stable share price implies investors’ faith in battle-hardened Mr Gong is unshaken. ■



娱乐

大额游戏

中国的流媒体大战或将以双头垄断和平收尾

创立于2010年的视频网站爱奇艺已经习惯了外媒叫它“中国版奈飞（Netflix）”。鉴于视频流媒体先驱奈飞取得的成功，这个别名也不算太差。但爱奇艺的创始人兼CEO龚宇坚称对他的公司更准确的称法应为“奈飞+”（Netflix plus）。这样的宣称很大胆，因为还在亏损的爱奇艺的市值仅为美国这家（已经实现正向现金流的）娱乐业巨头2140亿美元市值的十五分之一。不过，龚宇这么说也有其道理。

和奈飞一样，爱奇艺也为用户提供非常丰富的授权和原创内容。但和奈飞几乎完全依赖订阅费不同，爱奇艺有多种收入来源。每月低至19.8元的“会员费”在爱奇艺第二季度74亿元的营收中占比刚刚过半。其余收入主要来自爱奇艺商城（销售“娱乐相关商品”）、新增手游部门、电子书业务和广告；爱奇艺实行“免费增值”运营模式，允许不想付费的用户免费收看部分内容，只要他们同意观看广告。

对于爱奇艺（海外业务寥寥）来说幸运的是，由于中国的法规禁止了大量外国内容在国内播放，奈飞被中国拒之门外。但这并不是说中国就此免于—场流媒体大战——类似于奈飞和迪士尼、HBO（AT&T旗下）和NBC环球（属于康卡斯特）等竞争对手之间的那种厮杀。事实远非如此。龚宇正在与科技企业集团腾讯旗下的腾讯视频较量。6月末，腾讯视频的付费用户数达到1.14亿，超过了爱奇艺的1.05亿（见图表）。爱奇艺在最近一个季度流失了1400万名会员，而同样运行“免费增值”模式、会员费每月20元的腾讯视频增加了200万名。

爱奇艺坚持认为这次挫折源于一次性因素，比如疫情导致电影制作中断，内容一时供应不上。也许如此。但腾讯视频提供了更丰富的英语内容，包括《切尔诺贝利》和《硅谷》等热门剧集。更重要的是，腾讯视频和爱奇艺之间的竞争是实力强劲的腾讯和日渐式微的百度（这家搜索公司拥有爱

奇艺的多数股份)之间的代理人战争。实际上,爱奇艺在最近的年报中似乎也承认了这一点,称“竞争对手包括资本雄厚的公司,它们有能力提供更吸引到人才的薪酬福利”。

不过,流媒体并非零和游戏,同时付费订阅多个视频服务的西方人可以证明这一点。券商交银国际(BOCOM International)的周喆估计,中国市场很快就会大到足以同时容下爱奇艺和同样尚未盈利的腾讯视频两者。周喆预计,到2023年将有四亿中国人订阅视频流媒体平台,高于2019年的三亿左右。只要没有新的竞争对手出现,每家公司都能吸引到约1.5亿订户,帮助它们把成本分摊给更多订户,从而实现盈利。

在和平降临于流媒体世界之前,爱奇艺还面临另一场战斗。8月13日,它表示由于做空者指控其夸大销售数据,公司正在接受美国证券交易委员会(SEC)的调查。爱奇艺否认这一指控。如果被定罪,它可能要从纽约纳斯达克交易所退市。目前,这家公司稳定的股价表明,投资者对久经沙场的龚宇信心没有动摇。■



Viruses

The aliens among us

Viruses cause pandemics. They also shape the world

HUMANS THINK of themselves as the world's apex predators. Hence the silence of sabre-tooth tigers, the absence of moas from New Zealand and the long list of endangered megafauna. But SARS-CoV-2 shows how people can also end up as prey. Viruses have caused a litany of modern pandemics, from covid-19, to HIV/AIDS to the influenza outbreak in 1918-20, which killed many more people than the first world war. Before that, the colonisation of the Americas by Europeans was abetted—and perhaps made possible—by epidemics of smallpox, measles and influenza brought unwittingly by the invaders, which annihilated many of the original inhabitants.

The influence of viruses on life on Earth, though, goes far beyond the past and present tragedies of a single species, however pressing they seem. Though the study of viruses began as an investigation into what appeared to be a strange subset of pathogens, recent research puts them at the heart of an explanation of the strategies of genes, both selfish and otherwise.

Viruses are unimaginably varied and ubiquitous. And it is becoming clear just how much they have shaped the evolution of all organisms since the very beginnings of life. In this, they demonstrate the blind, pitiless power of natural selection at its most dramatic. And—for one group of brainy bipedal mammals that viruses helped create—they also present a heady mix of threat and opportunity.

Viruses are best thought of as packages of genetic material that exploit another organism's metabolism in order to reproduce. They are parasites of the purest kind: they borrow everything from the host except the genetic

code that makes them what they are. They strip down life itself to the bare essentials of information and its replication. If the abundance of viruses is anything to go by, that is a very successful strategy indeed.

The world is teeming with them. One analysis of seawater found 200,000 different viral species, and it was not setting out to be comprehensive. Other research suggests that a single litre of seawater may contain more than 100bn virus particles, and a kilo of dried soil ten times that number. Altogether, according to calculations on the back of a very big envelope, the world might contain 10^{31} of the things—that is ten followed by 30 zeros, far outnumbering all other forms of life on the planet.

As far as anyone can tell, viruses—often of many different sorts—have adapted to attack every organism that exists. One reason they are powerhouses of evolution is that they oversee a relentless and prodigious slaughter, mutating as they do so. This is particularly clear in the oceans, where a fifth of single-celled plankton are killed by viruses every day. Ecologically, this promotes diversity by scything down abundant species, thus making room for rarer ones. The more common an organism, the more likely it is that a local plague of viruses specialised to attack it will develop, and so keep it in check.

This propensity to cause plagues is also a powerful evolutionary stimulus for prey to develop defences, and these defences sometimes have wider consequences. For example, one explanation for why a cell may deliberately destroy itself is if its sacrifice lowers the viral load on closely related cells nearby. That way, its genes, copied in neighbouring cells, are more likely to survive. It so happens that such altruistic suicide is a prerequisite for cells to come together and form complex organisms, such as pea plants, mushrooms and human beings.

The other reason viruses are engines of evolution is that they are transport

mechanisms for genetic information. Some viral genomes end up integrated into the cells of their hosts, where they can be passed down to those organisms' descendants. Between 8% and 25% of the human genome seems to have such viral origins. But the viruses themselves can in turn be hijacked, and their genes turned to new uses. For example, the ability of mammals to bear live young is a consequence of a viral gene being modified to permit the formation of placentas. And even human brains may owe their development in part to the movement within them of virus-like elements that create genetic differences between neurons within a single organism.

Evolution's most enthralling insight is that breathtaking complexity can emerge from the sustained, implacable and nihilistic competition within and between organisms. The fact that the blind watchmaker has equipped you with the capacity to read and understand these words is in part a response to the actions of swarms of tiny, attacking replicators that have been going on, probably, since life first emerged on Earth around 4bn years ago. It is a startling example of that principle in action—and viruses have not finished yet.

Humanity's unique, virus-chiselled consciousness opens up new avenues to deal with the viral threat and to exploit it. This starts with the miracle of vaccination, which defends against a pathogenic attack before it is launched. Thanks to vaccines, smallpox is no more, having taken some 300m lives in the 20th century. Polio will one day surely follow. New research prompted by the covid-19 pandemic will enhance the power to examine the viral realm and the best responses to it that bodies can muster—taking the defence against viruses to a new level.

Another avenue for progress lies in the tools for manipulating organisms that will come from an understanding of viruses and the defences against them. Early versions of genetic engineering relied on restriction

enzymes—molecular scissors with which bacteria cut up viral genes and which biotechnologists employ to move genes around. The latest iteration of biotechnology, gene editing letter by letter, which is known as CRISPR, makes use of a more precise antiviral mechanism.

| *From the smallest beginnings*

The natural world is not kind. A virus-free existence is an impossibility so deeply unachievable that its desirability is meaningless. In any case, the marvellous diversity of life rests on viruses which, as much as they are a source of death, are also a source of richness and of change. Marvellous, too, is the prospect of a world where viruses become a source of new understanding for humans—and kill fewer of them than ever before. ■



【首文】病毒

我们当中的异类

病毒引发大流行病。它们也塑造世界

人类自认为是世界上的顶级捕食者。所以剑齿虎湮灭、新西兰恐鸟绝迹，还有许多其他巨型动物濒临灭绝。但此次新冠病毒表明，人类最终也可能成为猎物。病毒在近现代引发了一系列全球大流行病，如新冠肺炎、艾滋病，以及1918年至1920年爆发的致死人数超过一战的大流感等。在此之前，欧洲入侵者无意中带去的让很多原住民丧生的天花、麻疹和流感等区域流行病推动了——或者甚至是促成了——他们对美洲的殖民。

然而，病毒对地球生物的影响远远不止单个物种在过去和现在遭遇的灾难，不管这些灾难看起来有多紧迫。尽管最初的病毒研究是在调查一类看似是病原体一个奇怪分支的东西，但近些年的研究已把病毒视为理解基因策略的关键，不管是自私的还是利他的基因。

病毒种类繁多又无处不在的程度令人难以想象。人们逐渐认识到，自生命诞生之初，病毒就在很大程度上影响了所有生物的进化。在此过程中，它们以最剧烈的方式展现了自然选择那盲目而无情的力量。而且，对于人类这种在病毒的帮助下形成的有智慧的两足哺乳动物来说，它们令人晕眩地同时带来了“危”与“机”。

对病毒的最好理解方式是它们是利用另一种有机体的新陈代谢来繁殖的遗传物质组装体。它们是最纯种的寄生生物：除了令它们获得自身特性的遗传密码以外，其他一切都借自宿主。它们将自身生命剥离得只剩下遗传信息及其复制品的最基本要素。从病毒数量之多这一点来看，这确实是非常有效的策略。

世界充满了病毒。一项分析在海水中发现了20万种不同病毒，这还不是什么全面的研究。另一项研究表明，一升海水中可能含有超过一千亿个病毒颗粒，而一公斤干燥泥土中有超过一万亿个。根据非常粗略的估算，世界

上的病毒总数可能达到 10^{31} 个，也就是10后面有30个零，远远超过地球上所有其他生命形式的数量。

就目前所知，病毒——而且往往是很多不同的种类——已经适应了去攻击所有活生物体。它们之所以是进化的推进器，原因之一是它们主导着一场残酷的大规模屠杀，并在此过程中发生突变。这在海洋中尤其明显，每天海洋中有五分之一的单细胞浮游生物被病毒杀死。从生态学的角度来说，这通过大幅缩减一些数量众多的物种的规模，给较稀有的物种腾出生存空间，从而促进了生物多样性。一种生物体越常见，专门攻击它的病毒就越有可能制造一场局部瘟疫，从而控制该生物体的数量扩张。

病毒引发瘟疫的这种特性也强有力地促进了猎物自身防御能力的进化，而这些防御能力有时会产生更广泛的影响。例如，为什么细胞会故意自我毁灭？一种解释是，当一个细胞自我毁灭后，与它密切相关的邻近细胞上的病毒载量就会减少。这样，它在邻近细胞中复制的基因存活下来的几率就更大。巧合的是，这种利他性自杀正是促使细胞聚集并形成豌豆苗、蘑菇和人类等复杂生物体的先决条件。

病毒成为进化引擎的另一个原因是它们充当了基因信息的传输机制。一些病毒基因组最终被整合到其宿主的细胞中，从而可以遗传给那些生物体的后代。8%到25%的人类基因组似乎具有这种病毒起源。但反过来病毒自己也可能被“劫持”，它们的基因被改作新用途。比如，哺乳动物能够生育幼仔，就是一种病毒基因被修改而使胎盘得以形成的结果。甚至人类大脑的发育在一定程度上可能也要归功于类病毒元素在大脑内部的运动，这些元素制造了单个生物体中的神经元之间的遗传差异。

关于进化，最让人着迷的见解是，在生物体内部以及生物体之间持续的、不可调和的、破坏性的竞争会产生令人叹为观止的复杂性。自然选择这一“盲眼钟表匠”之所以让你拥有阅读和理解本文的能力，一定程度上是对成群结队微小的病毒复制基因的攻击做出的反应，这些攻击可能自大约40亿年前地球上刚出现生命起就一直在发生着。这是自然选择法则在起作用的惊人例子——而病毒的历程尚未完结。

人类独特的、由病毒雕琢而成的意识为应对和利用病毒威胁开辟了多种新途径。首先是疫苗接种这一奇迹，它能在病毒发起致病攻击之前做出防御。因为有了疫苗，上世纪夺走约三亿人性命的天花得以绝迹。总有一天，小儿麻痹症也会被消灭。此次新冠疫情推动的新研究将提高对病毒族群的研判能力，加强人体能够调集起的最佳响应，从而把病毒防御提升到一个新水平。

另一条进步途径存在于操纵生物体的工具中。创造这类工具的基础是对病毒以及病毒防御的了解。早期的基因工程依赖限制性内切酶，细菌用这把“分子剪刀”切断病毒基因，生物技术学家用它来四处移动基因的位置。最新的生物技术被称为CRISPR，可以逐个对碱基加以编辑，利用了一种更精确的抗病毒机制。

| 从最小处入手

自然界并不友好。要想生存在一个没有病毒的世界里是不可能的，也根本做不到，因此追求这一点毫无意义。无论如何，生命妙不可言的多样性有赖于病毒——它们不仅是死亡之源，同样也是丰富性和变化之源。同样妙不可言的是未来会出现这样一个世界——在这里，病毒成为人类新认知的来源，而它们的致死人数低于以往任何时候。■



Schumpeter

Dangerous curves ahead

The trucking industry is in the midst of upheaval—and hype

LIFE ON THE road has become a lot tougher since the 1980s, when Schumpeter spent a year driving a battered old lorry with several tonnes of four-hooved cargo around the western United States. The cab was too cramped to sleep in. The radio only played AM. And sweat would drench his shirt as he swerved down roads like the “Grapevine”, north of Los Angeles, with the smell of burning brake pads in his nose. Yet it was as close to the idyllic, free-wheelin’ life as a young Brit could hope for.

Not so for the genuine American trucker. Until that decade of deregulatory zeal, truckers were the best-paid members of America’s working class. Their union, the International Brotherhood of Teamsters, was revered and feared. And the romance of the road was celebrated in 1970s films like “Convoy”. Then came the Motor Carrier Act of 1980, which swept away restrictions on the number of haulage firms, as well as price controls. Union membership plunged and truckers’ livelihoods took a turn for the worse. Their sacrifice benefited the American consumer, though. As Steve Viscelli, a sociologist and author of “The Big Rig”, says, cheaper haulage on the back of lower wages for drivers supported a boom in big-box retailing that has transformed commerce ever since.

Today trucking is once again caught in an epochal upheaval that is also reshaping the retail industry. The main cause is online shopping, which is reducing long-haul delivery of containers from port to Main Street, and speeding up that of smaller packages from warehouses operated by retailers like Amazon and Walmart in America to consumers’ doorsteps. In addition, the experience of covid-19 is leading to a rethink of supply chains, which McKinsey, a consultancy, says may bring manufacturing closer to home

and increase demand for road haulage. And as one of the world's most fragmented industries, trucking is under pressure to become leaner, cleaner and more automated. The tech world is abuzz with efforts to disrupt it. Truckers, enjoying a rare moment of acclaim for their front-line work in the pandemic, are also on the front line of forces such as electrification and autonomous driving which, though overloaded with hype, could reshape their business.

This upheaval has only just begun to attract attention, despite the industry's size and the fact almost every product travels by lorry. It often gets short shrift. Few would guess, for instance, that in America road-freight revenues are almost \$800bn, about the same size as the world's airline industry. In America and Europe there are 3.5m and about 3m lorry drivers, respectively, making trucking a jobs juggernaut. Yet it is so splintered that it is easy to overlook. China, for instance, has an estimated 8m trucking firms, most of which are one-man shops. America has almost 900,000, 96% of which own fewer than 20 lorries, according to the American Trucking Associations (ATA). In long-haul especially, this fragmentation comes at a high economic cost. The biggest 25 full-trailer (or "truckload") freight firms in America, led by companies such as J.B. Hunt, account for less than a tenth of industry revenue. They are the most efficient, pay decent wages and are trundling through the pandemic with tolerable results. But the small fry producing the remaining 90% of revenues are in the slow lane. For about a third of the time they are on the road cargo-less—and drivers make no money. The pandemic is making their fortunes even worse.

Change is clearest in the short-haul segment, most recognisable in the fleets of delivery vehicles operated by logistics giants such as UPS, which have benefited from surging demand from locked-down shoppers, and increased profits despite the extra cost of door-to-door deliveries. Digitisation is helping improve efficiency, too. Uber Freight, the ride-

hailing giant's shipping arm, is developing a brokerage app to match carriers with shippers. In China, Full Truck Alliance, a startup backed by SoftBank, a Japanese technology group, is said to have a similar business model. E-trucks are on the horizon, albeit bedecked with bubblelike hoopla. The wild stockmarket debut of Nikola, a startup that plans to lease vehicles powered by hydrogen fuel cells, makes Tesla (which wants to start making a massive "semi" e-truck in Texas) look like a boring investment. At some times recently Nikola, which has yet to produce, let alone sell, a single vehicle, has been worth more than Fiat Chrysler. At least the histrionics have drawn attention to plans by more sober American truck- and engine-makers like PACCAR and Cummins to manufacture e-vehicles. Amazon has a \$5bn order with Rivian, a startup, for 100,000 electric vans.

The biggest force of disruption is autonomous driving, which some fear could hit trucking like a neutron bomb, killing jobs that account for as much as 40% of freight costs. "Driver-assist" technology such as adaptive cruise control, which adjusts a lorry's speed to keep a safe distance from vehicles in front, is already a reality. Bob Costello of the ATA says that the use of autopilot with a driver on board could be common within five years. TuSimple, a startup based in California and China, in July announced a partnership with Navistar, a truckmaker, to build semi-articulated robot trucks by 2024.

| *Right lane exits*

The spectre of platoons of driverless lorries barrelling down highways is probably some way off. Regulation for self-driving trucks is non-existent. The powerful rail industry will fight tooth and nail against a technology that imperils its future. Truckers, too, will raise a stink if they feel they have no prospects. Driverless cabs will not be here for decades, says Mr Costello.

One day they will come, though. The benefits of autonomous and electric trucking may be too powerful to resist, says John Murnane of McKinsey. In

the meantime expect a further split in the trucking industry, with the best-capitalised firms in the fast lane and the also-rans headed for the off-ramp. For truckers, even less of the romance of the open road will remain. But as journeys shorten, at least they will sleep in the cab less often. ■



熊彼特

前方弯道，危险

卡车运输业正在经历剧变，以及炒作

“在路上”的生活从上世纪80年代起变得艰难了许多。回到那会儿，本专栏记者开着一辆破破烂烂的旧卡车，载着几吨牲口，在美国西部跑了一年。驾驶室太狭窄，没法睡觉。收音机里只有AM电台。当他在洛杉矶北部的“葡萄藤”（Grapevine）这样的路段上蜿蜒前行时，汗水浸湿了他的衬衫，他闻到一股刹车片的焦味。不过，这是一个英国年轻人能期待的最接近田园诗般的随心所欲的生活了。

对于真正的美国卡车司机来说可不是这样。在监管放松的十年到来之前，卡车司机一直是美国工人阶级中收入最高的群体。他们的工会国际卡车司机协会（International Brotherhood of Teamsters）让人又敬又怕。上世纪70年代像《大车队》（Convoy）这样的电影赞美了公路上的浪漫。之后，《汽车运输法案》（Motor Carrier Act）于1980年出台，取消了对运输公司数量的限制和对价格的管控。工会会员骤减，卡车司机的境况急转直下。不过，他们的牺牲令美国消费者受益。正如《大卡车》（The Big Rig）一书的作者、社会学家史蒂夫·维切利（Steve Viscelli）所说，司机工资降低使得运输成本下降，推动了大型零售业的繁荣，从此改变了商业形态。

如今，卡车运输再次卷入了一场划时代的巨变，这场巨变同样也在重塑零售业。主要原因是网上购物。网购减少了从港口到主要商业区的集装箱长途运输，加速了从美国的亚马逊和沃尔玛等零售商的仓库到消费者家门口的小包裹配送。此外，新冠疫情也让人们重新思考供应链。咨询公司麦肯锡认为，这可能会让制造业更靠近本土，增加对公路运输的需求。作为世界上最分散的行业之一，卡车运输业正面临要变得更精简、清洁和自动化的压力。科技业正忙着要颠覆它。奋战在抗疫第一线的卡车司机们正享受着难得被追捧的一刻，他们同时也身处电气化和无人驾驶等变革力量的前沿地带，这些力量虽被大肆炒作，仍可能重塑卡车行业。

这场剧变才刚刚开始引起注意，尽管这个行业规模庞大，而且几乎所有商品都靠卡车运输。它常常不被重视。比如，很少有人会想到美国的公路货运收入高达近8000亿美元，和全球航空业的规模差不多。在美国和欧洲分别有350万和约300万名卡车司机，这让卡车运输业成了大雇主。但这个行业太过分散，容易被忽视。例如，中国估计有800万家卡车运输公司，其中大部分是个体户。根据美国卡车运输协会（American Trucking Associations）的数据，美国大约有90万家，其中96%只有不到20辆卡车。这样的分散带来了高昂的经济成本，尤其是在长途运输中。以J.B.亨特（J.B. Hunt）等公司为首的美国最大的25家全挂车（或者叫“整车运输”）货运公司的营收不到行业总收入的十分之一。它们是行业中最高效的公司，支付体面的工资，并且正在熬过疫情，财务状况尚可。但那些生成了剩下九成收入的小公司还行驶在慢车道上。大约有三分之一的时间它们的卡车都在路上空跑，司机也就赚不到钱。疫情让它们的运势变得越发糟糕。

短途运输的变化最明显，尤其体现在UPS等物流巨头运营的送货车队上，它们受益于封城时购物者激增的需求，尽管增加了送货上门的成本，利润仍然增长了。数字化也推动了效率提升。网约车巨头优步旗下的运输公司优步货运（Uber Freight）正在开发一款中介应用来匹配运输公司和托运人。在中国，由日本科技集团软银支持的创业公司满帮集团据说也是类似的商业模式。电动卡车即将出现，尽管充斥着泡沫般的炒作。计划出租氢燃料电池驱动汽车的创业公司尼古拉（Nikola）在股市的疯狂亮相让特斯拉看上去成了一项很无聊的投资（特斯拉打算开始在德州生产一款“半挂”重型电动卡车）。尼古拉连一辆车都还没生产出来，更不用说卖了，但最近它的市值几次超过了菲亚特克莱斯勒。这种作秀至少让人们注意到帕卡（PACCAR）和康明斯（Cummins）等更冷静的美国卡车和发动机制造商也有生产电动卡车的计划。亚马逊已经和创业公司Rivian签下了一份50亿美元的订单，购买10万辆电动货车。

最大的颠覆力量是无人驾驶，有人担心它会像中子弹一般袭击卡车运输业，让占到货运成本40%的工作岗位消失不见。自适应巡航控制等驾驶员辅助技术已经成为现实，它可以调整卡车的速度，与前车保持安全距离。

美国卡车运输协会的鲍勃·科斯特洛（Bob Costello）表示，配有一位司机在车上的自动驾驶系统将在五年内普及。总部位于加州和中国的创业公司图森未来（TuSimple）7月宣布将与卡车制造商纳威司达（Navistar）合作，在2024年之前生产出半挂式机器人卡车。

| 正确的车道出口

无人卡车车队在公路上疾驰的景象可能还有些遥远。对无人卡车的监管还不存在。强大的铁路行业将竭尽全力对抗危及自身未来的技术。卡车司机如果觉得前途渺茫，也会抱怨抗议。科斯特洛认为无人卡车在未来几十年内不会出现。

不过，总有一天它们会出现。麦肯锡的约翰·莫尼恩（John Murnane）说，无人电动卡车的好处可能会让人无法抗拒。与此同时，等着看卡车运输业进一步分化吧，那些资本最雄厚的公司将驶入快车道，落后的公司将转向出口匝道。对卡车司机来说，开阔公路上的浪漫会变得更少。但是，随着路程缩短，至少他们睡在驾驶室里的时间也会变少。■



China's hybrid capitalism

Blooming for the glory of the state

Xi Jinping is blending market mechanisms with Communist Party control to remake the Chinese economy

LAST YEAR Zotye, a carmaker, used it to tackle weak sales, and Wuliangye, a distiller, to improve the quality of its *baiju*; it helped Zheshang Bank to digitise its operations and catalysed the development of energy-saving technologies at China National Nuclear Power. “Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era” is, on the basis of these companies’ annual reports, quite the business-practice panacea.

The time when private Chinese companies downplayed their links to the Communist Party is gone. By *The Economist’s* count, nearly 400 of the 3,900 companies listed on stock exchanges in mainland China paid homage to the Communist Party and its leader in their annual reports this year. References by both state-owned firms and their private-sector peers to Mr Xi’s guidance have increased more than 20-fold since 2017 (see chart 1).

The trend reflects China’s new reality. The Communist Party has greater control over all aspects of life, and Mr Xi has greater control over the party. This does not just mean it is a good idea for companies to butter him up. It means that he is in a position to reshape the economy within which they prosper or fail. What is he doing with it?

Nothing good, say critics at home and abroad. He has brought reforms that liberalised the economy to a halt and has smothered market forces, returning to a top-heavy state-dominated growth model which looks distinctly creaky. Private companies have rushed to set up party committees with an increasing say over strategy. Their once-swashbuckling bosses have adopted lower profiles. The title of a recent book by Nicholas

Lardy of the Peterson Institute, an American think-tank, sums up the worries: “The State Strikes Back”.

Those observations are right. The conclusion is misleadingly wrong, encouraging a complacent and dangerous underestimate of China’s potential trajectory. Mr Xi is not simply inflating the state at the expense of the private sector. Rather, he is presiding over what he hopes will be the creation of a more muscular form of state capitalism. The idea is for state-owned companies to get more market discipline and private enterprises to get more party discipline, the better to achieve China’s great collective mission. It is a project full of internal contradictions. But progress is already evident in some areas.

Mr Xi announced his agenda in 2013, vowing that China would “let the market play the decisive role in allocating resources”, while reinforcing “the leading role of the state-owned sector”. When domestic stocks crashed in 2015 the government’s focus shifted to recapitalising its banks, tightening controls on cross-border cash transfers and taming the wildest corners of its financial system. But the party now thinks it has won this “battle against financial risks” and is getting Mr Xi’s agenda back on track in a new, bolder form.

Ever more tense relations with America have persuaded the party that China must be able to get ahead on its own. At the same time, China’s success in stalling its coronavirus epidemic and restarting its economy has reinforced its belief in what Mr Xi calls China’s “institutional advantages”—the idea that, as a strong one-party state, China can pool its economic and social resources to meet critical objectives.

Mr Xi’s push can be broken down into two big segments. The first is to establish clearer boundaries for the fizz and ferment of the Chinese marketplace: a stronger legal system for businesses; simplified rules for

day-to-day activities; a financial system better at allocating funds. The second is to make more adroit use of the government's grip on the economy's main levers: to make state firms more efficient; and to team them up with private firms in new industrial-policy initiatives.

Entrepreneurs still have considerable latitude, so long as they stay in their lane and move in government-endorsed directions. And they still have powerful incentives. "To get rich is glorious", a quip attributed to Deng Xiaoping that became a mantra for China in its go-go years, still applies. But only so long as your pursuit of riches also benefits the state.

Many foreign executives and diplomats have little time for the idea that there is real pro-market reform going on; they talk of promise fatigue. Repeated pledges to level the playing field on which Chinese and foreign firms meet have amounted to naught. State firms benefit from reams of subsidies and preferential rules, often opaque. Foreign companies have scant presence in key sectors such as finance and energy.

| *You may now go bankrupt*

They are all well-founded complaints. But they ignore the fact that when Mr Xi talks about market reform, it is order, not fairness, that he is after. He wants to define more clearly how businesses and people can work, and within what limits.

Start with the legal system. It is a tool of oppression, as its extension into Hong Kong is making clearer than ever. Mr Xi has been relentless in targeting anyone standing up for human rights. Yet he has also overseen a partial professionalisation of the judicial system and given courts more authority on non-political matters. The economy is simply too complex, and corruption too prevalent, to rely on local officials to adjudicate disputes as they used to.

These changes to the courts have coincided with an explosion in cases. Administrative lawsuits, which typically involve people suing the government, have more than doubled since 2012, the year that Mr Xi became China's paramount leader (see chart 2). Bankruptcy filings are up ten-fold. Last year Chinese courts accepted more than 480,000 intellectual property cases, nearly five times as many as they did in 2012, with some going to a new national court devoted to the area. Foreign plaintiffs won 89% of all patent infringement cases, according to Rouse, a consultancy.

Local officials have until now always had the option of simply ignoring court rulings: the head of a medical-services company complains that he was blamed for a health scandal in a small inland city caused by a firm that had stolen his company's name and continued to use it three years after a court ruled against it. It is partly to patch up such holes that the government is developing its "social credit" system. The courts can place people on so-called credit blacklists, in effect recruiting automated agents of the state to enforce their judgments. For example, if a court finds that a debtor owes money, its ruling, via the blacklist system, can stop them from buying a plane ticket or getting a loan. As of the end of 2018, some 290,000 business executives were on the blacklist.

It is easy to imagine the system taking a truly dystopian turn if its reach were to become more all-embracing, with access to everything in society made conditional on a history that extends beyond creditworthiness through social-media activity into political reliability. But many in China support it for now. "It's a price that must be paid to cultivate a healthy business environment," says Yan Yiming, a lawyer who focuses on corporate malfeasance.

As the law gets more reliable, administration gets simpler. The World Bank has found that the average time taken to start a business, which was 23 days as recently as 2017, is now just nine days—a little faster than Japan, a little

slower than America. Construction permits previously took 247 days; now they take 111. Digitisation has made filing taxes much more straightforward. When a business issues an invoice a copy goes directly to the tax authorities. Indeed, some fear that it is all-too-convenient: back doors in the government-mandated software could give hackers access to a company's computer network.

The last major focus of Mr Xi's market-orderliness reforms has been the financial system. For those who think that banking regulation is dry paperwork, his reassertion of government control over banks, brokerages and investment firms has been bracingly hands-on, featuring tactics such as the abduction of Xiao Jianhua, a once-mighty financier, from a luxury hotel in Hong Kong in 2017. Several other tycoons have also disappeared, only to re-emerge either chastened or on trial. The message to bankers has been chilling: fall into line with the new order, or else.

The reform is not purely *ad hominem*. There is real structural change. Between 2008 and 2016, China's debt-to-GDP ratio rose by roughly ten percentage points a year; from 2017 to 2019, the annual increase averaged just four percentage points. This year debt will soar as a result of Covid-19. But officials insist that this is a one-off. They are already tapering monetary stimulus as growth rebounds.

| *A taste for Moonshots*

The leverage on which the system is based also looks safer. In the 2010s Chinese banks threw themselves into the lucrative business of repackaging assets into opaque investment products: from 2010 until the end of 2017, banks' claims on other financial institutions rose 20-fold as they layered credit on top of credit. Over the past two years new rules have forced banks to retrench. The shadow-banking sector, a motley universe of thinly regulated lending and investment companies, has begun to shrink.

The bond market, by contrast, has boomed, going from 50% of GDP in 2012 to more than 100% today, and amended rules have made it somewhat easier for companies to raise capital by issuing shares. In many ways, China's financial system seems ever more reassuringly normal.

In other ways, though, it is what it was. Banks know that the government almost always bails out state firms, whereas private firms are left to their own devices; they are adept at contriving not to hear official calls for them to help small, struggling firms. Instead they direct most of their lending to state-owned firms—a rational choice in a still distorted market. This points to the other side of Mr Xi's agenda: remaking China Inc.

Since January 2019 a small Chinese rover has been wandering around on the far side of the Moon, sending back crystal-clear panoramic images of a realm no other nation has reached. But for the economy the image that mattered most was Mr Xi's meeting with hundreds of the scientists and bureaucrats responsible in the Great Hall of the People—an event at which he hailed their success as emblematic of a “new type of whole-nation system”.

Both China's boosters and its self-declared victims have long promoted a highly idealised view of its industrial policy. Mandarins decide what the country needs and apply a mixture of cheap capital, well-specified research priorities, intellectual-property theft, protectionism and *force majeure* to get it done.

In truth, Chinese industrial policy has rarely, if ever, been remotely that coherent. It has promoted industrialisation of more or less any type. Cities compete with each other to attract enterprises. Companies pile into whatever seems ripe for a boom. As a detailed study by Carsten Holz of the Hong Kong University of Science and Technology has shown, these investment patterns have borne little relationship to stated industrial

policy, which has often been catching up with the facts on the ground. Sometimes this pans out. There are fast trains and safe-looking nuclear power plants. But decades of official emphasis on semiconductors and internal-combustion-powered cars have failed to lift China to the premier league in either. Huge growth in sectors such as solar power and shipbuilding was bought with wasteful investment which produced overcapacity, huge losses and brutal consolidations.

Cheap land and capital, excellent infrastructure, inexpensive labour and, for years, an undervalued currency allowed stellar progress regardless of rickety strategy. But times have changed. The population is ageing, the debt burden has risen and the environmental effects of all-industrialisation-is-good-industrialisation have been recognised. China needs new tools with which to create new wealth. Mr Xi's new type of whole-nation system is intended to make real the focused and foundational industrial policy of myth.

In this respect "Made in China 2025", a new industrial strategy announced in 2015, has proved crucial—though not in the way originally intended. Covering more or less all of manufacturing industry, it is anything but focused. "Basically, every department in the industry ministry came up with pet projects. But there was no real action strategy," says Yu Yongding, an economist involved in developing some of China's five-year plans. However its ambition, coupled with China's industrial-policy mystique and habitual spying, prompted America to react. And that has provided Mr Xi with the criteria by which to select its true priorities.

What China needs are the things which America might hurt it by withholding: the term *kabozhi jishu*, "stranglehold technology", is much in vogue. Rather than targeting whole sectors, planners talk of prioritising the mastery of jet turbines, precision photolithography for semiconductors, high-speed bearings for machine-tools and a handful of other key

technologies.

State-owned enterprises (SOEs) are seen as necessary to this process because, though many have some private shareholders, the government's controlling stake allows it to dictate the firms' actions. But that is not much of an advantage if they are not up to the job. At present SOEs consistently lag their private-sector peers in productivity. Their bosses, as political appointees, are wary of risks; and they are often burdened with state duties. During the response to covid-19 officials praised SOEs such as PetroChina, an oil major, for creating extra jobs.

| *Mixing it up*

Mr Xi has made clear that he does not favour a fundamental overhaul for SOEs. There will be nothing like the wave of closures and privatisations implemented in the 1990s, a cull that carried a steep social price in unemployment but also helped to clear the way for buccaneering entrepreneurs. But it is a mistake to view the situation as static. The state is trying both to get more out of SOEs and to use them to get more out of the private sector.

Last year the government declared that net, not gross, profitability was to be a key measure of an SOE's success, which could encourage them to be more hard-headed about operating costs. "What makes us somewhat optimistic is that they are talking more about shareholder value," says a strategist with one of China's biggest hedge funds. Some are clearly better run than others: shares in China Merchants Bank, for instance, trade at 1.5-times book value, compared with just 0.5-times for Bank of Communications.

Potentially more important—and certainly more misunderstood—is the government's renewed push for "mixed ownership". It wants more state firms to attract private-sector investors and private firms to find state-

owned partners. Cross-pollination along these lines has happened before (notably, when major SOEs listed on stock exchanges in the early 2000s). But this time it will tie together a wider array of companies, notes Chen Long of Plenum, a research firm. In the past few years, state firms have pulled in more than 1trn yuan (\$145bn) of private capital. And in the first half of 2020 nearly 50 private-sector enterprises listed in China attracted chunky investments from state firms.

This is not the only way that the boundaries between the private and state sectors are getting fuzzier. Private companies have always been required to have party committees, but for a long time many did not bother. For the biggest that is no longer an option. Wang Xiaochuan, CEO of Sogou, an internet-search firm, expressed the truths of the new alignment bluntly in 2018. “If you think clearly about this, you really can resonate with the state. You can receive massive support,” he said. Woe betide any company that tries to go its own way. “You’ll probably find that things are painful, more painful than in the past,” he said.

There is some evidence that these changes are having the kind of impact the government wants. Zhang Xiaoqian, an economist at Zhejiang University, has found that both SOEs and private firms increase their spending on research and development after being remade as mixed-ownership firms. State firms benefit from an injection of ideas and risk appetite. Private firms benefit from better state connections which make it easier to raise capital.

Take for example integrated circuits, an area perennially targeted by planners without huge success (see chart 3) and which is now of huge significance. The government is funnelling more than \$100bn to SOEs, private firms and, most often, projects that bring the two together. There is a lot of waste. But there are signs of progress. In April Yangtze Memory Technologies Co (YMTC), a semiconductor company founded in 2016 with

both public and private capital, announced that it could now make memory chips as technologically advanced as the best Samsung has to offer, boasting 128 distinct layers of circuitry.

Dan Wang of Gavekal Dragonomics, a research firm, says that YMTC's chips are probably not actually as good as Samsung's, but that the achievement nonetheless demonstrates China's progress in both the design and production of chips. One remarkable element of the YMTC story is that it is based in Wuhan, ground-zero of the coronavirus pandemic. The government kept its factory open and supplied, ensuring that workers could clock in every day, even when the rest of the city was in total shutdown. It was the "new type of whole-nation system" in action.

Yet the basic tension in the SOE sector remains unresolved. Yes, the government has put more emphasis on profitability, but that does not mean decisions get made according to commercial logic. Indeed, under Mr Xi national duty—supporting China's rise—is more important than ever. And stricter party control is confusing lines of responsibility. An executive with a major state-owned insurance firm says that its party committee now controls all senior personnel appointments and expresses "opinions" on all investments worth more than 20% of net-asset value. Opinion is a euphemism. "It is normally the final decision. No one would go against the party secretary," he said. "But if something goes bad, the board will be responsible."

In the private sector, for all the criticism outsiders have of Mr Xi's increasing reach, it is salutary to note how well some of the biggest players have fared on his watch. China's ten biggest non-state companies have added roughly \$2trn to their market capitalisation since he became party chief. Mr Xi's strengthening of court decisions and disciplining of the financial system helps incumbents to make acquisitions, to sue firms infringing on their patents and to get financing.

| *Contradicting history*

This all helps underpin the gradual consolidation taking place across a range of industries—a process which demonstrates that there really are strong market forces at play in the economy, and that they are being channelled more effectively than in the past. In the property sector, for instance, the ten biggest developers now have a 34% market share, up from 20% five years ago, according to UBS, a bank.

But Mr Xi's rule has not just been a time of consolidation. Many startups have grown up under him, including the company that created TikTok, the social-media app now at the centre of its own geopolitical storm; Pinduoduo, an e-commerce firm taking on China's incumbent, Alibaba; and SenseTime, an AI company in the vanguard of facial-recognition technology.

The worry—for the economy as for those whom SenseTime's wares may victimise—is what comes next. An insistence on forming party committees in private companies, even if they are mainly window-dressing for now, and on mixed-ownership initiatives, can but drag entrepreneurs more firmly into the grasp of the state. Can technological advances delivered by the whole-nation system in any way make up for the constraints, second-guessing and divergent incentives which inevitably come with it?

It has always been possible for major decisions—investments, lay-offs and branding—in big Chinese companies, state-owned or not, to be subject to government scrutiny. But that possibility is now more clearly communicated and more deeply felt. All companies, whoever owns them, exist for the glory of China.

A flag-bearer of the new model is a company like BYD, the world's biggest maker of electric cars. At one level, it epitomises the can-do entrepreneurial spirit that has fuelled China's growth. Wang Chuanfu, a

chemist, left a poorly paid government job in the mid-1990s to strike out on his own, first developing phone batteries, then cars. Today, his company counts Warren Buffett as its biggest investor.

But BYD's connection to the party is strong. Mr Wang is a party member. Though BYD has never discussed the workings of its party committee in formal disclosures to shareholders, state media report that it helps to guide the company's decisions. And its business decisions are sometimes strikingly well aligned with government priorities. When America hit Huawei, China's embattled telecommunications giant, with sanctions last year, BYD started making smartphones for it.

It is getting harder to distinguish between the state and private sectors. It is getting harder to distinguish between corporate and national interests. And for all its inefficiencies, contradictions and authoritarianism, not to mention its increasingly pious cult of personality, it is getting harder to claim that state capitalism will hobble China's attempts to produce companies and master technologies that put it on the world economy's leading edge. ■



中国的杂交资本主义 为国家荣耀而绽放

习近平正在将市场机制与共产党控制相结合以重塑中国经济

去年，汽车制造商众泰用它来解决销量不佳的问题，而五粮液用它来改善白酒的质量。它帮助浙商银行将其业务数字化，促进了中国核电公司节能技术的发展。从这些公司的年报来看，“习近平新时代中国特色社会主义思想”近乎商业实践的万灵药。

中国民营企业淡化与共产党之间的联系的时代已经一去不复返了。据本刊统计，在中国大陆证交所上市的3900家公司中，有近400家在今年的年报中向共产党及其领导人致敬。自2017年以来，提及习近平领导的国有企业及其私营部门同行增加了20多倍（见图1）。

这一趋势反映了中国的新现实。共产党加强了对人们生活方方面面的控制，而习近平加强了对党的控制。这不仅仅意味着企业阿谀奉承他是个好主意。这意味着他所处的地位使得他可以重塑整体经济，而万千企业在其中成败浮沉。他是怎么做的呢？

什么好事也没干，国内外的批评家说。他让经济自由化的改革戛然而止，扼杀了市场力量，回到了由国家主导的头重脚轻的增长模式，看起来非常陈旧过时。民营企业忙着设立党委，党组织对公司战略的发言权越来越大。一度风光霸气的老板们变得低调。美国智囊团彼得森学院的尼古拉斯·拉迪（Nicholas Lardy）近期出版的一本书的书名概括了批评家的担忧：“国家的反击”。

这些观察是对的，结论却是错误的，且有误导性，让人懈怠而危险地低估了中国可能的行进轨迹。习近平并不是简单地牺牲私营部门来壮大国有部门，而是在主持创建一种他希望能更为强健的国家资本主义。其想法是让国有企业受到更多的市场约束，而让民营企业受到更多的党纪约束，以求更好地实现中国宏伟的集体使命。这是一项充满内部矛盾的工程，但在某

些领域已经取得了明显的进展。

习近平在2013年宣布了他的计划，誓言中国将“让市场在资源配置中起决定性作用”，同时加强“国有经济的主导作用”。2015年，当国内股票暴跌时，政府的重心转移到为银行注资，收紧对跨境现金转移的控制，以及驯服其金融体系里最疯狂的角落。但共产党现在认为它已经赢得了这场“防范化解金融风险之战”，因此正在让习近平的计划以一种新的更大胆的形式回到轨道上。

与美国日益紧张的关系让共产党相信中国必须能够自力更生。同时，中国成功地遏制了新冠病毒的流行并重启了经济，这进一步增强了它对习近平所说的中国“体制优势”的信念，即作为一个强大的一党制国家，中国可以集中其经济和社会资源来达到关键的目标。

习近平的努力可分为两大部分。首先是给中国市场的起伏动荡建立更清晰的边界范围：加强商业法律制度；简化日常活动规则；改善金融体系的资金分配。其次是更加娴熟高明地运用政府对经济主要杠杆的控制：提高国有企业的效率；让国企与民营企业协同实施新的产业政策计划。

只要企业家不越轨并朝着政府认可的方向发展，他们仍保有相当的自由度。而且他们依然有强大的动力。“致富光荣”，这句据传是邓小平所说并在经济腾飞的年代成了中国信条的话在今天依然适用。但是，你对财富的追求须得让国家也受益才行。

许多外国高管和外交官现在已经不想再听谁说有真正的亲市场改革在发生着。他们谈论着“承诺疲劳”。反复发誓要让中外企业公平竞争毫无实际意义。国有企业受益于大量通常都不透明的补贴和优惠规则。外国公司在金融和能源等关键领域的参与很少。

| 您现在可以破产了

这些抱怨都有凭有据。但它们忽略了一个事实，即习近平谈市场改革时，他追求的是秩序而不是公平。他想要更清楚地界定企业和人员的工作方式和范围。

首先来看法律制度。它是压迫的工具，这一点在它向香港延伸时已经体现得前所未有地清晰。习近平在打击任何要站出来捍卫人权的人上一直毫不手软。但他同时也主导了司法系统的部分专业化，并赋予法院更多权力来处理非政治事务。经济实在太复杂了，腐败太普遍了，没办法像以往那样依靠地方官员来裁决争端。

法院的这些变化恰逢案件激增的时代。自2012年习近平成为中国最高领导人以来，行政诉讼（通常是群众告政府）已增加了一倍以上（见图2）。破产申请增加了十倍。去年，中国法院受理了超过48万例知识产权案件，几乎是2012年时的五倍，其中一些由一家新设立的专门负责这一领域的国家法院审理。咨询公司劳斯（Rouse）表示，外国原告赢得了所有专利侵权官司的89%。

地方官员迄今都可以选择对法院的裁决置之不理。一家医疗服务公司的负责人抱怨说，他因为发生在某个内陆小城市的一桩医疗丑闻受到指责，而肇事者实则是盗用了他公司的名字，而且在法院判其败诉的三年之后依然在用。政府正在开发其“社会信用”系统，部分是为了弥补这类漏洞。法院可以将人们置于所谓的“失信黑名单”中，实际上是运用自动化的国家工具来执行判决。比如法院发现债务人欠钱，则其判决可以通过黑名单系统阻止他们购买机票或获得贷款。截至2018年底，约有29万名企业主管被列入黑名单。

不难想象，如果这个系统变得更加包罗万象，要获得社会中的任何东西都取决于你的历史记录——不单是通过社交媒体活动显现的信用度，还包括政治可靠性——那么就会发生真正的废托邦式转变。但是目前中国有很多人支持它。“这是培养健康的商业环境必须付出的代价，”主打企业违规案件的律师严义明说。

随着法律变得更加可靠，行政也变得更加简单。世界银行发现，注册成立一家公司所需的平均时间（哪怕近如2017年时也要23天）现在仅为九天，比日本快一点，比美国慢一点。获得施工许可从前需要247天，现在是111天。数字化让报税变得便捷多了。当企业开具发票时，副本会直接传给税

务部门。实际上，有些人担心它太过方便了：政府强制使用的软件的后门可能使黑客得以侵入公司的计算机网络。

习近平的市场秩序改革的最后一个重点是金融体系。对于那些认为银行业监管只是枯燥的文书的人来说，他重申政府对银行、券商和投资公司的控制权的方式切实得让他们精神一振。其战术包括2017年从香港一家豪华酒店带走了曾经呼风唤雨的金融家肖建华。还有几位大亨也消失了，重新出现时要么学乖了，要么在受审。传达给银行家们的信息令人不寒而栗：要么遵守新秩序，要么，呵呵。

这项改革并非纯粹是针对个人的。也有真正的结构变化。在2008年至2016年间，中国的债务占GDP的比率每年增长约10个百分点；而从2017年到2019年，年平均增长率仅为4个百分点。今年由于新冠肺炎，债务将飙升。但是官员们坚持认为这是一次性的。随着增长反弹，他们已经在缩减货币刺激措施。

| 放卫星的味道

金融体系背后的杠杆看起来也更安全了。在2010年代，中国的银行争先恐后地将资产包装成不透明的投资产品，以追逐丰厚利润：从2010年到2017年底，银行在信贷之上再叠加信贷，对其他金融机构的债权增长了20倍。在过去两年中，新规定迫使银行收缩。影子银行业这个由管制宽松的贷款和投资公司组成的鱼龙混杂的世界已经开始萎缩。

相比之下，债券市场蓬勃发展，从2012年占GDP的50%增长到如今的100%以上，并且修改后的规则使公司更容易通过发行股票来筹集资金。从许多方面来看，中国的金融体系似乎越来越显现出叫人放心的正常化。

但在其他一些方面，一切还是照旧。银行知道，政府几乎总是会救助国有企业，而任由民营企业自生自灭。面对官方呼吁它们帮助陷入困境的小企业，它们擅长装聋作哑。相反，它们将大部分贷款发放给国有企业，这是在一个仍然扭曲的市场中做出的理性选择。这就指向了习近平的另一个议题：重塑“中国公司”。

自2019年1月以来，一辆小型中国月球车一直在月球的远地点徘徊，传回极为清晰的全景图像，呈现一个其他国家尚未涉足的地域的面貌。但就中国而言，最重要的一张图是习近平在人民大会堂会见负责该项目的数百名科学家和官僚。在这次盛会上，他赞扬他们的成功是“新型举国体制”的象征。

长期以来，中国的支持者和自封的受害者都在宣扬一种关于其产业政策的高度理想化的看法。高官们决定国家的需求，并结合运用廉价资本、明确规定的研究重点、知识产权盗窃、贸易保护主义和不可抗力来实现目标。

实际上，中国的产业政策很少（甚至从未）拥有多少这样的连贯性。它多多少少促进了所有类型的工业化。城市相互竞争以吸引企业。任何貌似时机成熟、能够马上腾飞的东西都会有企业一拥而入。香港科技大学的卡斯滕·霍尔兹（Carsten Holz）进行的一项详细研究表明，这些投资模式与既定的产业政策无甚关系——政策往往是在努力追赶眼前的现实。有时这能够奏效。中国建起了高速铁路和安全的核电站。但是，几十年来官方对半导体和内燃机汽车的重视都未能使中国在这两个领域脱颖而出。太阳能和造船等行业的高速增长是用浪费严重的投资换来的，导致了产能过剩、巨额亏损和残酷整合。

尽管战略上跌跌撞撞，廉价的土地和资本、优质的基础设施、廉价的劳动力，以及多年来被低估的货币还是带来了惊人的进步。但是时代变了。人口在老龄化，债务负担在加重，“所有工业化都是好的工业化”对环境的影响也开始被人们所认识。中国需要新的工具来创造新的财富。习近平的新型举国体制旨在让传说中的重点基础产业政策变成现实。

在这方面，2015年宣布的新产业战略“中国制造2025”已被证明至关重要，尽管并不是按照它最初意图的方式。它几乎涵盖了制造业的全部内容，毫无重点可言。“基本上，工业部的每个部门都提出了自己偏爱的项目。但没有真正的行动策略。”参与制定了中国若干个五年计划的经济学家于永定说。然而，它的野心加上中国产业政策的神秘色彩和惯常的间谍活动，促使美国做出了反应。而这为习近平提供了标准来挑选真正的优先项。

中国需要的是那些美国可通过“拒不提供”来伤害中国的事物：“卡脖子技术”这个词变得十分流行。规划者不再把目标对准整个行业，而是优先考虑掌握喷气涡轮、半导体的精密光刻技术、机床高速轴承，以及其他一些关键技术。

国有企业被视为这一过程中必不可少的部分，因为尽管许多国企都有一些私人股东，但政府的控股权使其能够决定企业怎么做。但如果它们不能胜任工作，这就算不上什么有利条件了。目前，国企的生产率一直落后于私营部门。它们的老板是政治任命的，对风险保持警惕；而且它们还经常要承担国家职责。在抗击新冠疫情期间，官员们赞扬石油巨头中石油等国有企业创造了更多工作岗位。

| 混起来

习近平已经明确表示，他不赞成对国有企业进行根本性改革。不会再有1990年代的那种关停和私有化浪潮，当时的这种清理付出了下岗潮的沉重社会代价，但也为热衷冒险的企业家扫清了道路。但若认为眼下的情形是静止不动的，那就错了。国家正努力一面从国有企业中获得更多，一面利用它们从私营部门中也获得更多。

去年，政府宣布将净利润而非毛利润作为衡量国有企业成功与否的关键指标，这可能会鼓励国有企业更加理智地对待运营成本。中国最大的对冲基金之一的一位策略师表示：“让我们多少感到乐观的是，他们在更多地谈论股东价值。”有些公司显然比其他公司运营得要好，例如招商银行的股票市值为账面价值的1.5倍，而交通银行仅为0.5倍。

也许更重要的——但肯定是更被误解的——是政府对再次推动“混合所有制”。它希望更多的国有企业吸引私营部门投资者，也有更多的民营企业寻找国有合作伙伴。这种思路的“交叉授粉”以前也发生过（特别是2000年代初将大型国企挂牌上市时）。但是，研究公司Plenum的陈龙（音译）指出，这一次它将把更多类型的公司连结在一起。过去几年中，国有企业已经吸收了超过1万亿元人民币（1450亿美元）的私人资本。2020年上半年，在中国上市的近50家民营企业吸引了国有企业的巨额投资。

这不是私营部门和国有部门的界限日渐模糊的唯一方式。中国一直要求民营企业设立党委，但在很长一段时间里很多公司并未理会。如今最大的那些公司已经别无选择。互联网搜索公司搜狗的首席执行官王小川在2018年直言不讳地表达了这种新联盟的真相。“如果你想清楚这个事，你真的和国家能够共振起来，你得到的支持会非常大。”任何想自行其是的公司都会倒霉。“那你可能自己会痛苦，比原来更痛苦。”他说。

有证据表明，这些变化正在产生政府想要的影响。浙江大学的经济学家张小茜发现，在改组为混合所有制企业后，国有企业和民营企业都增加了研发支出。国有企业受益于创意和风险偏好的注入。民营企业受益于和国家联系更紧密，更容易筹集到资金。

以集成电路为例，规划人员历来瞄准这个领域，但没有取得太大的成功（见图3），而现在这一领域意义重大。政府正在将超过1000亿美元的资金提供给国有企业和民营企业，而最常见的是提供给让二者联合的项目。有很多浪费，但也有进步的迹象。4月，成立于2016年、同时具有公共和私人资本的半导体公司长江存储科技宣布，它现在可以制造出在技术上媲美三星最佳水平的存储芯片，拥有128个不同的电路层。

研究公司龙洲经讯的王丹（音译）说，长江存储的芯片实际上很可能不如三星的芯片好，但这一成就仍然展现了中国在芯片设计和生产方面的进步。长江存储的故事中一个醒目的元素是它的总部位于武汉这个新冠疫情的始发地。哪怕在这个城市的其他地方完全停工时，政府也保持了这家公司的工厂继续开工、获得供应，确保工人每天都可以上班。这就是“新型举国体制”的例子。

但国有部门的基本矛盾仍未解决。是的，政府更加重视盈利能力了，但这并不意味着基于商业逻辑做决策。实际上，在习近平治下，国家使命——支持中国崛起——比以往任何时候都更为重要。而更严格的党的控制正在混淆职责范围。一家大型国有保险公司的高管表示，其党委现在控制所有高级人员的任命，并对所有价值超过其资产净值20%的投资发表“意见”。“意见”是个委婉的说法。“通常这是最终决定。没有人会反对党委书记，”

他说，“但如果出了问题，那是董事会负责。”

在私营部门，虽然外界普遍批评习近平的影响力不断扩大，但应当注意的是，一些最大的企业在他的监督下表现多出色。自他上任以来，中国十大非国有公司的市值增加了约2万亿美元。习近平强化了法院判决，整肃了金融体系，这帮助了既有企业开展收购、起诉侵犯其专利的公司及获得融资。

| 矛盾的历史

所有这些都助于加强一系列行业的逐步整合。这一过程表明，经济中确实有强大的市场力量在发挥作用，并且与过去相比，它们被更有效地引导。例如，根据瑞银（UBS）的数据，在房地产领域，十大开发商目前的市场份额为34%，高于五年前的20%。

但习近平统治的时期并不仅仅是一个整合的时期。许多创业公司都在他的治下成长起来，包括创建了如今处于自身地缘政治风暴中心的社交媒体应用抖音的公司、挑战中国成熟企业阿里巴巴的电子商务公司拼多多，还有在面部识别技术领域走在前沿的人工智能公司商汤科技。

令人担忧的是接下来会发生什么，这既关乎经济，也关乎商汤科技的产品可能会伤害的人。坚持要在民营企业中设立党委（即使目前还主要是装点门面），以及坚持混合所有制倡议，都只能将企业家更牢牢地拖入国家的掌控之中。举国体制所带来的技术进步能弥补不可避免地随之而来的限制、揣测和激励不一致吗？

不论是否国有，中国的大公司所做的重大决策（投资、裁员和品牌塑造）一直都可能受到政府的审查。但是，这种可能性现在被传达得更清楚了，也被更深切地感受到了。所有公司，不管其所有者是谁，都是为了中国的荣耀而存在。

新模式的护旗手是一家比亚迪这样的公司，它是世界上最大的电动汽车制造商。在一个层面上，它体现了推动中国发展的那种勇于尝试的企业家精神。化学专业出身的王传福在1990年代中期辞掉了一份薪水不高的政府工

作，开始自己打拼，先是研发手机电池，然后再开发汽车。今天，他的公司最大的投资者是沃伦·巴菲特。

但比亚迪与党有紧密的联系。王传福是党员。尽管比亚迪从未向股东正式披露过其党委的工作，但据官方媒体报道，党委会帮助指导公司的决策。而且其业务决策有时与政府的重点项目惊人地吻合。去年，当美国用制裁打击处境艰难的中国电信巨头华为时，比亚迪开始为其制造智能手机。

要区分国有部门和私营部门越来越难。要区分企业利益和国家利益越来越难。而尽管存在种种低效、矛盾、威权——更不用说越来越虔诚的个人崇拜，要说国家资本主义将阻碍中国创造公司、掌握技术从而领先世界经济，那也是越来越难了。■



Hidden figures

A flattened curve

Why does low unemployment no longer lift inflation?

EVERY NIGHT at about 10pm the lights of the prisoner-of-war camp in Indonesia would mysteriously dim, to the puzzlement of the Japanese guards. They failed to spot the makeshift immersion heaters, used to brew cups of tea for the inmates, that had been cobbled together by a prisoner from New Zealand, William Phillips. These secret contraptions were just one example of his resourcefulness.

After the second world war he built a “hydraulic” model of the circular flow of income in an economy—a labyrinth of water tanks, valves and pipes that helped earn him an appointment at the London School of Economics. But neither of these exploits is the reason why Phillips is known to every economist today. His fame rests instead on his “quick and dirty” study, published in 1958, documenting a striking, decades-long relationship between British wage inflation and unemployment: the one tended to be high when the other was low. A downward-sloping curve, which he drew largely freehand, illustrated the point. The Phillips curve, as it became known, has been described as “probably the single most important macroeconomic relationship”. It has also been called the “least solid piece of work” he ever did.

The Phillips curve’s solidity and shape has been called into question more than once in the past 60 years, including in the period since the global financial crisis of 2007-09. But the logic of the curve still guides central banks today.

When business is brisk and unemployment low, central bankers worry that workers will demand pay raises over and above inflation and any

improvement in their productivity. If firms pass these higher wages on to customers by increasing prices, inflation will rise. If central bankers wish to prevent this, they will raise the interest rate they charge for the money they lend, slowing the economy and curbing the wage pressure.

The opposite happens at the other end of the curve. High unemployment flattens wages and spending, putting downward pressure on inflation. To counteract this, policymakers typically cut interest rates.

Central bankers hope to find themselves somewhere in the middle: with inflation where they want it to be and unemployment neither high nor low enough to dislodge it. In these happy circumstances, they aim to set a “neutral” interest rate that will leave inflation where it is.

Most central banks in the rich world target an inflation rate of about 2%. At such modest levels, inflation does not greatly complicate financial planning or erode confidence in the currency. But it allows wages to fall modestly, relative to prices, without anyone suffering a thinner pay packet. That cheapening of labour may, in turn, help preserve jobs in a downturn.

In recent years, however, inflation has fallen persistently short of the central bank’s target in many countries (see chart). In the immediate aftermath of the global financial crisis, such low inflation was no puzzle. Unemployment rose sharply, reaching 10% in America in October 2009. In those circumstances, the only surprise was that inflation did not fall further. But after the recovery inflation continued to remain muted even as unemployment in America, the euro area and Japan fell unusually far. That has forced economists to rethink the relationship.

In the 1960s some sceptics, perhaps most notably Milton Friedman, pointed out that the relationship between unemployment and inflation is only as solid as the expectations that underlie it. If inflation is expected to

be 2%, then workers emboldened by low unemployment might demand a wage increase of 3 or 4%. But if inflation is expected to be 10%, then similarly emboldened workers might demand a wage increase of 11% or more. In the 1970s, high inflation persisted despite high unemployment precisely because workers' expectations of inflation had risen so much. Economists decided to "augment" the Phillips curve by adding expectations alongside unemployment as a separate determinant of inflation.

Another complication comes from imports. Unemployment at home has little bearing on wages abroad. The price of anything consumers buy from the rest of the world will be determined by other forces. For this reason, some economists add a measure of import prices to the curve.

Neither of these additions, however, can explain the missing inflation of recent years. Imports from countries like China may have depressed the price of some products, such as electrical appliances. But that is no reason why prices in general should be subdued. If China is holding down the price of one corner of the shopping basket, the central bank should be able to encourage other prices to rise to offset it. Inflation of 2% is perfectly compatible with some prices dropping steeply, as long as enough others rise sufficiently fast.

Inflation expectations can also explain only part of the puzzle. They have been low for decades: in America, they have not exceeded 3% for 20 years, according to the Federal Reserve Bank of Cleveland. These subdued expectations have shifted the Phillips curve downwards, so that a given rate of unemployment is associated with a lower rate of inflation.

| *Middle of the riddle*

But what has happened to the curve in recent years is different: more akin to a rotation, rather than a shift up or down. Inflation has become seemingly insensitive to joblessness, yielding a curve that has become

strangely flat. This may be because the unemployment rate misstates the amount of spare capacity or “slack” in the economy. By 2019 unemployment in America, Europe and Japan had fallen to surprisingly low levels, which tempted some people on the periphery of the labour force back into work. Japan’s firms found room to grow by hiring many women and old folk who had not been counted as unemployed.

Inflation may also be slow to rise in a jobs boom for the same reason it is slow to fall in a bust. In downturns, firms are reluctant to lower wages, because of the harm to staff morale. But because they refrain from cutting wages in bad times, they may delay raising them in good. According to this view, wages will eventually pick up. It just takes time. And many other things, like a pandemic, can intervene before they do.

The impact of low unemployment would be easier to spot in the data if it were not so rare, according to Peter Hooper of Deutsche Bank, Frederic Mishkin of Columbia University and Amir Sufi of the University of Chicago in a paper published in 2019. To increase the number of observations, they unparcelled America into its separate states and cities. At this subnational level, they found numerous examples of red-hot jobs markets over the past few decades, and a clearer link to wage and price inflation. The local Phillips curve is “alive and well”, they note, and perhaps the national version is just “hibernating”.

It may also take time for higher wages to translate into dearer prices. In bustling fruit-and-vegetable markets stalls display their prices in chalk, making them easy to scrub out and revise. But for many other firms, changing prices is costly. When inflation is low, they may change prices only infrequently: it does not seem worth printing a new menu just to change prices by 2%. This inertia, however, also means firms rarely have the opportunity to reprice their goods to reflect swings in their business. The economy has to move a lot before prices will move at all.

Although the flat Phillips curve puzzles central banks as much as anyone, they may be partly responsible for it. The curve is supposed to slope downwards (when inflation or unemployment is high, the other is low). But central banks' policies tilt the other way. When inflation looks set to rise, they typically tighten their stance, generating a little more unemployment. When inflation is poised to fall, they do the opposite. The result is that unemployment edges up before inflation can, and goes down before inflation falls. Unemployment moves so that inflation will not.

The relationship between labour-market buoyancy and inflation still exists, according to this view. And central banks can still make some use of it. But precisely because they do, it does not appear in the data. "Who killed the Phillips curve?" asked Jim Bullard, an American central banker, at a conference of his peers in 2018. "The suspects are in this room."

But what happens when the killers run out of ammunition? To keep the Phillips curve flat, central banks have to be able to cut interest rates whenever inflation threatens to fall. Yet they can run out of room to do so. They cannot lower interest rates much below zero, because people will take their money out of banks and hold onto cash instead.

When Mr Bullard spoke, the Federal Reserve expected the economy to continue strengthening, allowing it to keep raising interest rates. But that proved impossible. The Fed was able to raise interest rates no higher than 2.5% before it had to pause (in January 2019) then reverse course. The neutral interest rate proved to be lower than it thought. That left it little room to cut interest rates further when covid-19 struck.

The neutral interest rate has fallen, according to some observers, because of global capital flows. Heavy saving by the world's ageing populations has resulted in too much money chasing too few investments. By lowering the neutral rate, this "global savings glut" has left central banks closer to the

floor on interest rates than they would like. That has made it harder for them to offset any additional downward pressures on prices.

Friedman thought central banks could prevent inflation if sufficiently determined to do so. "There is no technical problem about how to end inflation," he wrote in 1974. "The real obstacles are political." Is reviving inflation any different? Central banks face two technical limits. First, they cannot lower interest rates much below zero. And they can only purchase financial assets, not consumer goods. Central banks can create unlimited amounts of money. But they cannot force anyone to spend it.

One solution is to work in tandem with the government, which can spend any money the central bank creates. Before covid-19, such dalliances were rare. But an increasing number of central banks, in both the rich and emerging world, are changing course. These partnerships will try to stop pandemic-related unemployment turning low inflation into outright deflation. If they fail it will be an economic disaster: mass joblessness coupled with negative inflation. And it will be no consolation to students of economics that this combination will remove the flatness from one of their discipline's most famous curves. ■



隐藏的数字

变平的曲线

低失业率为何不再推高通胀？【“反思经济学基本理论”系列之三】

每晚到了十点左右，印度尼西亚一个战俘营的灯光都会神秘地暗下来，日本看守们对此百思不得其解。他们没有发现那些简易“热得快”——由来自新西兰的囚犯威廉·菲利普斯（William Phillips）捣鼓出来给狱友们泡茶用。这批秘密的小玩意只是他聪明才智的例证之一。

二战后，他建了一个“液压”模型来论证经济体中收入的循环流动。这个由水箱、阀门和管道组成的迷宫帮他谋得了伦敦经济学院（London School of Economics）的一个职位。但上述两样成果都不是今天所有经济学家都知道菲利普斯其人的原因。他的赫赫声名建基于他在1958年发表的一项“潦草”的研究，记录了英国工资上涨与失业率之间长达数十年的惊人关联：当一个走低时，另一个趋于走高。他用一条基本上是徒手绘制的向下倾斜的曲线阐明了这一点。这条后来变得众所周知的“菲利普斯曲线”被描述为“很可能是最重要的宏观经济关系，没有之一”。它也被称为是菲利普斯做过的“最不可靠的研究”。

菲利普斯曲线的可靠性和形状在过去60年里不止一次引发质疑，包括自2007到2009年全球金融危机以来的这些年。但这条曲线的逻辑仍然指导着今天的央行。

当经济活跃、失业率走低时，央行官员们担心工人要求涨薪的幅度会超过通胀和其生产率提升的幅度。如果企业通过涨价把工资增长转嫁给客户，通胀将上升。如果央行官员希望避免这种情形，他们将提高贷款利率来放缓经济增速并抑制工资的上行压力。

在曲线的另一端，发生的情况正相反。高失业率压低工资和支出，给通胀带来下行压力。为对抗这种压力，政策制定者通常会降低利率。

央行官员希望置身于中间的某个地方：通胀处在他们想要的水平，而失业率没有高到或低到影响通胀的程度。在这样令人愉悦的情形下，他们的目标是设定一个“中性”利率，以让通胀保持在原位。

多数富裕国家的央行把通胀目标设在2%左右。这样的些许通胀不会让财务规划过于复杂，也不会削弱人们对货币的信心。但它允许工资相对于物价略微下降，而每个人的工资袋却不会变薄。劳动力成本的下跌继而可能在经济低迷期帮助保住工作岗位。

然而，近些年许多国家的通胀率一直都低于央行的目标（见图表）。在全球金融危机刚发生后的时期里，这样的低通胀不足为奇。失业率急剧上升，2009年10月在美国已经达到10%。在这种情况下，唯一的意外是通胀率没有下跌更多。但是，经济复苏后，即便美国、欧元区和日本的失业率回落到异常低位，通胀却仍没什么动静。这迫使经济学家重新思考两者的关系。

在1960年代，一些质疑者（米尔顿·弗里德曼可能是其中最出名的一个）指出，失业率和通胀率关联的程度要看人们对这种关联的预期程度。如果人们预期通胀率为2%，那么受到低失业率鼓舞的工人可能会要求加薪3%或4%。但如果预期通胀率为10%，那么受低失业率鼓舞的工人可能会要求加薪11%或更多。在1970年代，尽管失业率很高，通胀率却保持高位，恰恰是因为工人对通胀的预期已经提高到这个水平。经济学家决定把预期通胀作为一个决定通胀的独立因素，和失业率放到一起，以“增强”菲利普斯曲线。

另一个把局面变复杂的因素是进口。国内的失业率对国外的工资水平没什么影响。消费者从世界其他地方购买的任何商品的价格由其他因素决定。为此，一些经济学家在菲利普斯曲线上增加了进口价格这个尺度。

然而，两个新增的因素都无法解释近年通胀的消失。从中国等国家进口的产品可能压低了某些产品的价格，比如电器。但这不至于抑制总体价格。如果中国拉低了购物篮一角的价格，那么央行应该能够促使其他商品涨价

以抵消其影响。只要有足够多的其他产品以足够快的速度涨价，那么2%的通胀率完全可以容许某些价格的暴跌。

对通胀的预期也只能解释部分谜团。低预期已经持续了几十年：根据克利夫兰联邦储备银行的数据，在美国它们已经长达20年没有超过3%了。这种低预期已经让菲利普斯曲线向下偏移，让特定的失业率关联到更低的通胀率。

| 迷雾之中

但近年来这条曲线的走势很不一样：它更像是在水平旋转，而不是上下移动。通胀似乎对失业不敏感了，产生了一条异常扁平的曲线。这有可能是因为失业率没有准确反映经济中的剩余产能或称“闲置部分”。到2019年，美国、欧洲和日本的失业率已经跌至令人惊讶的低位，诱使一些蛰伏在劳动力队伍边缘地带的人群重回职场。日本企业通过雇用众多之前未被算作失业者的女性和老人找到了成长空间。

通胀率在就业热潮中爬升缓慢，可能还因为它在就业低迷期跌得慢。在低迷期，企业不大愿意减薪，因为怕损伤员工的士气。但因为它们在困难时期没有削减工资，在繁荣时期可能也会延迟涨工资。根据这种观点，工资最终是会上涨的。只是需要时间。而在它上涨之前，像疫情等许多其他事情都可能干扰其进程。

德意志银行的彼得·霍珀（Peter Hooper）、哥伦比亚大学的弗雷德里克·米什金（Frederic Mishkin）和芝加哥大学的阿米尔·苏菲（Amir Sufi）在2019年发表的一篇论文中表示，如果数据不是那么稀缺的话，低失业率的影响会更容易被发现。为增加观测数，他们把整个美国拆分成州和城市来研究。在这种地方层级上，他们发现了过去几十年里就业市场火红的大量例子，而就业与工资和物价上涨的关联也更清晰地显现出来。他们指出，地方版菲利普斯曲线“很鲜活”，全国版可能只是在“冬眠”。

工资上涨转化为物价上涨可能也需要一段时间。在热闹的蔬果市场，摊贩们用粉笔写出价格，随时可以擦掉重写。但对许多其他公司来说，改价格

花费不菲。通胀在低位时，它们可能只会偶尔地更改价格，因为看起来为把价格上调2%而重印菜单并不值得。但是，这种惯性也意味着企业很少有机会对产品重新定价以反映业务波动。经济需要发生很大的变化，物价才会开始动。

尽管央行官员和所有其他人一样对平坦的菲利普斯曲线感到困惑，但他们可能对此负有部分责任。这条曲线本应向下倾斜（通胀率和失业率一个高时另一个低），但央行的政策却是另一种倾向。当通胀看起来必然要上升时，央行通常会收紧自己的货币政策，让失业略微增加。当通胀势必要下跌时，它们做相反的动作。其结果是，失业率抢在通胀之前上升或下降。失业率会变动以求通胀率不变。

根据这种观点，劳动力市场的活跃程度和通胀之间的关联仍然存在。而央行仍然可以利用它。但正因如此，这种关系就不再显现在数据中。“谁杀死了菲利普斯曲线？”美联储官员吉姆·布拉德（Jim Bullard）在2018年的一次央行会议上问道，“嫌犯就在这个房间里。”

但是，当杀手们的弹药用尽时会发生什么呢？为使菲利普斯曲线保持平坦，无论什么时候眼看通胀就要下行，央行都必须能够下调利率。但这种操作的空间可能会用尽。它们不能把利率降到低于零太多，因为这时人们会把钱从银行取出，转为持有现金。

布拉德说那句话时，美联储预期经济将继续走强，令其能够继续调高利率。结果证明这不可能。美联储只把利率调高到了不超过2.5%，就不得不在2019年1月刹车，然后掉头。事实证明中性利率比它预期的要低。这让它在新冠肺炎来袭时已经没有了进一步降息的空间。

一些观察家认为，由于全球资本流动，中性利率已经下降。全世界不断老龄化的人口持有的巨额储蓄导致太多资金追逐太少的投资机会。这种“全球储蓄过剩”拉低了中性利率，使各国央行非己所愿地处于更靠近利率底部的位置。这让它们更难去抵销任何一点物价进一步下行的压力。

弗里德曼认为，只要有足够的决心，央行可以阻止通胀。他在1974年写

道：“在如何结束通胀上不存在任何技术问题。真正的障碍是政治上的。”那么让通胀回升有何不同吗？央行面临两方面的技术限制。首先，它们无法把利率降到远低于零的水平。此外，它们只能购入金融资产而不能购买消费品。央行可以无限量地印钱，但不能强迫任何人花钱。

一种解决方案是与政府合作，这可以把央行印出来的钱都花掉。在新冠疫情之前这类联手很少见。但是，无论是在富裕世界还是新兴国家，越来越多央行都在改变路线。这些合作将努力阻止疫情引发的失业把低通胀变成完全的通缩。如果它们失败了，那将是一场经济灾难：大规模失业伴随负通胀。这种组合将让经济学最著名的一条曲线不再平坦，却不会给这个专业的学生带去多少安慰。■



Chaguan

Being blind and young in China

Only five blind students took China's university entrance exam this year. What a waste of potential

SEVERAL STARTLING things awaited 20 blind Chinese youngsters attending a residential course last month in Shanghai, designed to prepare them for university. Adult instructors, many of them also blind, broached topics that protective parents rarely raise, from the rules of raucous student party-games to the perils of falling in love. Learning to navigate a campus alone is not just about finding libraries or canteens, noted Yang Qingfeng of Golden Cane, the charity organising the course. It is pretty vital if teenagers ever hope to go on unchaperoned dates.

In pep talks, students were urged to think beyond the few careers traditionally offered to blind Chinese. Since the 1950s, when China opened vocational schools for disabled war veterans, the visually impaired have typically been pushed to become musicians or, above all, to work as masseurs in state-run clinics or private parlours. People may say there is nothing wrong with being a masseur, a rapt audience heard from Cai Cong, who attended a blind-massage college a decade ago before persuading his parents to let him work as a radio journalist. Well that is fine, said Mr Cai—as long as it is your choice.

Several students, all neatly clad in black trousers and yellow polo shirts, admitted to nerves about the final test of the course. It will involve leaving the hotel alone to find a place to eat in central Shanghai, trailed by sighted volunteers who will intervene only if danger looms. Yet the real novelty of the course is arguably simpler. For this small group of youngsters—at once unusually brave and at the same time awkward and quick to dissolve in nervous giggling—the course promises seven days focused on what they

can do, not on things deemed unwise, unsafe or beyond them.

This is almost certainly the best moment to be blind in Chinese history. The past was often exceedingly grim. Chinese literature is filled with stories of blind people who survive by begging or telling fortunes. As modern China grew more prosperous and opened to the world, it built special schools for the handicapped and, by ratifying such agreements as the UN Convention on the Rights of Persons with Disabilities, gave domestic reformers new, albeit limited leverage to press for change. In 2014 China announced that blind students would be allowed to take the national university entrance examination, the fearsome *gaokao*. This breakthrough followed years of official foot-dragging. In 2015 almost 9.5m candidates took the exam. Just eight students took a special version in Braille or large print. No official count of blind school-pupils exists in China. But if the proportion of American youngsters with legally registered visual handicaps is taken as a guide, as many as 80,000 of those taking the *gaokao* each year should be blind.

Alas, this also remains a frustrating moment to be blind and Chinese. Of 10.7m students who sat the *gaokao* this summer, just five took the Braille papers for the blind. Since 2015 candidate numbers have never exceeded ten in a single year, leading some Chinese to grumble about “wasting national resources” on the Braille *gaokao*, says Mr Cai. That ignores other hurdles still to be dismantled, he argues, noting that only about 30 Chinese universities admit blind students, and that even some of those fail to offer accessible tests and textbooks on a systematic basis. Other universities exclude the blind with medical tests and other gambits. Education officials do see a need to look after the disabled, he says. The problem is low expectations, and an attitude towards the blind and others that “what we give you is what’s best for you”. Doctors play a role in making families timid, too, says Mr Cai, who lost his sight at ten. Once they decide a progressive disability cannot be cured, they too often abandon hope and

counsel risk-avoidance.

Nonetheless a handful of blind students manage to stay in the mainstream school system and achieve *gaokao* scores that entitle them to apply for elite colleges, a feat that reflects luck, talent but also years of grinding toil. One such student, Ang Ziyu, a serious youth from the inland city of Hefei, attended the Shanghai training course. He must wait until late August to learn if his score of 635 is enough to enter Beijing Normal University, a teacher-training school. He expects no special allowance to be made for years of having schoolwork read to him by his parents, or the trickiness of taking the *gaokao* in Braille, a tactile form of printing that is ill-suited to transliterating Chinese characters. Mr Ang currently leans towards teaching at a blind school after graduation. But he has heard that attending college often leaves students eager to explore new possibilities. “I feel like that, too,” he says shyly.

| *The soft bigotry of low expectations*

Each year a few hundred blind students take simplified admissions tests set by special disabled colleges or sections of ordinary universities. That is the path taken by Zhang Shuxun and Huang Kan, two teenage girls from the southern province of Guangdong. Speaking at the Shanghai training camp, they volunteer that the education they received at high schools for the blind was “vastly different” from that of a normal senior school. Ms Zhang plans to be a music teacher. Already her father has offered to buy her a flat so she need not worry about earning a living—an offer not open to her two younger brothers. Indeed, her mother was reluctant even to let her attend the course in Shanghai, thinking it risky.

Ms Huang’s parents would not let her attend an ordinary high school. “They worried I would get in danger or impair my vision further,” she says, conceding: “A lot of us have lived a very closed-off life since we were young.” She credits the internet and screen-reading software with

connecting her to the world. She hopes to become a psychotherapist, and to help other Chinese know that the blind are as capable as others. "I have a lot of dreams," she says. Unexpectedly, the thought brings on tears, but she wants no sympathy, instead apologising for her loss of control. These stubborn, impressive students know what they need: equal chances to show what they can do. Pity is of no use to them. ■



茶馆

中国的视障青年

今年只有五名盲人学子参加了中国的高考。这是对潜能的极大浪费

二十名中国盲人青少年参加了8月在上海举办的一个寄宿式培训营，帮助他们为上大学做好准备，其中有些内容让他们意想不到。课程的成人导师——有很多本身也是盲人——提到了保护型父母们很少会提及的话题，从喧闹的学生派对的游戏规则到恋爱的风险等。筹办该课程的公益机构金盲杖的杨青风指出，学会独自在校园生活不仅仅关乎找得到图书馆或食堂。如果少年人有朝一日想在没人监护的情况下去约会，这种自主能力是至关重要的。

在开营讲话中，导师鼓励学生拓宽思路，在展望前程时不要局限于提供给中国盲人青年的那几种传统职业。中国在上世纪50年代开设了残疾退伍军人职业学校，自那以后视障人士通常都被引导从事音乐类工作，或者最常见的——在国营医院或私人按摩院做按摩师。人们可能会说做按摩师没什么不好的，蔡聪对全神贯注的学员们说。他自己十年前上了盲人按摩学校，后来说服父母让他去做广播记者。是没什么不好，蔡聪说，只要是你自己选的就可行。

学员们都整齐划一地穿着黑色长裤和黄色polo衫，其中有几个坦言对课程的结业考感到紧张。考查内容包括独自离开酒店，在上海市中心找地方吃饭，视力正常的志愿者会跟在后面，只有在出现危险时才会干预。不过该课程真正的新颖之处或许可以说更为简单。针对这个少数年轻人群体——他们异常勇敢的同时又笨拙尴尬，很容易就紧张地咯咯笑起来，这个为期七天的课程承诺专注于他们能做到的事情，而不是被视为不明智、不安全或超出他们能力范围的事情。

几乎可以肯定，现在是中国历史上盲人最幸福的时候。过去他们的境况往往非常凄凉。中国文学中有大量盲人靠乞讨或算命糊口的故事。日益繁荣和开放的现代中国为残疾人建立了特殊学校，并通过签署联合国《残疾人

权利公约》等协议，为国内的改革者提供了新的、尽管也受到限制的推动变革的手段。2014年，中国宣布允许盲人学生参加高校招生全国统一考试，也就是可怕的高考。这一突破是官方拖延了多年之后实现的。2015年，全国近950万考生参加了高考，其中使用布拉耶盲文或大号特殊试卷的视障生只有八名。中国没有官方的盲校学童人数统计。但是，如果参考正式注册在案的美国视障年轻人的比例，那么每年参加高考的学生中按理说应该有多达八万名视障生。

可惜，对于中国的视障人士来说，眼下仍旧是个令人沮丧的时刻。今年夏天，1070万名学生参加高考，只有五人领取了盲文试卷。自2015年以来，每年的视障考生人数从未超过十名，这导致一些中国人抱怨盲文试卷是“浪费国家资源”，蔡聪说。他认为这忽视了其他仍需消除的障碍，并指出只有约30所中国大学录取视障学生，但即使是这些大学也有一些尚未能系统性地提供无障碍考试和教科书。其他大学则通过体检和其他招数将视障生拒之门外。他说，教育部门官员确实认为需要照顾残疾人。问题是人们的期望值低，对视障人士和其他残障人士的态度也是“我们给你的就是最适合你的”。医生也是导致父母们胆怯保守的一个原因，十岁失明的蔡聪说。一旦医生认为某种进行性残疾无法治愈，他们常常会放弃希望并建议规避风险。

尽管如此，仍有少数视障生留在了主流教育系统中，并在高考中取得了足以申请名牌大学的分数。取得这样了不起的成绩既有赖运气、才华，也靠多年的艰辛努力。参加了此次培训的昂子喻来自内陆城市合肥，个性稳重。他要等到8月下旬才能知道自己635分的成绩够不够上北京师范大学。他不指望因为父母多年给他念课本，或者用盲文考卷参加高考有多难（因为盲文这种靠触感的印刷文字不大适合转化汉字）就能得到特殊待遇。昂子喻目前希望毕业后能在盲校任教。但他听说大家在上大学后往往会渴望探索新的可能性。“我觉得这也挺好。”他害羞地说。

| 低期望带来的轻度偏执

每年有几百名盲人考生参加特殊教育学院或普通大学的特殊教育院系简化入学考试。来自广东的两名少女张舒勋和黄侃走的就是这条路。她们

在参加上海培训营时发言说，她们在盲人高中接受的教育与普通高中“有很大的不同”。张舒勋计划做一名音乐老师。她的父亲已经表示要给她买一套公寓，这样她就不必担心生计了——她的两个弟弟都没有这个待遇。事实上，她的母亲因为担心她的安全，连上海的培训都不大愿意让她来参加。

黄侃的父母不让她去上普通高中。“他们担心我会碰到危险，或者进一步损伤视力。”她承认，“我们中许多人从小就过着与外界隔离的生活。”她认为是互联网和屏幕阅读软件把她与世界连结了起来。她希望成为一名心理治疗师，还想让其他中国人知道盲人和其他人一样有能力。“我有很多梦想。”说完她不禁湿了眼眶。但她不想别人同情她，倒为自己“失态”而抱歉。这些固执、令人印象深刻的学生知道自己需要什么，那就是展示自己才能的平等机会。怜悯对他们没有用处。■



Raising the floor

What harm do minimum wages do?

Three decades of research have led to a major rethink

FOR A LONG TIME economists—whose median income, according to a survey of the American Economic Association (AEA), is \$104,000 a year—considered minimum wages to be harmful. A survey of AEA members in 1992 found that 79% of respondents agreed that a minimum wage increases unemployment among young and low-skilled workers. In an often fractious field, that is about as close to a consensus view as can be found. Although many economists recognised that low pay can indeed be a real problem, they argued that no pay was worse.

They were not the only people who thought so. The same argument was used by Republican politicians. In 1968, America's federal minimum wage stood at its highest level since first being applied in 1938. During the following two decades it fell, in real terms, by 44%. Though Jimmy Carter raised the wage in each of the four years he was president, keeping pace with inflation, Richard Nixon raised it only twice in six years and Ronald Reagan not once in eight. Some state and local politicians, mostly Democrats, tried to offset the fall by raising their minimum wages, creating a patchwork of different levels. The disparities this created allowed detailed empirical research on the policies' effects, and provided the means by which the economists' consensus would be undermined.

Not only did this see the conventional wisdom on minimum wages challenged in America; it also saw such policies spread elsewhere. Britain introduced a national minimum wage in 1998, and has increased it in recent years. Germany's came into effect in 2015. Around 90% of countries have some sort of legal wage floor, although enforcement practices vary widely. Economists now have lots of data with which to understand how

minimum wages affect the economy in practice and, in the context of a promise by Democratic presidential candidate, Joe Biden, to raise America's federal minimum wage to \$15, to argue about how high they can go.

The concern that minimum wages destroy jobs comes from the most basic of economic models: supply and demand. If labour is made more expensive, employers will probably want less of it. Textbooks state that, in the absence of a minimum wage, a worker is paid his "marginal product of labour", which means the value of what he produces. There is no room to deviate from this wage in either direction. If an employer tries to pay a worker less, a rival firm will poach him. If the government imposes a minimum wage that is higher than a worker's marginal product, the firm loses money by employing him. He is left jobless instead.

Reality is more complex. Firms do not know how much each worker contributes to their revenues. Few workers can find a new job at the drop of a hat. Yet the basic model reveals one important truth: the workers who are most vulnerable to losing their job as a result of the minimum wage are those whose productivity is low—the very people the policy is designed to help.

More sophisticated theorising about labour markets recognises that they are not perfectly competitive. There is no single wage at which a worker has his pick of employers. As a result, firms probably pay workers less than their marginal revenue product. How much less depends on negotiations and who does best there depends on bargaining power. In this framework, the goal of the minimum wage is not to defy market logic but to stop firms in a strong negotiating position from squeezing their workers.

The upper bound on the minimum wage still applies: firms will not willingly employ workers at a loss. But below that ceiling, the effect of the minimum wage is ambiguous. It depends on a series of questions. Can a

company replace its workers with machines? Can it raise prices and make its customers pay for the minimum wage? Does it face competition from foreign firms who face laxer rules overseas?

Consider a comparison between factories and restaurants. Logically, there would be little scope to increase manufacturing pay using minimum wages, because firms face stiff international competition, and jobs are constantly automated away. By contrast, jobs in restaurants are hard to automate and face no foreign competition. Any increase in costs affecting the whole sector should be passed on to consumers. Job losses should be lower—especially if it turns out that consumers are willing to pay higher prices. So can one minimum wage do justice by both sectors?

The empirical study which revitalised the debate on minimum wages in the 1990s was by David Card and Alan Krueger, both then at Princeton University. In 1992 New Jersey increased its hourly wage floor from \$4.25 to \$5.05. Neighbouring Pennsylvania kept its own at \$4.25. Thrilled at the prospect of a naturally occurring case study, the two economists gathered information of employment at fast-food restaurants in both states before the April increase and again several months later. Fast food seemed to offer the ideal conditions for a study, as a homogenous sector employing unskilled workers.

The increase in the wage floor did not lead to jobs being lost in New Jersey; employment in the restaurants they looked at went up. Nor did the authors find any indication that the opening of future restaurants would be affected. Looking at the growth in the number of McDonald's restaurants across America, they saw no tendency for fewer to open where minimum wages were higher.

Their book, "Myth and Measurement" (1995), changed a lot of minds. By 2000 only 46% of AEA members were certain that a minimum wage

increased unemployment among the young and low-skilled: to the rest the textbook view—that, faced with a rise in the cost of employing workers, firms would use fewer of them—was wrong. But why? Over the past 20 years a growing body of research has shown that a key consideration is the power enjoyed by employers.

This school of thought argues that some labour markets are characterised by a market structure known as monopsony. Under a monopolistic regime one dominant supplier sells to many buyers, whereas under a monopsonic regime, one dominant buyer purchases from many sellers. Just as a monopolist can set prices higher than would be the case in a competitive market, a monopsonist can set prices artificially lower.

Thus, though it may sound counterintuitive for a higher wage to lead to more employment, it makes sense if what the legislation is doing is pushing a wage kept artificially low by monopsony back to where it would be in a market where supply and demand were matching each other freely. People who may not have bothered to look for a job at \$10 an hour may be drawn into a job market offering \$15 an hour. Push the minimum wage significantly beyond that point, though, and jobs will indeed be lost as companies find labour too expensive to afford.

Once the role of competition in the labour market is accepted, the debate on minimum wages becomes more nuanced and more empirical.

Gathering data is not easy. Researchers must consider whether to track jobs or workers, and whether to study certain groups, such as teenagers or the unskilled, or broader sectors. And the job market is affected by more than just minimum-wage rules. Constructing reasonable counterfactuals is hard.

| *Specific north-west*

Consider an example from Seattle. The city has been at the forefront of the

“fight for \$15” campaign that led to Mr Biden’s pledge, and its rapid wage rises have made it an attractive laboratory for economic studies, despite the fact, some grumble, that it is unrepresentative. A paper by Ekaterina Jardim and others at the University of Washington, published in 2017, found that minimum-wage increases in the city in 2015 and 2016 led to employers reducing hours in low-paid sectors. The average low-paid worker earned more per hour but, because they worked fewer hours, their monthly earnings dropped by \$74—the equivalent of five hours’ pay.

That paper used aggregate data on hours and earnings by sectors. In a paper published in 2018, the same authors used administrative data to track individual workers rather than looking at averages. This time they found that low-paid workers saw their weekly earnings increase by \$8-12 a week. The majority of that gain, though, was taken by low earners with above-median experience levels and some of it from workers making up lost hours worked in Seattle with additional hours elsewhere in Washington state.

In 2019 a review commissioned by the British government of more than 50 recent empirical studies into wage floors found the effect on employment to be generally muted, even with relatively ambitious increases. Yet some studies did find higher impacts. Arindrajit Dube, the author of the review, warned that the evidence base is still developing. It is, for instance, too soon to opine on South Korea’s 25% increase in its minimum wage between 2016 and 2018.

The effects of a wage floor can also be felt outside low-pay sectors. A preliminary study in 2019 of the impact of Germany’s minimum wage found it led to more reallocation of workers from smaller, lower-paying firms to larger, higher-paying ones. The same year an article in the *Quarterly Journal of Economics* found that the impact of minimum-wage laws on average earnings was amplified by small but important spillover

effects higher up the earnings ladder. Employers tend to want to maintain some sort of wage differential for staff with more responsibility. So if the minimum wage boosts the pay of fast-food workers, then restaurants may also need to raise the pay of fast-food supervisors.

Who pays for the minimum wage? In theory a higher cost base could be passed on to consumers through higher prices, or absorbed by employers through lower profit margins. In reality the answer varies by market. In competitive sectors, such as fast food, research has found that a 10% increase in the wage floor pushes up burger prices by just 0.9%. In 2019 a study of supermarkets in Seattle found no impact on grocery prices from big increases.

Economists no longer think higher minimum wages are always bad. But that is not the same as saying they are always good. In 2018 a paper by Isaac Sorkin and others cautioned policymakers to take a longer-term view, rather than worry about short-term unemployment. Its authors found that if firms perceived a higher wage floor to be permanent and unlikely to be eroded by inflation, it could encourage them to automate more and decrease employment growth in the future. The idea that a minimum wage can sometimes lead to higher rather than lower employment does not mean it always will. When pushing up the floor, policymakers need to ensure they do not hit the ceiling. ■



抬高地板

最低工资有何危害？

30年的研究带来了重大反思【“反思经济学基本理论”系列之二】

很长一段时间里，经济学家都认为最低工资是有害的（根据美国经济学会 [American Economic Association，以下简称AEA] 的调查，经济学家的年薪中位数为104,000美元）。1992年对AEA成员的调查发现，他们中有79%的人认同最低工资会增加年轻人和低技能工人的失业率。在经济学这个争吵不休的领域，这样的比例差不多等同于一致意见了。虽然许多经济学家承认工资太低确实可能引发切实问题，他们指出没有工资可拿就更糟糕了。

并不是只有他们这么想。共和党政客也使用了同一套论证。1968年，美国联邦最低工资达到自1938年首次采用最低工资制以来的最高水平。随后20年里它的实值下跌了44%。尽管卡特在他任总统的四年里每年都提高最低工资以跟上通胀步伐，但尼克松在他的六年任期中只提高了两次，而里根的八年里一次都没有。一些州和地方的政客——大多是民主党人——试图通过提高本地的最低工资以补上跌去的部分，一幅参差不齐的图景由此产生。其中的差异使得人们可对最低工资政策的影响开展详尽的实证研究，为日后打破经济学家的共识提供了路径。

这不仅让美国有关最低工资的传统观念受到了挑战，也使得这类政策传播到了其他地方。英国在1998年实施了全国最低工资，并在近年提高了标准。德国的最低工资制于2015年生效。大约90%的国家和地区都有某种法定的最低工资，尽管在执行上千差万别。现在，经济学家拥有了大量数据来了解最低工资在实践中如何影响经济，并且，在民主党总统候选人拜登承诺要把美国的联邦最低工资提高到15美元之际，争论最低工资可以被提高到多高。

对最低工资损害就业的担忧源于最基本的经济模型：供求关系。如果把劳动力变得更昂贵，雇主很可能就会少要一点。按照教科书的说法，在没有

最低工资的情况下，工人得到的是“劳动边际产量”，也就是他生产产品的价值。向上或向下都没有偏离这一工资水平的空间。如果雇主试图少付工资，那么竞争对手就会把人挖走。如果政府强制执行的最低工资高于一名工人的边际产量，那么公司就会因为雇用他而蒙受损失。这会让他反而丢了工作。

现实世界更加复杂。企业并不知道每个工人为自己的收益贡献了多少。没有哪个工人随随便便就能找到新工作。不过，这个基本模型仍然揭示了一个重要真相：最容易因为最低工资制度而丢了工作的是那些生产率低下的工人——恰恰是这项政策本来要帮助的人。

关于劳动力市场的更复杂的理论指出它们并非完全竞争市场。并不存在哪个工资水平让一名工人可以随心所欲地挑选雇主。结果是，企业支付给工人的工资很可能少于其边际收益值。具体少多少则取决于谈判，而谁在谈判中争取到最好结果则取决于议价能力。在这种框架下，设定最低工资的目的不是要违背市场逻辑，而是要防止那些处于强势谈判地位的企业压榨工人。

最低工资的上限仍然适用：企业不会甘心亏本用人。但在这块天花板之下，最低工资的影响模糊不清。它取决于一系列问题。企业可以用机器代替工人吗？它能涨价来让顾客为最低工资买单吗？它是否面临来自外国公司的竞争，而这些外国公司在海外享受更宽松的规定？

来比较一下工厂和餐馆。从逻辑上讲，通过最低工资来提高制造业工资水平的空间极小，因为企业面临激烈的国际竞争，而且岗位在不断被自动化进程削减。相比之下，餐馆的工作很难自动化，也没有外国竞争的压力。任何影响整个行业的成本增加应该都会被转嫁给消费者。岗位流失应该会更少些——尤其是如果事实证明消费者愿意支付更高价格的话。那么同一个最低工资能在这两个行业都实现公正吗？

让围绕最低工资的辩论重新活跃起来的那项实证研究是在1990年代由普林斯顿大学的戴维·卡德（David Card）和艾伦·克鲁格（Alan Krueger）开

展的。1992年，新泽西州将最低时薪从4.25美元提高到了5.05美元，隔壁的宾夕法尼亚州继续维持4.25美元。眼看一个研究案例自然地出现了，两位经济学家兴奋不已。在当年4月这次薪资上调实施之前，两人收集了两个州内快餐店的用工情况，几个月之后再收集了一次。快餐业这个雇用非熟练工人的同质化部门似乎为研究提供了理想的条件。

最低工资的提高并没有导致新泽西州就业减少。在他们追踪的餐馆，受雇人数增加了。两位作者也没有发现任何显示未来新餐馆的开张会受影响的迹象。他们查看了麦当劳在美国各地增设分店的数字，没有发现在最低工资更高的地方新开门店更少的趋势。

他们于1995年出版的著述《迷思与测量》（Myth and Measurement）改变了很多人的看法。到2000年，只有46%的AEA成员确信最低工资会增加年轻人和低技能工人的失业率。对于其余的人来说，教科书的观点——企业面对用工成本上升会减少雇人——是错的。但为什么错了？过去20年间，越来越多研究表明，一个关键的考量因素是雇主享有的权力。

这个思想学派认为，某些劳动力市场的特征是被称为买方垄断的市场结构。在卖方垄断系统中，一个强势的供应商向众多买家出售货品，而在买方垄断系统中，一个强势的买家从许多卖家那里购买货品。正如垄断的卖方可以设定高于竞争市场售价的价格，垄断的买方可以人为拉低价格。

因此，尽管“提高工资会增加就业”听上去可能有违直觉，但如果相关立法是把被垄断的买方人为压低的工资推回到在一个供求自由匹配的市场中应有的水平，那么它就讲得通了。那些本来可能懒得找一份10美元时薪工作的人可能会被15美元时薪重新吸引回就业市场。但是，如果把最低工资提高到大大超过这个节点，那么就真的会发生岗位流失，因为企业负担不起劳动力了。

一旦人们接受了竞争在劳动力市场中的作用，关于最低工资的辩论就变得更加细致也更基于实证。收集数据并不容易。研究人员必须斟酌的是去追踪岗位还是工人，是研究某些特定群体——比如青少年或非熟练工人——还

是更广泛的行业和部门。而就业市场不仅仅受到最低工资规定的影响，要构建合理的反事实情境很难。

| 独特西北区

来看看西雅图的例子。这座城市在“为15美元而战”运动（拜登的承诺由此而来）中一直走在最前沿，这里工资的快速上涨使它成为一个颇有吸引力的经济研究实验室，尽管一些人抱怨它缺乏代表性。华盛顿大学的叶卡捷琳娜·雅尔丁（Ekaterina Jardim）等人在2017年发表的一篇论文发现，2015年和2016年该市最低工资的上涨导致雇主缩短了低薪部门的工作时长。一名典型低薪工人的时薪更高了，但因为工时减少，他们的月收入下降了74美元——相当于五小时工资。

那篇论文使用了各行各业的工时和收入的汇总数据。在2018年发表的另一篇论文中，同一批作者用行政管理数据来追踪工人个体，而非查看平均值。这次，他们发现低薪工人的周收入增加了8到12美元。不过，这一增长的大头被经验水平在中位数以上的低收入者拿走了，其中有一部分是在西雅图工作时长减少的工人那里转移而来，后者靠在华盛顿州的其他地方增加工时来弥补损失。

英国政府在2019年委托撰写的一份综述回顾了近年有关最低工资的50多项实证研究，结果发现它们对就业的影响总体上很微弱，即便提升幅度较大时也一样。不过，其中有些研究确实发现了更大的影响。这份综述报告的作者阿林德拉吉特·杜贝（Arindrajit Dube）警告说，证据基础仍在发展中。比如，对于韩国在2016年至2018年间将最低工资提高了25%的影响，要发表意见还为时过早。

在低薪工种之外也能感受到最低工资的影响。2019年对德国最低工资制度影响的一项初步研究发现，它导致更多工人从较小的、薪资更低的公司转移到较大的、薪资较高的公司。同年发表于《经济学季刊》（*Quarterly Journal of Economics*）的一篇文章发现，最低工资立法在收入阶梯的更高处产生了虽小却重要的溢出效应，扩大了这类法律对平均收入的影响。雇主倾向于为那些肩负更多责任的员工维持某种工资差异。因此，如果最低

工资提高了快餐工人的工资，那么餐馆可能也需要提高快餐主管的工资。

谁为最低工资买单？从理论上讲，更高的成本基数可以通过更高的产品价格转嫁给消费者，或通过更低的利润率由雇主吸收。在现实中，答案因市场而异。在快餐业等竞争性行业中，研究发现最低工资提高10%仅仅使汉堡价格上涨了0.9%。2019年对西雅图超市的调查没有发现最低工资大幅上涨影响食品杂货价格。

经济学家不再认为提高最低工资总是不好的。但这并不等同于说它们永远是好的。艾萨克·索尔金（Isaac Sorkin）等人在2018年发表的一篇论文告诫政策制定者，相比担心短期失业率，他们需要看得更远些。作者发现，如果企业认为更高的最低工资会永久持续却不大可能被通胀抵销，那么这可能会促使它们扩大自动化而缩减劳动力增长。最低工资有时会增加而非减少就业，但并不意味着永远如此。在抬高这块地板时，政策制定者需要确保自己不会触到天花板。 ■



A healthy dose of competition

From hospitality to hipsterism

In the first of a series on subjects where economists are rethinking the basics, we look at arguments against letting businesses grow as large as they would like

DONALD TURNER, America's top trustbuster in the mid-1960s, saw antitrust law as benefiting from an "inhospitable" tradition: on many matters its default response was to say no. Government lawyers routinely blocked mergers merely on the grounds that the resulting company would be too big. The companies' counterargument that being bigger would make them better was rarely entertained by the courts.

In the 1970s the "Chicago school" of antitrust law successfully harnessed economics to argue for a much more hospitable approach. Over the following decades America's regulators became so welcoming that critics painted them as doormats. In many industries the largest firms have consistently gained market share without any official concern; the most successful technology companies have grown into veritable titans. Many economists studying the subject now worry that a lack of competition is an economic drag, especially online. Some scholars go further, arguing that the Chicago school's sense of what is good for consumers is not serving their broader interests.

The Chicago school, built on the work of Aaron Director, an economist from the mid-20th century, reached its zenith in the writing of the legal scholars Robert Bork and Richard Posner. Its proponents argued that many activities which were assumed to be anti-competitive were entirely reasonable strategies for improving corporate efficiency. They also claimed that in some cases even things which couldn't be justified that way could safely be left to the market to sort out without recourse to law.

Take “predatory pricing”. Regulators thought that selling goods below cost so as to bankrupt competitors was malfeasance that had to be stopped. The Chicago school argued that it was a poor business strategy which would fail. Even if the predator crushed its competition, it would not remain a monopoly long enough to recoup its earlier losses. Instead, its high profits would attract new competitors.

Perhaps because, in the 1970s, American business had started to look more in need of help than hindrance, such arguments found favour with the American courts. And though the Chicago school’s influence was more limited elsewhere, many jurisdictions, including the European Union, adopted one of Bork’s central ideas: that the sole purpose of competition law should be to protect consumers. It is a view which forbids regulators from considerations of the broad public interest, limiting them to the busting of cartels and the prevention of mergers that create monopolies. Under this “consumer-welfare standard”, competition cases turn on forensic analysis of “upward pricing pressure”—ie, of the degree to which a merger or strategy will leave consumers out of pocket.

But has this approach led regulators to miss the wood for the trees? In 2016 *The Economist* pointed to America’s high corporate profits and the rising market shares enjoyed by big firms as evidence that competition across the economy had waned. Later that year economists at the White House released a report making similar observations. A version of the trend can also be found in Europe. Research by the OECD, a club of mostly rich countries, finds that between 2000 and 2014 the share of sales accounted for by the top eight firms in a given industry rose by four percentage points in Europe and eight percentage points in North America (see chart).

Many antitrust experts are unconcerned: industrial concentration, they argue, does not tell you how competitive the market for a particular good is. But some economists have blamed falling levels of competition for far-

reaching economic ills, such as stagnant labour markets and growing inequality. In a paper published in 2019 the late Emmanuel Farhi of Harvard and François Gourio of the Federal Reserve Bank of Chicago argued that the rising market power of big companies was linked to low interest rates and weak investment, factors shaping the whole economy.

As in the days of the Chicago school, other economists see these critiques as ignoring the role of efficiency. A recently published paper by David Autor and John Van Reenen of MIT, David Dorn of the University of Zurich, Lawrence Katz of Harvard and Christina Patterson of the University of Chicago argues that globalisation and technological advances have concentrated economic activity in a small number of “superstar firms”. Because these firms are more productive, the industries which have seen the most of this concentration have also seen the fastest productivity growth.

It is when they are applied to technology giants that these arguments get most heated. In America the Department of Justice, the Federal Trade Commission, Congress and many states are investigating whether Amazon’s dominant position in online shopping, Apple’s immense profitability or the duopoly that Facebook and Google enjoy in online advertising can be seen as involving the abuse of the giants’ market power. Google has been the subject of three separate competition investigations by the EU and fined €8.2bn (\$9.7bn).

| *Competition in, or competition for?*

Businesses built on “platforms”, as Amazon, Facebook and Google are, raise particular issues when it comes to competition because they have two separate sets of customers. Amazon deals with both retailers and consumers, Facebook and Google with both users and advertisers. In the 2000s Jean Tirole and Jean-Charles Rochet, two French economists, laid out an economic framework for looking at such platform businesses which

showed that their optimal strategy will often be to provide cheap access to one side of the platform and charge steeply on the other. Consumers enjoy free Google searching and Facebook socialising; advertisers pay through the nose to reach them as they do so.

Platforms existed before big technology firms: television, newspapers and credit cards are all platforms of sorts. But the internet has provided vast scale and reach. Adding users is cheap, and it is often the case that the more users a platform has the more attractive it becomes to those yet to sign up. A firm that attains critical mass becomes overwhelmingly dominant: winner takes all.

Does it matter if the winning platforms dominate the digital economy? In terms of consumer welfare it seems, on the face of it, a sweet deal: users get stuff which is of real value to them at a price—zero—to which no one can object. But on the other side of the platforms things look more worrying. A recent investigation by Britain's Competition and Markets Authority found that the cost of digital advertising for firms was worth £500 (\$650) per household per year. Were the market less concentrated, those costs might fall—and some of the savings would be passed on to consumers in the form of lower prices.

Another potential worry is that there are conflicts of interest in many big-tech business models, such as when Apple sells through its app-store software which competes with its own, or when Amazon collects data about the sales of third-party products with which it competes.

Perhaps concentration would be tolerable if the big firms lived in fear of usurpation by a hot new entrant. But startup platforms face growing barriers to entry. One is amassing the reams of data which enable firms to tailor their services to individual users. Another is that in the digital economy it is relatively easy for an incumbent to see what it is that users

like about what a startup offers, provide something similar and push it out to millions (if not billions) of existing users. That reduces the incentive to innovate in the first place. A final worry is that wealthy incumbents can close off the possibility of competition by buying new entrants before they pose a real threat, as when Facebook bought Instagram in 2012 and WhatsApp in 2014. In the decade to 2019 the five largest technology firms made over 400 acquisitions with scant intervention by competition authorities.

There are, broadly speaking, two sets of ideas for reforming competition economics and antitrust enforcement in response to these worries. Adherents of the more radical call themselves “neo-Brandeisians” after Louis Brandeis, an early-20th-century American Supreme Court justice who thought the overarching purpose of government antitrust action should be to prevent any one firm from exerting too much power over the economy. Neo-Brandeisians such as Lina Khan of Columbia Law School and Matt Stoller of the American Economic Liberties Project, a think-tank, want to broaden the purpose of antitrust investigations beyond promoting consumer welfare. Governments, they argue, should not fear breaking up the tech giants; they should fear leaving them be. In this view the companies’ size and power are a threat not just to consumers and workers but to democracy itself.

| *Each time I roam...*

To its Chicago-school critics, Neo-Brandeisianism is “hipster antitrust”, replacing a transparent and rigorous methodology with an ill-defined set of social goals. It might disempower technology firms, but it would empower regulators. If concentrations of market power should be viewed with suspicion, so should concentrations of regulatory power: they bring the risk of arbitrary and unaccountable decision-making. In America, its home territory, this debate is predictably partisan: neo-Brandeisians are listened

to only by Democrats.

The second set of ideas for reform is more incremental. It seeks not to abolish the consumer-welfare standard but to reinterpret it. Carl Shapiro of the University of California, Berkeley, has suggested calling it the “protecting competition standard” to make clear that it takes into account all the harm that anti-competitive practices might do to consumer welfare, including that which is indirect or diffuse.

Applying this interpretation of the consumer-welfare standard to digital platforms means accepting that in some situations firms will naturally grow large, meaning that at any point in time there will be little “competition in the market”. But there can still be “competition for the market” if a new, better product has a chance to disrupt the status quo. That might mean blocking more of the sort of early acquisitions which snuff out potential competitors, or reversing the burden of proof in such cases, so that the merging companies have to show that their plans will benefit consumers. It also might mean forcing incumbents to share some of their data, or at least making it easier for users to switch easily between platforms.

This agenda might not do much to satisfy neo-Brandeisian complaints about the political power of tech titans today. But it could succeed at making life at the top slightly more precarious. ■



引入适量竞争

从友好到嬉皮

经济学家正在反思一些基本理论。本文探讨那些反对企业随心所欲扩大规模的论点【“反思经济学基本理论”系列之一】

唐纳德·特纳（Donald Turner）这位上世纪六十年代中期美国的最高反垄断官员认为，反垄断法得益于一个“不好客”的传统：在许多事项上，默认的回答选项就是说“不”。政府律师总是阻止合并，理由仅仅是合并后的企业规模太大了。企业抗辩说扩大能让自己变得更好，但法庭很少听得进去。

七十年代，反垄断法的“芝加哥学派”成功地利用经济学理论来提倡一种友好得多的方式。在随后的几十年中，美国的监管机构如此热情迎客，批评者说它们简直成了擦鞋门垫。在许多行业中，规模最大的公司不断地获得市场份额，而没有引来任何监管的关注。最成功的科技公司已成长为不折不扣的巨头。现在，许多研究该课题的经济学家都担心缺乏竞争会拖累经济发展，尤其是在线经济。有学者更进一步，指出芝加哥学派所认为的对消费者有益的东西并不能维护他们更广泛的利益。

芝加哥学派建立在20世纪中叶的经济学家亚伦·戴雷科特（Aaron Director）的研究的基础之上，通过法学家罗伯特·伯克（Robert Bork）和理查德·波斯纳（Richard Posner）的著述达到顶峰。其拥趸认为，许多被认为是反竞争的行为都是提高公司效率的完全合理的策略。他们还声称，在某些情况下，即使不符合这一目的的行为也可以放心地留给市场去调节，而无需诉诸法律。

以“掠夺性定价”为例。监管机构认为，以低于成本的价格出售商品以挤垮竞争对手的做法是违法行为，必须得制止。芝加哥学派认为，这是一种糟糕的商业策略，终究会失败。掠夺者即便破坏了竞争，也无法保持足够长时间的垄断来弥补先前的损失。相反，其高利润将吸引来新的竞争对手。

在七十年代，也许是因为美国企业开始看起来更需要帮助而不是阻碍，这种观点受到了美国法院的青睐。尽管芝加哥学派在其他地方的影响力有限，但包括欧盟在内的许多司法辖区都采纳了伯克的一个核心思想，即竞争法的唯一目的应是保护消费者。这种观点让监管机构无法考虑广泛的公共利益，而把力气局限在打散卡特尔和阻止会产生垄断的合并上。在这种“消费者福利标准”下，竞争案件裁决的关键就在于对“向上定价压力”（即一项合并或战略在多大程度上会导致消费者多花钱）的细致分析。

但是，这种方法是否会让监管机构一叶障目？2016年，本刊指出，美国大公司的高利润和不断上升的市场份额证明整个经济中的竞争已经减弱。同年早些时候，白宫的经济学家发表的一份报告得出了类似的结论。在欧洲也能看到这样的趋势。成员主要为富裕国家的经合组织（OECD）研究发现，在2000年至2014年间，特定行业中前八家公司所占的销售份额在欧洲增加了四个百分点，在北美增加了八个百分点（见图表）。

许多反垄断专家对此并不担心。他们认为，产业集中度并不能说明特定商品的市场竞争程度如何。但有些经济学家认为，是竞争减少造成了劳动力市场停滞和不平等加剧等影响深远的经济弊病。在2019年发表的一篇论文中，哈佛大学已故经济学家伊曼纽尔·法希（Emmanuel Farhi）和芝加哥联储的弗朗索瓦·古里奥（François Gourio）认为，大公司不断增长的市场支配力与低利率和投资疲软有关，而这些因素影响了整体经济。

和在芝加哥学派的时代一样，其他经济学家认为这些看法忽略了效率的作用。麻省理工学院的大卫·奥特尔（David Autor）和约翰·范雷南（John Van Reenen）、苏黎世大学的大卫·多恩（David Dorn）、哈佛大学的劳伦斯·卡茨（Lawrence Katz）和芝加哥大学的克里斯蒂娜·帕特森（Christina Patterson）最近发表的论文认为，全球化和技术进步将经济活动集中在少数“超级巨星公司”。由于这些公司的生产率更高，因此集中度最高的行业生产率增长也最快。

当涉及科技巨头时，这些争论变得最为激烈。在美国，司法部、联邦贸易委员会（FTC）、国会和许多州正在调查亚马逊在网上购物领域的主导地

位、苹果巨大的盈利能力，或Facebook和谷歌在在线广告领域享有的双头垄断是否涉嫌滥用它们的市场支配地位。欧盟对谷歌展开了三项独立的反竞争调查，并对它处以了82亿欧元（97亿美元）的罚款。

| 在市场中竞争，还是竞争一个市场？

谈到竞争，亚马逊、Facebook和谷歌等基于“平台”的企业会引出一些特殊问题，因为它们有两类不同的客户。亚马逊的交易对象同时包括零售商和消费者，Facebook和谷歌则同时包括用户和广告主。在本世纪的头十年，两位法国经济学家让·梯若尔（Jean Tirole）和让·夏尔·罗歇（Jean-Charles Rochet）提出了研究此类平台公司的经济学框架，展示了这些公司的最佳策略通常是在平台一端让用户以低廉的成本访问，而在另一端高价收费。消费者免费享受谷歌的搜索和Facebook的社交功能，而广告主则要花大价钱才能在平台上打广告吸引消费者。

在科技巨头出现之前，平台就已经存在：电视、报纸和信用卡都是某种形式的平台。但互联网提供了庞大的规模和覆盖范围。添加用户的成本很低，而且通常情况是平台的用户越多，对未注册用户就越有吸引力。实现了临界规模，公司就能获得压倒性的主导地位：赢家通吃。

如果通吃的平台主导了数字经济，有什么要紧吗？就消费者的福利而言，从表面上看这很合算：用户以没人会反对的价格（一分不花）获得对他们有真正价值的东西。但在平台的另一端，情况看起来就更令人担忧了。英国的竞争与市场管理局（Competition and Markets Authority）最近的一项调查发现，企业的数字广告成本平均为每年每户500英镑（650美元）。如果市场集中度降低，这些成本可能会下降，而节省下来的部分成本将通过降低价格惠及消费者。

另外一个潜在的担忧是许多科技巨头的商业模式中存在利益冲突，比如苹果通过其App Store销售与其自身产品相竞争的软件，或者亚马逊收集与之竞争的第三方产品的销售数据。

如果大公司要一直担心被势头正旺的新进入者成功篡位，这种市场集中度

或许还能容忍。但是，新创建的平台进入市场的障碍越来越多。一个障碍是平台需要积累大量数据才能为每个用户提供个性化服务。另一个障碍是，在数字经济中，要了解用户为什么喜欢创业公司提供的产品、随之提供类似的产品并将之推销给自己的数百万乃至十几亿现有用户对老牌公司而言相对更容易。这让创业公司从一开始就创新动力不足。最后要担心的障碍是，资金雄厚的老牌企业可以在新进入者真正构成威胁之前就收购它们，从而消除任何竞争的可能性，Facebook在2012年收购Instagram以及在2014年收购WhatsApp就是这样。在本世纪的第二个十年里，五家最大的科技公司进行了400多次收购，竞争管理机构少有干预。

面对这些担忧，在改革竞争经济学和反垄断执法上大致有两种思路。其中较激进的思路的拥护者自称“新布兰代斯主义者”。路易斯·布兰代斯

（Louis Brandeis）是20世纪初美国最高法院的大法官，他认为政府反垄断措施的总体目标应是防止任何一家公司对经济有过大的影响力。哥伦比亚法学院（Columbia Law School）的丽娜·可汗（Lina Khan）和智库美国经济自由项目（American Economic Liberties Project）的 Matt Stoller 等新布兰代斯主义者希望反垄断调查的目的不应只是增进消费者福利。他们认为，政府不应害怕拆分科技巨头。它们应该担心的是任由这些巨头发展。这种观点认为公司的规模和实力不仅对消费者和劳动者构成威胁，对民主本身也构成威胁。

| 每次我漫游时.....

在芝加哥学派的批评者看来，新布兰代斯主义是“嬉皮反垄断”，用一套含混不清的社会目标代替了透明而严谨的方法论。它可能会削减科技公司的权力，但也会让监管机构获得更多权力。如果市场支配力的集中应该受到质疑，那么监管权力的集中同样应该被质疑，因为后者可能会导致任意武断却无需担责的决策。在这场辩论的主场美国，它自然有党派之分：新布兰代斯主义者的言论只有民主党听得进去。

改革的第二种思路更循序渐进。它不寻求废除消费者福利标准，而是要重新诠释它。加州大学伯克利分校的卡尔·夏皮罗（Carl Shapiro）建议把它叫作“保护竞争标准”，以明确它考虑到了反竞争行为可能对消费者福利

造成的所有危害，包括间接或扩散的危害。

把对消费者福利标准的这种解释应用于数字平台，意味着接受在某些情况下公司将自然而然地成长壮大，也就是说在未来的任何时间点“市场中的竞争”都将很少。但是，如果更好的新产品有机会打破现状，那么仍然会有“对市场的竞争”。这可能意味着阻止那类扼杀潜在竞争对手的早期收购，或者倒置这类收购案的举证责任，让合并企业必须证明其计划将有利于消费者。这也可能意味着要迫使现有大公司共享部分数据，或者至少让用户能更容易地在不同平台之间轻松切换。

对于抱怨科技巨头今天的政治影响力过大的新布兰代斯主义者，这种改革方式可能不会让他们多么满意。但它可能会让高管们的日子更加不安稳一些。 ■



Technology listings

Partying like it's 1999

Initial public offerings are back in Silicon Valley amid the pandemic, after a fashion

THE IPO is dead, long live the IPO. When the pandemic hit in March, initial public offerings, particularly those by technology startups, were predicted to be among the early victims. After all, who wants to go public in a once-in-a-century crisis?

Quite a few people, it turns out. In the past couple of months ipos, which all but dried up until late May, have come back with a vengeance in America. None of Silicon Valley's recent and upcoming listings rivals that of Ant Group. The payments affiliate of Alibaba, an online giant, wants to raise a record \$30bn in China by October, which could value the firm at around \$200bn. But America's technology startups have brought in \$10bn so far this year (see chart 1)—and there is more to come. On August 19th Airbnb, which rents homes to travellers, filed for an ipo. Other privately held “unicorns” reportedly ready for public pastures include Snowflake Computing, which makes cloud software; DoorDash, which delivers food; and Instacart, which delivers groceries. Add Palantir, a cryptic data-management firm preparing for a direct sale of existing shares in public markets, and the latest combined valuation of these five is \$80bn, according to PitchBook, a data provider. Even if they float only a portion of their shares, billions-worth of fresh tech stocks will soon trade publicly.

This flurry of activity has not reached dotcom-bubble territory from the turn of the century, when dozens of startups floated each month. But there is a whiff of “irrational exuberance” in the air, detects Lise Buyer, who has watched technology stocks since the heady late 1990s and now helps startups with IPOs at Class V Group, an advisory firm. When Duck Creek, an insurance-tech company, went public on August 14th, it closed nearly 50%

higher. BigCommerce, an online-shopping platform which floated a week earlier, saw its shares “pop” by more than 200%.

With the S&P 500 index of big American firms at an all-time high, never mind that covid-19 rages on, investors’ rationality is certainly up for debate. But for many startups, the desire to go public is perfectly rational, for two reasons.

The first has to do with the financial markets themselves. Venture capitalists who had been pouring billions into unlisted firms began to cool on frothy startups before the pandemic, after a few unicorn listings disappointed (Lyft and Uber) or collapsed (WeWork). At the same time, rock-bottom interest rates are pushing public capital to seek returns. As a result, stockmarket investors are ready to accept high valuations, says Lauren Cummings of Morgan Stanley, an investment bank and a leading underwriter of IPOs. “There is insatiable demand by public investors,” agrees Brian Feinstein of Bessemer Venture Partners, a venture-capital (VC) firm.

Startups are keen to slake it before it dissipates. Many firms are therefore dusting off listing plans that were put on hold in the wake of the ride-hailing duds and the WeWork snafu. Their case is bolstered because—and this is the second reason for startups’ listing-lust—the pandemic has been a boon for many tech firms.

The five big platforms—Alphabet’s Google, Amazon, Apple, Facebook and Microsoft—have thrived as self-isolating consumers spend more time and money online, and firms splash out on cloud-computing services to enable remote working. On August 19th Apple briefly touched a market capitalisation of \$2trn, the first American company to do so. Not-so-big tech, too, has benefited, including many companies that have recently gone public.

The pandemic has highlighted and sped up a fundamental shift towards digital businesses, says Sarah Cannon of Index Ventures, a VC firm. The trend will last for decades, she predicts. Markets concur. The tech-heavy Renaissance IPO Index, which includes most listers of the past two years, is up by more than 40% since January (see chart 2). Zoom, whose videoconferencing app has become ubiquitous amid lockdowns, has seen its share price rise fourfold since floating in April 2019; it is worth \$78bn. CrowdStrike, a cyber-security firm which listed in June last year, has quadrupled in value since March.

One thing the latest boom has done is highlight how unhappy startups and VC firms have grown with the current process of going public. It is cumbersome, with reams of paperwork, and can take more than a year. It is also pricey—and seen as too cosy for Wall Street. Investment banks' fees alone eat up between 4% and 7% of a typical IPO's proceeds, not counting lawyers and other advisers. Startups and VC firms point to big first-day pops as evidence that offerings are underpriced to give banks' big investors a quick return. After all, those customers are regulars that must be kept sweet, whereas most startups only go public once.

Disaffection with the IPO process, combined with a renewed desire to go public, has led some firms to consider alternatives. One is a “direct listing” of the sort Palantir is pursuing, and which Spotify, a music-streaming service, and Slack, a corporate-messaging firm, have used to good effect. Asana, which sells web-based project-management software, may be another unicorn to take the direct route. Direct listings use an electronic auction by the stock exchange to get startups a fairer price for their shares than investment bankers might. But they do not allow firms to raise new money. As a result, they are an option only for cash-rich firms.

Another route that has gained prominence is the special-purpose acquisition company. These SPACs, as they are known for short, are shell

firms that go public promising to buy one or more private businesses with the proceeds from the listing. The private business then fills up the listed shell through a reverse merger. SPACs have a dodgy history; many have underperformed the broader stockmarket. But the latest lot promise to fix the flaws while preserving the benefits, which include direct negotiations over the purchase price that can make deals faster and more predictable. From January to early August 60 SPACs went public, raising \$22.5bn. In July Bill Ackman, a hedge-fund boss, launched a \$5bn-7bn vehicle, the biggest so far.

It is unclear if Silicon Valley will embrace SPACs wholeheartedly. The biggest tech firm to have used one is Nikola, a secretive zero-emission-lorry startup which now boasts a market capitalisation of about \$16bn. Many entrepreneurs and their backers would resist letting their firms be sucked up into a shell. But SPACs have a place in tech world. On August 18th Kevin Hartz, an early investor in Airbnb and Uber, launched one. Ribbit Capital, a VC firm, is reportedly planning another.

The IPO-industrial complex is not averse to direct listings or SPACs, even if they are less lucrative than the old-school ways. Bankers predict a diverse future of increasingly tailor-made flotations that, say, target specific investors and predetermine how long staff must hold on to their shares. As Greg Chamberlain of JPMorgan Chase, a bank, sums up, “Not all technology companies are the same. They have different objectives.” So long as startups want to cash in, as all ultimately do, they will need Wall Street to shepherd them through. ■



科技公司上市 狂欢如1999

IPO潮在疫情中重回硅谷——某种程度上

IPO已死，IPO长存。3月疫情爆发时，公司IPO被认为会是最先受到冲击的领域之一，尤其是科技创业公司的IPO。毕竟，谁愿意在百年一遇的危机中上市呢？

没想到，愿意的人还不少。美国的IPO在5月底以前几乎完全停顿，但在过去两三个月又卷土重来。最近上市和即将上市的硅谷公司中，无一能与蚂蚁集团计划中的IPO匹敌。网络巨头阿里巴巴旗下的这家支付子公司希望在10月前在中国筹集到创纪录的300亿美元，这样公司的估值可能将达到2000亿美元左右。但美国的科技创业公司自今年初以来已经融资100亿美元（见图表1），而且还有更多公司准备上市。8月19日，为旅行者预订住房的爱彼迎申请上市。据报道，其他准备上市的私有“独角兽”包括开发云软件的Snowflake Computing、外卖服务DoorDash，以及配送杂货的Instacart。另外，神秘的数据管理公司Palantir也在筹备把现有股票直接拿到公开市场出售。数据供应商Pitchbook的统计显示，这五家公司的最新总估值达到800亿美元。即使它们只发行一部分股份，几十上百亿美元的新科技股票也将很快上市交易。

这波热潮尚未达到世纪之交时互联网泡沫的那种程度，当时每个月都有几十家创业公司上市。但丽丝·拜尔（Lise Buyer）已经嗅到了一丝“非理性繁荣”的气息。她从上世纪90年代末的狂热时期开始关注科技股，目前在咨询公司Class V Group帮助创业公司上市。保险科技公司Duck Creek在8月14日上市时，当天收盘上涨近50%。而比它早一周上市的网购平台BigCommerce股价暴涨超过200%。

新冠疫情肆虐之际，代表美国大型企业的标普500指数仍创下历史新高，投资者是否理性无疑值得商榷。但许多创业公司的上市愿望是完全合理的，有两点原因。

第一个原因关乎金融市场本身。疫情爆发前，已对未上市公司砸下巨资的风险资本在几家独角兽上市表现惨淡（Lyft和优步）或失败（WeWork）之后对充满泡沫的创业公司热情降温。与此同时，利率已降至谷底，促使公共资本寻求回报。投资银行、IPO主要承销商摩根士丹利的劳伦·卡明斯（Lauren Cummings）表示，在这种情况下股市投资者愿意接受高估值。风投公司柏尚投资（Bessemer Venture Partners）的布莱恩·范斯坦（Brian Feinstein）表示认同，“公众投资者表现出了难以满足的需求。”

创业公司急切想在这种需求消退之前抓住机会。在两家网约车公司上市后“哑火”和WeWork陷入混乱之后，许多公司暂时搁置了上市计划，现在它们又重新把这些计划拿了出来。现在上市的理据更加充分，因为这场疫情已经为许多科技公司带来利好——这是创业公司渴望上市的第二个原因。

自我隔离的消费者在网上花费更多时间和金钱，企业也纷纷花大钱购买云计算服务以实现远程工作，推动五大平台公司（Alphabet旗下的谷歌、亚马逊、苹果、Facebook和微软）生意蒸蒸日上。8月19日，苹果公司的市值一度达到2万亿美元，成为首家突破这一关口的美国公司。规模没那么大的科技公司也因疫情受益，包括许多最近上市的公司。

风投公司Index Ventures的莎拉·坎农（Sarah Cannon）表示，疫情凸显并加速了向数字化商业的根本转变。她预测这一趋势将持续数十年。市场也认同这一观点。纳入过去两年上市的大部分公司、以科技股为主的Renaissance IPO指数自1月以来已经上涨逾40%（见图表2）。Zoom的视频会议应用在封城期间大行其道，自2019年4月上市以来股价增长了三倍，目前市值达780亿美元。去年6月上市的网络安全公司CrowdStrike自3月以来市值已翻了两番。

最近这波上市潮也凸显了创业公司和风投公司对当前的上市流程日益不满。整个过程极为繁琐，要准备大量文件，可能耗时一年以上。上市还很贵——让人感觉华尔街赚钱太容易了。在一般的IPO交易中，单是投行费用就要吃掉融资额的4%到7%，此外还有律师和其他顾问的费用。创业公司和风投公司指出，上市首日股价大涨证明了发行价格被低估，为的是给

银行的投资大户带来快速回报。毕竟这些大客户都是常客，必须一直讨好，而大多数创业公司只做一次上市。

对IPO流程的不满，加上重新燃起的上市热望，促使一些公司考虑其他选择。一种是Palantir计划采取的“直接上市”。音乐流媒体服务Spotify和企业通讯公司Slack都采用这种方式取得了不错的成效。销售网页端项目管理软件的独角兽公司Asana也可能采取这条路线。直接上市通过股票交易所的电子竞价发售股票，能让创业公司获得比通过投行上市更公平的股票价格。但直接上市没法募集新资金，因此只适合那些现金充裕的公司。

另一种受到青睐的上市途径是特殊目的收购公司（简称SPAC）。这些壳公司在上市时承诺用融到的资金收购一家或多家私营企业。然后，私营企业通过反向合并填充上市的壳公司。SPAC曾经不太可靠，许多股价表现不及大盘。但最近一批SPAC有望弥补缺陷，同时保留优点，包括能直接谈判收购价格，从而让交易更快速和更可预测。从1月到8月初已有60家SPAC上市，融资225亿美元。7月，对冲基金大佬比尔·阿克曼（Bill Ackman）推出了一个50至70亿美元的投资工具，是迄今为止规模最大的SPAC。

尚还不清楚硅谷的科技公司是否真心愿意选择SPAC。通过这种途径上市的科技公司中，规模最大的是一家神秘的零排放卡车创业公司尼古拉（Nikola），市值约为160亿美元。许多企业家和出资人不愿意把自己的公司放到一个壳公司里。但SPAC在科技业仍有一席之地。8月18日，爱彼迎和优步的早期投资者凯文·哈兹（Kevin Hartz）启动了一个SPAC。据称风投公司Ribbit Capital也在筹划推出SPAC。

尽管直接上市或SPAC带来的利润不如传统方式丰厚，但IPO产业综合体并不排斥这些做法。银行人士预测，未来的IPO将更加多种多样，提供更为定制化的上市方式，比如可以面向特定的投资者，以及预先规定员工持股的禁售期。正如摩根大通的格雷格·张伯伦（Greg Chamberlain）总结的那样：“不是所有的科技公司都一样。它们的目标各不相同。”只要创业公司想要变现——最终它们都会——就还是需要华尔街来指路。■



People power

Beginner's luck

Why has democracy thrived in some places but been thwarted in others?

TWO COMMON beliefs about democracy are that it began in ancient Athens and, on spreading from there, remained peculiarly Western. David Stasavage, a professor of politics at New York University, finds both views mistaken. Without them, he thinks it will be easier to get hopes and fears for present-day democracy into better perspective and balance.

Understood as government by consultation and consent, democracy, he shows, can be found in many early civilisations, not just classical Greece—including ancient Mesopotamia, Buddhist India, the tribal lands of the American Great Lakes, pre-conquest Mesoamerica and pre-colonial Africa. With that spread in mind, he writes that under given conditions, “democratic governance...comes naturally to humans”. The puzzle is that autocratic governance was just as natural. It, too, was found in many places. In pre-modern China and the Islamic world, for example, autocracy—together with a centralised bureaucracy—was for centuries the norm.

To find out why early democracy occurred where it did, the author draws on evidence from archaeology, soil science, demographics and climate studies. The key, in his account, was information.

Early democracy tended to flourish where rulers knew little of what people were growing and had few ways to find out. They might underguess taxable produce (forgoing revenue) or overguess (provoking non-compliance). It was better to ask people how much they grew and, in return, listen to their demands. That pattern was typical where populations were small and a central state weak or non-existent.

With big populations, consultation was impractical. Rulers instead sent officials to see how much was grown and, before long, how many young men could be drafted into armies. Bureaucracies emerged. With their aid, autocratic rule imposed itself on local custom. In pre-modern settings, this autocratic bureaucracy was more common where soil was good, yields high and know-how advanced, especially in writing and measuring. Such systems were able to tax heavily. Song China (10th-13th centuries) and the Abbasid Caliphate (8th-13th centuries) extracted at their height respectively 10% and 7% of gross yearly product. Medieval European rulers managed barely 1%.

Once established, central bureaucracies were hard to dismantle. They took well to modernity and new technologies. Early democracy, by contrast, was notably—although not fatally—vulnerable to the rise of modern states and rapid economic development. It accordingly vanished in many places, while surviving in others.

Modernity and central states, in other words, allowed for either autocracy or democracy. But was there a pattern? Mr Stasavage thinks so. He calls it “sequencing”. “If the early democratic institutions of government by consent are established first,” he writes, “then it is possible to subsequently build a bureaucracy without veering inevitably into autocracy or despotism.” It depends on what went before.

| *First-mover advantage*

Awkwardly for this argument, the West is the one part of the world where early democracy of the small-scale, direct kind evolved most securely into modern, representative democracy. Does that not make democracy peculiarly Western after all? In modern democracy’s three waves—in the 19th century, post-1945 and post-1989—Western democracy was first. Despite glaring collapses, it has fared best. Yet, in Mr Stasavage’s telling, there was nothing essential—a liberal outlook, say, or respect for property,

or a gift for industry—that tied the West and modern democracy together, beyond the luck of the past.

Pre-modern Europe had (with exceptions) democratic customs and weak rulers without effective bureaucracies. Where it occurs, and is not wiped out by autocracy, consensual government, the author writes, leaves “very deep traces”. Democracy and autocracy each have strong roots. There are good reasons to expect each to endure.

That conclusion may seem small yield for such intellectual labour. But a bracing stringency is one of the virtues of “The Decline and Rise of Democracy”. It sweeps across the globe in command of recent scholarship. It takes an economic view of politics as putative bargaining between rulers and ruled, dispensing with what actual people thought and did and skirting fastidious analysis of key ideas. Its strongest lessons are negative: it shows how complex democracy’s patterns are and, on the evidence, how simpler accounts of its past and prospects stumble. ■



人民的力量

新手有好运

为什么民主在一些地方蓬勃发展，却在另一些地方受挫？

关于民主有两种常见的看法，一是它始于古代雅典，二是它从那里传播开来后仍旧是更限于西方世界的制度。纽约大学政治学教授大卫·斯塔萨瓦奇（David Stasavage）认为这两种观点都是错误的。他认为，如果能抛却这两种观点，对当今民主的希望和担忧会更容易获得更佳视角和平衡。

他论证说，如果把民主理解为基于协商和民众同意的政府，那在许多早期文明中都能找到民主，而不仅仅是在古希腊。这些早期文明包括古代美索不达米亚、佛教盛行时期的印度、美国五大湖地区的部落、被征服前的中美洲以及被殖民前的非洲。有鉴于此，他写道，在特定条件下，“民主治理……对人类来说是自然而然的事。”问题在于，专制治理同样自然而然，同样可以在许多地方找到。例如在前现代的中国和伊斯兰世界，专制统治——连同中央集权的官僚机构——在几个世纪里都是常态。

为了回答早期民主缘何在所发生之地发生，斯塔萨瓦奇利用了考古学、土壤科学、人口统计学和气候研究的证据。按他的说法，关键在于信息。

早期民主往往在统治者对民众的耕种情况知之甚少、却也没有什么办法去查明的地方繁荣发展。他们可能会低估应税农产品的数量（丧失税收收入）或高估（引发民众违抗）。不如问民众种植了多少，而作为回馈，倾听他们的需求。这种模式在人口少且中央政府软弱或不存在的地方很典型。

在人口众多的地方，协商就不现实了。统治者于是便指派官员去查看作物的种植量，不久又开始查看有多少年轻人可被征召入伍。官僚机构由此出现。在它们的帮助下，专制统治得以强加于地方习俗。在前现代的背景下，这种专制的官僚机构在土壤肥沃、收成好、专门知识（尤其是在文字和度量方面）先进的地方更常见。这样的体系能够征收重税。中国的宋朝

（10至13世纪）和阿拉伯帝国的阿拔斯王朝（8至13世纪）在各自的鼎盛时期分别从全年生产总值中抽取10%和7%。中世纪的欧洲统治者只勉强抽得1%。

中央官僚机构一旦建立，就很难废除。它们乐于接受现代化和新技术。相比之下，早期的民主特别容易受到现代国家崛起和经济快速发展的影响，尽管这种影响不至致命。因此，它在许多地方消失了，却也在其他地方幸存了下来。

换句话说，现代化和中央政府不是容纳了专制，就是容纳了民主。但其中是否存在某种模式？斯塔萨瓦奇认为是存在的，并称之为“次序”。他写道：“如果是民选政府的早期民主制度建立在先，那么就有可能在随后建立起一个官僚机构的同时不至于必然转向专制或独裁暴政。”关键要看什么发生在前。

| 先发优势

对于这一论点，比较尴尬的是，正是在西方，早期的那种小规模、直接的民主最安然无虞地演变成了现代的代议制民主。那么民主终究不还是西方特有吗？现代世界经历了三次民主化浪潮，分别发生在19世纪、1945年后和1989年后，其中第一次发生在西方。西方民主尽管出现过明显的回潮，但仍是迄今发展得最好的。然而在斯塔萨瓦奇的讲述中，除了先前的运气之外，没有什么关键要素将西方和现代民主联系在一起——比如自由的观念、对财产的尊重，或者是工业方面的天资。

前现代欧洲有民主习俗，以及缺乏有效官僚机构的软弱的统治者（也有例外）。作者写道，如果获得民众同意的政府在某地出现，且没有被专制彻底消灭，便会在那里留下“非常深刻的痕迹”。民主和专制都有牢固的根基。有充分的理由预期两者都会长久持续下去。

作者付出大量脑力得出了这个结论，看起来似乎算不上成果丰硕。但这本《民主的兴衰》（*The Decline and Rise of Democracy*）的优点之一是它令人精神为之一振的严密性。它自如地运用近年的学术研究成果来放眼全

球。它从经济视角看待政治，将之推定为统治者和被统治者之间的讨价还价，省去了现实中的人的想法和行为，回避了对关键概念一丝不苟的分析。这本书得出的最强有力的经验是消极的：它显示了民主的种种模式有多么复杂，并以证据表明，对民主的过去和前景更简单化的记述有多站不住脚。■



People's Bank of China

Conforming to norms

As central banks ramp up their money-printing, China is the odd one out

YI GANG, THE head of China's central bank, is fond of saying that he wants to run "normal" monetary policy. By that he means keeping interest rates well above zero, ensuring that the yield curve slopes upwards and avoiding direct purchases of the government's bonds—much of which, in fact, make the People's Bank of China (PBoC) a highly abnormal central bank these days. The clearest sign of this is its balance-sheet. In terms of its assets, the PBoC has gone from the undisputed heavyweight to a middleweight. Its restraint is a combination of two different strands in its pursuit of policy normality: an avoidance of the unusual manoeuvres that have become common elsewhere and a reversal of some of the unusual manoeuvres that used to be common in China.

Starting in the early 2000s, the PBoC accumulated assets at a prodigious rate, almost entirely in the form of foreign-exchange reserves. The build-up was a result of its policy of limiting the yuan's appreciation at a time when China was running a giant trade surplus. The PBoC's assets peaked at 70% of GDP in 2008, more than twice the level of its peers in America, Europe and Japan at the time. But as China's foreign-exchange reserves have shrunk and then stabilised over the past five years, so has the central bank's balance-sheet.

By contrast, the assets of the Federal Reserve, the European Central Bank and the Bank of Japan have mostly risen over the past decade or so, as they undertook quantitative easing, buying up government bonds and, in some cases, corporate paper and equities. In order to minimise the economic damage from the coronavirus pandemic, they are buying yet more bonds. The PBoC, though, has barely added to its assets (see chart). As a share of

GDP, the size of its balance-sheet is now roughly the same as the Fed's—around 35%.

In part China's restraint is because the economy is in relatively better shape, with the virus all but stopped and a growth rebound well under way. Partly it also reflects what might be called the Kipling doctrine in China's bid to promote the yuan's international role: if you can keep your money supply in check when all about you are expanding theirs like mad, then reserve-currency status may some day be yours.

There is also a deeper reason for China's apparent conservatism, though. It is gradually reversing some of its extraordinary past interventions. In order to maintain an undervalued currency, the PBoC printed as much yuan as needed to buy the foreign currency streaming into China. To prevent that newly created money from causing inflation, it then had to soak much of it back up, or to "sterilise" the inflows. It did that primarily by jacking up reserve-requirement ratios for commercial banks. At the peak in 2011, banks were forced to place 21.5% of their deposits at the central bank. After repeated cuts, including two since the coronavirus outbreak, mid-sized banks now need to set aside only 9.5% of their deposits, freeing them to lend more. Coupled with targeted liquidity injections and old-fashioned moral suasion (a powerful tool in a largely state-owned financial system), the PBoC can support the economy without dramatically scaling up its balance-sheet.

Still, the very stability of that balance-sheet has led to questions about whether it may be accumulating foreign-exchange reserves on the sly. The main reason for suspicion is that even as China has notched up huge trade surpluses (\$62bn in July, just shy of a monthly record set in May), its reserves have barely budged. But a focus on trade overlooks the cash that has left through other channels. In the second quarter, net financial outflows (excluding direct investment) soared to \$104bn—equivalent to

two-thirds of trade earnings—partly thanks to mainlanders punting on stocks in Hong Kong. This points to one more way in which the monetary system looks more normal—it is becoming fiendishly complex to monitor all the cash criss-crossing China's borders as, little by little, it opens up its capital account. ■



中国人民银行 遵循常规

各国央行加印货币，中国自成一派

中国央行行长易纲总爱说自己想推行“正常”的货币政策。他指的是保持利率远高于零，确保收益率曲线向上倾斜，并避免直接购买政府债券。而实际上，很多这些措施现如今让中国人民银行成了一家非常反常的央行。最明显的信号是它的资产负债表。就资产而言，中国央行已从无可争议的重量级央行变成了中量级。它的克制体现为从两个不同方面追求实现政策常态化：避免执行在国外已变得平常的不寻常操作；扭转一些过去在中国很普遍的不寻常操作。

从本世纪初开始，人行以惊人的速度积累资产，这些资产几乎全部是外汇储备。这是当年中国在存在巨额贸易顺差的时期实行限制人民币升值的政策的结果。人行的资产规模在2008年达到巅峰，等同于GDP的70%，是当时美国、欧洲和日本央行资产水平的两倍多。但随着中国外汇储备缩水，而后在过去五年里稳定下来，人行的资产负债表也呈现同样的走势。

相比之下，在过去十年左右的时间里，随着美联储、欧洲央行和日本央行采取量化宽松政策，购买政府债券，有时还购入公司债券和股票，它们的资产大多有所增加。为最大程度减少新冠疫情造成的经济损失，它们正在购入更多债券。但人行的资产却几乎没有增加（见图表）。按占GDP比重衡量，人行资产负债表的规模目前与美联储大致相同，约为35%。

中国的克制一方面是因为疫情基本被遏制，经济正强势反弹，因而整个经济体状况相对较好。另一方面也反映了中国为提升人民币的国际地位而奉行或许可称为“吉卜林主义”的做法：如果旁人都在疯狂扩大货币供应而你能把持住，那么终有一天储备货币的地位会是你的。

不过，中国表面的保守还有更深层次的原因。它正在逐步扭转过去一些非常规的干预措施。为保持人民币汇率被低估，人行需要加印足够多的人民

币来购买流入中国的外币。为防止加印的货币导致通货膨胀，它必须把其中很大一部分吸收回来，或可称为“冲销”流入。主要方法是提高商业银行的准备金率。在2011年的顶峰时期，中国的商业银行必须将其存款的21.5%存入人行。在多次下调（包括疫情爆发以来的两次）后，中型银行现在只需要留出9.5%的存款准备金，因而可以把更多资金用于贷款。加上定向流动性注入和老式的道义说教（在基本为国有的金融体系内，这是件有力的工具），人行可以在不大幅扩大资产负债表的情况下为经济提供支持。

人行资产负债表的这种稳定性毕竟还是引来了外界怀疑：它是否在悄悄积累外汇储备？怀疑的主因是在中国出现巨额贸易顺差（7月为620亿美元，略低于5月创下的单月新高）之时，其外汇储备几无变化。但是，只盯着贸易这一块忽略了从其他渠道流出的资金。第二季度资金净流出（不包括直接投资）飙升至1040亿美元，相当于贸易收益的三分之二，部分原因是大陆居民大举购入香港股票。而这又从另一个方面让中国的货币体系显得更加正常了——随着中国一点一点地放开对资本账户的管制，要监控所有的资金跨境流动正变得异常复杂。 ■



Sino-American tech war

No more quarter

America closes the last remaining loophole in its hounding of Huawei

THANKS TO ITS high quality and low prices, Huawei's telecoms gear is popular around the world. Not in America, where the Chinese giant is banished over (unsubstantiated) fears that it could be used by spies in Beijing to eavesdrop on Americans. But expelling Huawei from the United States—and pressing allies like Australia and Britain to do the same—was not enough for the Trump administration. It seems to want Huawei dead.

Last year the Department of Commerce (DoC) barred American firms from selling Huawei chips made in America, which oxygenate swathes of the global semiconductor industry. In May the DoC added a rule banning domestic and foreign firms from using American-built chipmaking equipment to create custom-made processors for Huawei.

On August 17th the DoC tightened the noose once again—this time, many experts think, for good. Its new rule prohibits anyone from selling any chips to Huawei, custom or not, if these were produced with American technology. This covers practically every chipmaker in the world, including those in China, thus closing loopholes that the global chip industry's high-powered lawyers have found in the earlier edicts. The share price of MediaTek, a Taiwanese company which was hoping to sell Huawei generic components, plunged by 10% on the news.

The changes take effect on August 20th. After that, Huawei will start running down its stockpile of chips. It has been amassing them for months and probably has enough to last it into 2021, reckons Dan Wang of Gavekal Dragonomics, a research firm. But its customers, including European mobile operators using Huawei kit and in need of spares, will start

panicking before then. And who would buy new network kit from a firm which may be unable to fulfil orders?

Huawei's options are limited. It could sue, claiming that the DoC's actions contravene America's own laws, but its two ongoing lawsuits against the American government already look like long shots. Its suppliers, particularly Chinese ones, may sell it chips in breach of DoC rules. Yet that could provoke American ire—and Huawei-like sanctions against them, too.

America's chip firms are also in a bind. The Semiconductor Industry Association said it was "surprised and concerned by the administration's sudden shift" from an approach that balanced national security with corporate interests. Besides lost sales to Huawei, which bought \$19bn in components from American firms last year, technology bosses fret that their government's actions will drive investment away from them to rivals in other countries.

If Beijing retaliates with a counter-claim of jurisdiction over any product made in China, that would devastate the supply chains of Apple and other American technology firms. On August 18th China's government accused America of "violating international trade rules". But it has so far resisted striking back, perhaps counting on Mr Trump's defeat in November's presidential election by Joe Biden, who may take a softer stance against China.

The DoC can still issue licences to firms that want to keep supplying Huawei with components. American trade negotiators may want to use this power to extract concessions from China in ongoing trade talks to boost Mr Trump's re-election chances, diminished by his mishandling of the covid-19 pandemic. Given the supposed threat Huawei poses, it may be odd to let it live in exchange for a few extra tonnes of soyabean sales to China. Then again, policy inconsistency has not been an obstacle for the Trump

administration in the past. Many Western technology firms hope that remains the case. ■



中美科技战 赶尽杀绝

美国为围猎华为堵上最后的漏洞

华为电信设备质优价廉，走俏全球。在美国却不然，这家中国巨头遭到美国政府封杀，理由是担心北京的间谍会利用华为设备窃听美国民众通讯（并无实证）。但特朗普政府并不满足于把华为赶出美国并迫使澳大利亚和英国等盟国采取同样的措施。它似乎要置华为于死地。

去年，美国商务部禁止美国公司向华为供应美国制造的芯片，向全球半导体产业的很大一块出让了生意。今年5月，美国商务部新增一项规定，禁止国内外公司使用美国生产的芯片制造设备为华为定制处理器。

美国商务部在8月17日再次勒紧绞索——许多专家认为这次已是绝杀。新规定禁止任何人向华为出售一切采用美国技术生产的定制或非定制芯片。这几乎覆盖了全球所有的芯片制造商，包括中国的在内。这堵上了全球芯片行业里忙不迭的律师们在早期禁令中发现的漏洞。消息传出后，原本希望向华为出售通用元器件的台湾半导体公司联发科的股价应声下跌了10%。

新规于8月20日生效。此后，华为将开始逐渐耗尽芯片库存。研究公司龙洲经讯的王丹（音译）认为，好几个月来华为一直在囤积芯片，大概够它撑到2021年。但是，华为的客户（包括使用其设备并需要备用配件的欧洲移动运营商）在这之前就会开始恐慌。而且谁会向可能无法完成订单的公司购买新的网络设备呢？

华为没多少选择。它可能会状告美国商务部，指其行动违反美国自己的法律，但它现有的两宗控告美国政府的诉讼看起来已经胜算不大。华为的供应商可能会违反美国商务部的规定向其出售芯片，尤其是中国供应商。但这会惹怒美国，招致类似华为所受的制裁。

美国的芯片企业也陷入了尴尬的困境。美国半导体行业协会

（Semiconductor Industry Association）表示，对美国政府突然改变原本兼顾国家安全与公司利益的做法“感到惊讶和担忧”。除了损失华为的订单（去年华为从美国公司购入了价值190亿美元的元器件），科技公司的老板们还担心美国政府的行动会吓跑投资者，使他们转而投资其他国家的竞争对手。

如果中国实施报复，对美国在中国生产的产品发起对等反制，那将摧毁苹果和其他美国科技公司的供应链。8月18日，中国政府指责美国“违反国际贸易规则”。但到目前为止中国克制住了反击冲动，也许是指望特朗普在11月的大选中被拜登击败，后者的对华立场可能会温和些。

美国商务部仍可以向希望继续向华为出售元器件的公司发放许可。美国贸易谈判代表可能想以此作筹码，在正在进行的贸易谈判中迫使中国让步，从而提高特朗普连任的机会，挽回他因应对新冠疫情不力而流失的支持。从华为被指造成的威胁来看，只为多卖给中国几吨大豆就放它一条生路，这未免显得奇怪。但话又说回来，特朗普政府向来不顾忌政策反复无常。许多西方科技公司希望这次依然如此。 ■



Airbus A380

Superjumbo problems

The world's biggest passenger aeroplane is going cheap

HOW MUCH is an airliner worth if it is languishing on the tarmac, and may never fly passengers again? In the age of covid-19 that is the fate of many double-decker A380 superjumbos built by Airbus, Europe's aerospace giant. Once seen by airlines as the future of commercial aviation, many are being retired early as covid-19 has cast a pall on the future of globe-trotting. Those still in service could be yours for a few million dollars.

The A380 was in trouble before the pandemic. Delays meant that by the time it at last flew it had to compete with smaller, more efficient jets. Only 14 airlines ever ordered the 500-plus seater, with Emirates, based in Dubai, operating nearly half the 242 planes delivered. After Emirates cancelled orders for 39 in February 2019, Airbus announced it was winding down production of the plane.

All aircraft have lost value as a result of covid-19. But the fall has been unusually steep for A380s. The model's main attraction for airlines was to relieve congested runways at global hub airports. Now these are empty. Fewer than one in ten working A380s are plying the skies, according to Flightradar24, which tracks air traffic. Smaller craft are faring somewhat better.

The aviation industry may not recover until 2024, according to the International Air Transport Association, a trade group. That is a long time to maintain aeroplanes, so some airlines have thrown in the towel. Air France has announced its nine A380s will never fly again, and booked a €500m (\$588m) write-down in the value of its fleet. Germany's Lufthansa has cut its 14-strong squadron by six. Singapore Airlines, the second-biggest

operator with 19 planes, plans an ominous-sounding “review”.

Valuations of A380s have tumbled accordingly. The oldest models have been flying for 12 years or so. At that age, aircraft have typically lost half their value. Given each costs \$250m-300m to buy when kitted out, airline accountants might have hoped for \$125m. But even before covid-19 appraisers suggested between \$75m and \$100m. Now some A380s are fetching half what they used to be worth, says Usman Ahmed of Aircore Aviation, a consultancy. The slump is borne out by the accounts of investment funds that own planes and lease them to airlines. A fund called Doric Nimrod Air One recently cut the accounting value of its sole asset, an A380 leased to Emirates, by 51% in dollar terms.

The share prices of listed A380-owning funds suggests the residual values of the planes once the leases expire are between \$10m and \$15m, says Matthew Hose of Jefferies, an investment bank. Given regular maintenance overhauls of each of the A380's four engines can cost \$6m, existing motors in decent nick are, in principle, worth at least that much. Add the landing gear, also in principle reusable, and that would make the airframe itself worthless. It also signals that even the spares—which in modern planemaking are always aircraft-specific and useless for other models—may not have much value.

Struggling operators sometimes convert unwanted passenger jets into cargo planes. But Airbus never launched a freight version of the A380, so the conversion would be tricky. No scheduled carrier that flies the aircraft already is keen on more, even at knock-down prices. The first A380 to fly, which came into service in 2007, has already been sent to the scrapheap. More are headed that way. ■



空客A380

巨无霸问题

世界上最大的客机在降价

如果一架客机闲置在停机坪上，而且可能再也不会载客升空，那它值多少钱？新冠疫情期间，这是欧洲航空航天巨头空客制造的许多双层巨无霸客机A380的命运。A380一度被航空公司视作商业航空的未来，但因为疫情给全球航空出行的前景蒙上阴影，它们中有许多正在提前退役。而那些还在服役的，你花上几百万美元就能拥有一架。

A380在疫情前就已陷入困境。由于交付延迟，等到它最终投用时，又得与更小、更高效的飞机竞争。只有14家航空公司订购过这个有500多个座位的机型，而在已交付的242架中将近一半由总部位于迪拜的阿联酋航空运营。2019年2月阿联酋航空取消了39架A380的订单，此后空客宣布逐步停产该机型。

疫情爆发后，所有飞机都贬值了。但A380的跌幅之大非同一般。这个机型过去对航空公司最大的吸引力是能缓解全球枢纽机场中跑道拥堵的情况。但现在跑道上空空如也。根据追踪空中交通的“24小时飞行雷达”（Flightradar24）的数据，在役A380中只有不到十分之一在执飞航班。更小的飞机情况稍好一些。

行业组织国际航空运输协会（International Air Transport Association）认为，航空业可能要到2024年才能复苏。这对于飞机维护来说是一段很长的时间，所以一些航空公司索性放弃了。法国航空宣布它的九架A380将不再执飞，并对机队价值做了5亿欧元（5.88亿美元）的减记。德国汉莎航空已将其总共14架的A380机队砍掉了六架。拥有全球第二大A380机队、有19架在役的新加坡航空计划开展一次听起来不妙的“审查”。

A380的估价随之大跌。其中最老的飞机已经服役了12年左右。这个机龄的飞机通常会跌价一半。鉴于一架装备齐全的飞机要花2.5亿到3亿美元购

买，航空公司的会计师们原本可能希望每架还能值1.25亿美元。但即使是在疫情发生前，估价师给出的价格也只在7500万至1亿美元之间。咨询公司空核航空（Aircore Aviation）的乌斯曼·艾哈迈德（Usman Ahmed）表示，现在一些A380卖得的价钱只有之前的一半。拥有飞机并出租给航空公司的投资基金的账目证实了价格暴跌。一家名为Doric Nimrod Air One的基金最近将其唯一资产的美元账面价值减记了51%，那就是一架租赁给阿联酋航空的A380。

投资银行杰富瑞（Jefferies）的马修·何塞（Matthew Hose）说，从那些拥有A380飞机的上市基金的股价来看，一旦租约到期，每架飞机剩余的价值在1000万美元到1500万美元之间。考虑到给A380的四个引擎中的每一个做定期维修可能要花600万美元，状态尚好的引擎原则上至少值这个价。加上原则上同样还能重复使用的起落架，那么就等同于说机身本身一文不值。这也意味着，就连备件（在现代飞机制造中都是供某个机型专用，对其他机型毫无用处）可能也不值多少钱了。

日子难过的航空公司有时会将多余的客机改装成货机。但空客从未推出过货运版的A380，因此要改装它是件麻烦事。没有一家已经在用这款飞机的航空公司乐意买更多，哪怕是以“地板价”。于2007年开始服役的首架A380已经被送进了废品堆。还有更多正走在这条路上。■



Saudi Aramco

Trial by fire

In its first six months as a public company the world's biggest oil firm shows unrivalled strength—and unusual weakness

IN DECEMBER, WHEN Saudi Aramco listed 1.5% of its shares on the Riyadh stock exchange, it became the world's most valuable listed company, with a market capitalisation of \$1.9trn or so. The state-backed oil behemoth's bosses assured investors that low costs and vast reserves would make it resilient in a downturn. Since then Saudi Arabia and Russia waged a short but brutal price war, covid-19 has provoked the most sudden collapse in oil demand on record, and Aramco lost its stockmarket crown to Apple, whose market value has risen by nearly 50% this year to \$1.9trn, while Aramco's has edged down by 6%. Then, on August 9th, the firm reported a 73% year-on-year fall in second-quarter profits.

The events are a Rorschach test both for Aramco's boosters and its critics. Proponents see a firm that can produce more oil, more profitably than anyone on Earth. Sceptics point to unusual vulnerabilities, notably its majority owner's dependence on its profits. As with all Rorschach tests, there is no one right assessment.

Start with the optimists. On August 10th Amin Nasser, Aramco's chief executive, touted its "resilience across oil-price cycles". Aramco may have endured more of a cyclone than a cycle this year, but Mr Nasser's claim rings true. His firm has fared well, at least relative to rivals. It still made money, \$6.8bn in the three months to June, in contrast to the likes of Royal Dutch Shell and BP, two European giants, which lost \$18.1bn and \$16.8bn, respectively.

Or take Aramco's debt. At 20.1% of capital, it is above the range of between

5% and 15% the firm had promised, in part owing to its \$69bn purchase of a 70% stake in SABIC, a Saudi state-controlled petrochemicals company. Yet it remains less indebted than other oil majors. Critically, its investors enjoy juicier returns (see chart). In a world where many firms are reluctantly choosing to cut their dividends—as BP has done by half and Shell by two-thirds—Aramco is keeping its pledge to return \$75bn to shareholders this year.

Aramco's 262bn barrels of crude reserves and low production costs also allow it to limit spending without threatening future output, unlike America's frackers, forced to pare back activity as investors sour on shale. Big international companies are slashing capital spending, too. BP and Eni, an Italian major, plan to reduce crude production over the next decade, amid investor disenchantment with oil's returns and rising concern over climate change. If that continues, Aramco may gain market share with no need for another price war.

To the sceptics, saying Aramco is more resilient than rivals is like boasting that milk is sour but not curdled—neither prospect is appetising. The outlook for oil remains uncertain as consumer habits change, electric cars get cheaper and governments mull new climate regulations.

A bigger short-term worry is Saudi Arabia's sway over Aramco. The firm now has minority shareholders but they remain powerless. And recent months have shown how complicated royal control can be.

Aramco's production depends not on market forces, but on Saudi priorities. At the height of the price war in April Aramco pumped 12.1m barrels a day—an impressive feat that helped drive down global prices and lower Aramco's profits. For every dollar the oil price falls, Aramco's cashflow generally declines by \$1.5bn, reckons Neil Beveridge of Bernstein, a research firm.

As Saudi Arabia made peace with Russia and others in an attempt to balance crude markets in May and June, Aramco has returned to its role as oil's central banker. That is better than waging a price war in a pandemic, but still awkward for Aramco. The kingdom calibrates its output not just to support oil prices but to encourage other petrostates to do the same.

Aramco's interests and the kingdom's can diverge in other ways. For example, even as the market value of SABIC, which is also listed in Riyadh, has fallen over the past year Aramco did not renegotiate the \$69bn purchase price agreed in 2019. Aramco's chairman, Yasir Al-Rumayyan, also leads Saudi Arabia's Public Investment Fund, which sold Aramco its 70% stake in SABIC and which is also tasked with investing to diversify the Saudi economy.

That economy is strained. Last year Saudi Arabia needed an oil price of more than \$80 a barrel to balance its budget. Brent crude, the international benchmark, has not fetched more than \$50 since February. Despite spending cuts Saudi Arabia still faces a yawning deficit.

All of Aramco's shareholders covet the same thing: payouts. To lure investors before listing, Aramco said it would give priority to non-state shareholders' dividends for five years, come hell, high water or cheap oil. No one really thought it would have to make that choice. Now it has borrowed to meet its \$75bn dividend pledge. As Mr Beveridge notes, that strategy is unsustainable at current oil prices. Those prioritised payments remain subject to approval by the board. Sooner or later Aramco will have to decide: keep the promise to minority owners or renege? That will be a real test of its bona fides as a public company. ■



沙特阿美

火的考验

在上市后的头六个月，这家全球最大的石油公司展现了无与伦比的实力——以及非同寻常的脆弱

去年12月，沙特阿美将自己1.5%的股份在利雅得证券交易所上市发行，一举成为全球市值最高（约1.9万亿美元）的公司。这家国有石油巨头的高层向投资者保证，低成本和大储量能让公司在衰退期迅速复原。这之后，沙特与俄罗斯开打了短暂却残酷的价格战，新冠肺炎引发了有记录以来最急剧的石油需求暴跌，沙特阿美在股市的桂冠被苹果夺走，后者的市值在今年上涨了近50%，达到1.9万亿美元，而沙特阿美小幅下降了6%。接着，8月9日，公司财报称第二季度利润同比下降了73%。

不论是对沙特阿美的支持者还是批评者，这些事件都构成了一次罗夏墨迹测验。支持者看到了一家能生产更多石油且利润超过所有同业的公司。怀疑者指出它非同寻常的脆弱性，尤其是控股股东对其利润的依赖。和所有罗夏墨迹测验一样，这些判断并没有标准答案。

先来看乐观人士的观感。8月10日，沙特阿美的CEO阿明·纳赛尔（Amin Nasser）夸耀它在“在整个油价周期中的复原力”。尽管今年沙特阿美经受的可能更多是“旋风”而非“周期”，但纳赛尔的说法听起来符合事实。至少与竞争对手相比，他的公司状况不错。它仍然赚到了钱：4月至6月的三个月里它盈利68亿美元，而荷兰皇家壳牌和BP这两个欧洲巨头分别亏损了181亿美元和168亿美元。

债务水平也是证据。它的资产负债率为20.1%，高于该公司之前承诺的5%到15%的水平，部分原因是它以690亿美元收购了国有石化公司沙特基础工业公司（以下简称SABIC）70%的股份。但与其他石油巨头相比，它的负债水平仍然更低。关键的一点是，它的投资者享受着更丰厚的回报（见图表）。眼下大批公司都不得已选择削减股息，比如BP和壳牌分别削减了一半和三分之二，沙特阿美却仍在遵守今年给股东派发750亿美元股息的

承诺。

沙特阿美2620亿桶的原油储量和低生产成本也使得它能限制支出不危及未来产量，而不像美国的页岩油开采商那样，在投资者对页岩油兴趣减退后只能减少开采。大型国际公司也在削减资本支出。随着投资者对石油回报不再抱持幻想以及对气候变化的担忧日益加剧，BP和意大利公司巨头埃尼（Eni）计划在未来十年减少原油产量。如果这种情况持续下去，沙特阿美可能无需再打一场价格战就能赢得市场份额。

而在怀疑者看来，说沙特阿美比竞争对手更具韧性，就好像在夸牛奶馊了但还没结块——两种情形一样都叫人没有胃口。随着消费者习惯改变、电动汽车降价以及各国政府考虑出台新的气候法规，石油的前景仍不明朗。

短期内一个更大的担忧是沙特对沙特阿美的控制。这家公司现在有一些小股东，但他们仍然没有影响力。而最近几个月发生的事已经向世人展现了王室控股能复杂到何种地步。

沙特阿美的产量并不取决于市场力量，而是取决于沙特政府对轻重缓急的选择。4月价格战最激烈的时候，沙特阿美每天的石油产量达到1210万桶，这一惊人壮举帮助拉低了全球油价，同时也压低了沙特阿美的利润。研究公司盛博的尼尔·贝弗里奇（Neil Beveridge）表示，油价每下跌一美元，沙特阿美的现金流通常就会减少15亿美元。

随着沙特在5、6月间与俄罗斯等国为平衡原油市场而达成和解，沙特阿美又重新扮演起了“石油央行”行长的角色。这比在疫情期间发动价格战要好，但对沙特阿美来说，状况仍然棘手。沙特调整产量不仅是为支撑油价，也是要鼓励其他产油国跟进。

沙特阿美与沙特王国的利益也可能在其他方面产生分歧。例如，同样在利雅得上市的SABIC去年市值下滑，而沙特阿美并没有重新谈判在2019年达成的690亿美元的收购价格。沙特阿美的董事长亚西尔·鲁迈扬（Yasir Al-Rumayyan）同时也是沙特公共投资基金（Public Investment Fund）的负责人。该基金将自己持有的70%的SABIC股份出售给了沙特阿美，它肩负

着投资推动沙特经济多元化的任务。

沙特经济正承受巨大压力。去年，它需要油价超过每桶80美元才能平衡预算。自今年2月以来，国际基准油价布伦特原油价格一直没有超过每桶50美元。尽管削减了开支，沙特仍然面临巨大的赤字。

沙特阿美的所有股东全都觊觎同一样东西：股息。为了在上市前吸引投资者，沙特阿美曾表示，无论遭遇低油价还是什么天大的困难，五年内它都会优先给非国有股东分红。当时没有人真的认为它还真有要硬着头皮这么干的一天。如今它已经在举债来兑现自己750亿美元的派息承诺。正如贝弗里奇指出的，在当前的油价水平下，这种策略难以为继。那些优先派发的股息仍然需要经过董事会批准。沙特阿美迟早必须做出决定：是信守对小股东的承诺还是背信弃义？对一家上市公司来说，这将是一次不折不扣的诚信考验。■



Cheating in sport

Through the mousehole

A doping supremo-turned-snitch reflects on his country and career

AS A YOUNG man in the Brezhnev-era Soviet Union, Grigory Rodchenkov dreamed of becoming a champion long-distance runner. He wasn't good enough. Instead, after training as a chemist, he made it to the top of another discipline: doping. His engaging memoir tells the story of how, as head of what was in theory Russia's national anti-doping laboratory, he masterminded a huge, state-sponsored cheating operation, culminating in the biggest fraud in sporting history: the jaw-droppingly brazen sample-swapping shenanigans at the Winter Olympics of 2014 in the Russian city of Sochi, for which the host country was eventually fingered and banned from international competitions.

His book covers a lot of ground at speed: the history of drugs in sport; the half-hearted efforts of global authorities to crack down; the geopolitical rivalries driving cheating; the pettiness and vindictiveness of Russia bureaucracy; and the morality of doping. Despite his whistle-blowing, Mr Rodchenkov himself remains ambivalent about steroid use. Done judiciously, it can be less harmful than overtraining, he says.

Doping is in Russia's sporting blood. It seemed quite normal to Mr Rodchenkov to inject Retabolil, a Hungarian steroid, in his early 20s, his mother administering it in their cramped flat in Moscow. Elite athletes took copious quantities. One coach boasted of injecting more than 50 race-walkers a day. In 1984, the author says, the Soviet Union had an abortive plan to send a ship with a secret lab to the port of Los Angeles, to assist with doping for the Olympics (which the Soviets ultimately boycotted).

The "medals over morals" policy, as Mr Rodchenkov calls it, was stepped up

under Vladimir Putin, who saw Olympic success as a way to project power in the post-Soviet world. After the embarrassment of the Vancouver Winter Olympics of 2010, in which Russia won just three golds, and with Sochi next, officials were loth to leave anything to chance. Mr Rodchenkov and his team developed a highly effective cocktail of steroids, known as the Duchess, dissolved in Chivas Regal (or vermouth for those who liked it sweeter). During the games, Russian medal contenders' urine samples were passed through a "mousehole" in the wall of his Sochi lab at night, taken by FSB (security-service) agents who had worked out how to open supposedly tamper-proof bottles without leaving marks, replaced with clean pee and passed back. A spook posing as a plumber oversaw the scam.

Mr Rodchenkov was very good at his job. Across five winter and summer Olympic games, not one elite athlete under his guidance was caught during competitions. The trick, he says, was to offer the odd sacrificial lamb lower down the pecking order so as not to look suspicious. In one case, when a well-known biathlete's sample tested positive as inspectors from the World Anti-Doping Agency (WADA) looked on, he managed to switch the paperwork, leaving an unknown wrestler to take the fall.

Keeping one step ahead in the cat-and-mouse with WADA and global sports administrators was not hard; WADA was a "hot air machine", hobbled by indecision. Olympic officials talked tough on doping control but worried that scandals would scare off sponsors and audiences. In the end, this impotent anti-doping regime was forced to get much tougher after a series of revelations in the international media.

The author has since attained celebrity as a snitch, starring in an Oscar-winning documentary, "Icarus" (see picture), and having an American anti-doping law named after him. But his status has come at a cost. Granted political asylum in America, he lives in protective custody in an undisclosed location. When he leaves home, flanked by at least one

bodyguard, he sometimes wears a bulletproof vest. He has reason to worry, given Russia's vengeful attitude to "traitors". Two former doping officials who stayed in Russia died 11 days apart in mysterious circumstances.

His erstwhile paymasters have been forced to admit violations, but hardly appear chastened. Russia is appealing against a four-year Olympic ban. It continues to play games, submitting "a clumsily adulterated pack of lies" to WADA investigators, which, says Mr Rodchenkov, was "so artlessly counterfeited that it was almost as if they were begging to be caught". Paraphrasing George Orwell, he concludes that the Russian state is as conscious as ever of the truth, but as wedded as ever to lies. ■



体育作弊

鼠洞乾坤

一个曾主导兴奋剂大案的告密者反思他的国家和事业【《罗琴科夫事件》书评】

在勃列日涅夫时代的苏联，年轻的格里戈里·罗琴科夫（Grigory Rodchenkov）梦想成为一名长跑冠军。但他不够优秀。不过在经过化学专业的训练后，他在另一个项目上出人头地了：使用禁药。在他引人入胜的自传里，他讲述了自己担任俄罗斯所谓的国家反兴奋剂实验室的主管时，如何策划了一场由政府支持的大规模作弊行动，最终上演了体育史上最大的欺诈案：在2014年索契冬奥会上，东道国俄罗斯厚颜无耻地偷换样本、瞒天过海。这一令人瞠目结舌的诡计最终被告发，俄罗斯被禁止参加国际赛事。

他在书中节奏明快地讲述了诸多内容：体育运动中的用药史、国际机构在反兴奋剂方面不痛不痒、地缘政治竞争助长作弊、俄罗斯官僚机构的小心眼和报复心，还有使用兴奋剂的道德问题。尽管他最终成了揭发内幕的吹哨人，罗琴科夫本人对使用类固醇的态度仍然模棱两可。他说，如果使用得当，药物造成的危害可能还没有超负荷训练大。

俄罗斯体育的血液中流淌着兴奋剂。罗琴科夫20来岁时，他的母亲就在他们莫斯科狭小的公寓里给他注射一种匈牙利产的一类固醇癸酸诺龙（Retabolil），这一切对他来说似乎再正常不过。顶尖运动员更是大剂量地使用它们。一名教练曾洋洋自得地说自己一天里要给50多名竞走运动员注射药物。罗琴科夫说，1984年苏联曾计划派遣一艘配有秘密实验室的船只前往洛杉矶港，以协助本国队员在奥运会期间使用兴奋剂（最终苏联抵制了这届奥运会，该计划也就作罢）。

在奥运会上取得成功被普京视为在后苏联时代展示实力的方式，在他治下，罗琴科夫称之为“奖牌第一、道德第二”的政策变本加厉。在2010年温哥华冬奥会上，俄罗斯仅摘得三枚金牌，颜面尽失；到了之后一届的索契冬奥会，官员们可不愿听天由命。罗琴科夫和他的团队开发出了一种非常

有效的类固醇鸡尾酒，用芝华士威士忌冲调（喜欢甜一点的也可以用威末酒），取名“公爵夫人”。在奥运会期间，有望争夺奖牌的俄罗斯选手的尿样在夜里通过他的索契实验室墙上的“老鼠洞”传递，由俄罗斯联邦安全局（FSB）的特工带走，他们有办法不留痕迹地打开本应防篡改的尿样瓶，替换成干净的尿液，然后传送回原处。一名特工伪装成水管工，监督整个诡计。

罗琴科夫的工作十分出色。在他的指导下，整整五届冬季和夏季奥运会没有一名顶尖运动员在比赛中被检出用药。他说，诀窍在于偶尔祭出几个替罪羊，牺牲掉地位较低的选手来避免被怀疑。有一次，在世界反兴奋剂机构（WADA）检查员的眼皮底下，一个知名冬季两项选手的尿样检测呈阳性，罗琴科夫设法调换了文件，让一个名不见经传的摔跤选手出来顶罪。

在这场与WADA和世界体育管理机构的猫鼠游戏中，保持领先一步并不太难：WADA只会夸夸其谈，行动上优柔寡断。奥委会官员在兴奋剂问题上严厉表态，但又担心丑闻会吓跑赞助商和观众。在国际媒体一系列曝光之后，这个软弱无力的反兴奋剂制度终于被迫变得强硬了许多。

罗琴科夫后来以告密者的身份名声大噪，主演了一部奥斯卡获奖纪录片《伊卡洛斯》（Icarus，见图），美国还以他的名字命名了一部反兴奋剂法案。但他也为此付出了代价。在美国获得政治庇护后，他在一个秘密地点生活，处于保护性监禁的状态。出门时他身边至少有一名保镖，有时还会穿上防弹背心。鉴于俄罗斯对“叛国者”的报复心，他的担心不无道理。两名留在俄罗斯的前反兴奋剂官员在11天里先后离奇死亡。

他以前的雇主被迫承认违规，但并没有多少悔过自新的迹象。俄罗斯正在就四年奥运会禁赛期提起上诉。它还在继续耍花招，向WADA调查人员提交了“一大摞拙劣的谎言”。罗琴科夫说，这些谎言“就这么赤裸裸地捏造出来，好像生怕没人来拆穿”。他套用乔治·奥威尔的话总结道，俄罗斯政府一如既往地清楚真相，却一如既往地忠于谎言。■



The Chinese model

Xi's new economy

China's strongman leader is shaping a new form of state capitalism. Don't underestimate it

AMERICA'S CONFRONTATION with China is escalating dangerously. Earlier this month the White House has announced what may amount to an imminent ban on TikTok and WeChat (two Chinese apps), imposed sanctions on Hong Kong's leaders and sent a cabinet member to Taiwan. This ratcheting up of pressure partly reflects electioneering: being tough on China is a key strut of President Donald Trump's campaign. It is partly ideological, underscoring the urgency the administration's hawks attach to pushing back on all fronts against an increasingly assertive China. But it also reflects an assumption that has underpinned the Trump administration's attitude to China from the beginning of the trade war: that this approach will yield results, because China's steroidal state capitalism is weaker than it looks.

The logic is alluringly simple. Yes, China has delivered growth, but only by relying on an unsustainable formula of debt, subsidies, cronyism and intellectual-property theft. Press hard enough and its economy could buckle, forcing its leaders to make concessions and, eventually, to liberalise their state-led system. As the secretary of state, Mike Pompeo, puts it, "Freedom-loving nations of the world must induce China to change."

Simple, but wrong. China's economy was less harmed by the tariff war than expected. It has been far more resilient to the covid-19 pandemic—the IMF forecasts growth of 1% in 2020 compared with an 8% drop in America. Shenzhen is the world's best-performing big stockmarket this year, not New York. And China's leader, Xi Jinping, is reinventing state capitalism for the 2020s. Forget belching steel plants and quotas. Mr Xi's new economic

agenda is to make markets and innovation work better within tightly defined boundaries and subject to all-seeing Communist Party surveillance. It isn't Milton Friedman, but this ruthless mix of autocracy, technology and dynamism could propel growth for years.

Underestimating China's economy is hardly a new phenomenon. Since 1995 China's share of world GDP at market prices has risen from 2% to 16%, despite waves of Western scepticism. Silicon Valley chiefs dismissed Chinese tech firms as copycats; Wall Street short-sellers said ghost towns of empty apartments would bring a banking crash; statisticians worried that the GDP figures were fiddled and speculators warned that capital flight would cause a currency crisis. China has defied the sceptics because its state capitalism has adapted, changing shape. Twenty years ago, for example, the emphasis was on trade, but now exports account for only 17% of GDP. In the 2010s officials gave tech firms such as Alibaba and Tencent just enough space to grow into giants and, in Tencent's case, to create a messaging app, WeChat, that is also an instrument of party control.

Now the next phase of Chinese state capitalism is under way—call it Xinomics. Since he took power in 2012 Mr Xi's political goal has been to tighten the party's grip and crush dissent at home and abroad. His economic agenda is designed to increase order and resilience against threats. For good reason. Public and private debt has soared since 2008 to almost 300% of GDP. Business is bifurcated between stodgy state firms and a Wild West private sector that is innovative but faces predatory officials and murky rules. As protectionism spreads, Chinese firms risk being locked out of markets and denied access to Western technology.

Xinomics has three elements. First, tight control over the economic cycle and the debt machine. The days of supersized fiscal and lending binges are over. Banks have been forced to recognise off-balance-sheet activity and build up buffers. More lending is taking place through a cleaned-up bond

market. Unlike its reaction to the financial crisis of 2008-09, the government's response to covid-19 has been restrained, with a stimulus worth about 5% of GDP, less than half the size of America's.

The second strand is a more efficient administrative state, whose rules apply uniformly across the economy. Even as Mr Xi has used party-imposed law to sow fear in Hong Kong, he has constructed a commercial legal system in the mainland that is far more responsive to businesses. Bankruptcies and patent lawsuits, once rare, have risen fivefold since he took office in 2012. Red tape has been trimmed: it now takes nine days to set up a company. More predictable rules should allow markets to work more smoothly, boosting the economy's productivity.

The final element is to blur the boundary between state and private firms. State-run companies are being compelled to boost their financial returns and draw in private investors. Meanwhile the state is exerting strategic control over private firms, through party cells within them. A credit blacklisting system penalises firms that misbehave. Instead of indiscriminate industrial policy, such as the "Made in China 2025" campaign launched in 2015, Mr Xi is shifting to a sharp focus on supply-chain choke-points where China is either vulnerable to foreign coercion or where it can exert influence abroad. That means building up self-sufficiency in key technologies, including semiconductors and batteries.

Xinomics has performed well in the short term. The build-up of debt had slowed before covid-19 struck and the twin shocks of the trade war and the pandemic have not led to a financial crisis. State-run firms' productivity is creeping up and foreign investors are pouring cash into a new generation of Chinese tech firms. The real test, however, will come over time. China hopes that its new techno-centric form of central planning can sustain innovation, but history suggests that diffuse decision-making, open borders and free speech are the magic ingredients.

One thing is clear: the hope for confrontation followed by capitulation is misguided. America and its allies must prepare for a far longer contest between open societies and China's state capitalism. Containment won't work: unlike the Soviet Union, China's huge economy is sophisticated and integrated with the rest of the world. Instead the West needs to build up its diplomatic capacity and create new, stable rules that allow co-operation with China in some areas, such as fighting climate change and pandemics, and commerce to continue alongside stronger protections for human rights and national security. The strength of China's \$14trn state-capitalist economy cannot be wished away. Time to shed that illusion. ■



【首文】中国模式

习氏新经济

中国的强人领袖正在塑造一种新型国家资本主义。不要小看它

美国与中国的对抗正在危险升级。8月上旬，白宫宣布了可能等同于即将封禁TikTok和WeChat这两款中资应用的命令，又对香港政府官员实施制裁，还派出一位内阁官员访问台湾。如此连番加压一方面是为了竞选拉票：对中国强硬是特朗普竞选连任的一个关键支杆。另一方面也有意识形态的因素，突显了特朗普政府的鹰派人士迫切想要全线击退一个日益强硬的中国。但这也反映出自中美贸易战开打之日起特朗普政府对华态度背后的一种假设：中国这种打了激素般的国家资本主义外强中干，所以这种打压招数能奏效。

这种逻辑简洁得迷人。诚然，中国实现了增长，但靠的是一套不可持续的模式——债务、补贴、裙带关系和窃取知识产权。施以足够大的压力，其经济就可能垮塌，迫使其领导人让步，最终开放其由政府主导的体系。正如美国国务卿蓬佩奥所说：“世界上热爱自由的国家必须促使中国改变。”

很简洁，但错了。关税战对中国经济的损害不像预期般严重。而它在新冠疫情中的复原力却又强得多——国际货币基金组织（IMF）预测2020年中国经济将增长1%，而美国将下跌8%。今年全球表现最佳的大型股票市场是深圳，而非纽约。而且，中国国家主席习近平正面向未来十年重塑国家资本主义。忘掉冒着浓烟的钢铁厂和配额制度吧。习近平的新经济目标是要让市场和创新在严格界定的范围内更好地发挥作用，并接受中国共产党的全面监督。这不是米尔顿·弗里德曼那一套，但这种把专制、技术和活力坚决混合在一起的方式可能会在未来多年里推动中国经济增长。

低估中国经济不是什么新鲜事。尽管不断受到西方的质疑，但按市场价格计算，中国占世界GDP的比例已从1995年的2%上升到16%。硅谷的高管对中国的“山寨”科技公司很不屑；华尔街的卖空者称大量公寓空置的“鬼城”将引发银行业崩溃；统计人员担心中国的GDP数据造假；投机者警告资本

外逃会导致货币危机。中国的表现却出乎这些怀疑者所料，因为它的国家资本主义已经改变形态以适应现实。例如，20年前其重心是贸易，而现在出口仅占GDP的17%。过去十年里，政府给了阿里巴巴和腾讯等科技公司刚好足够大的空间成长为巨头，而以腾讯为例，它开发的消息应用微信也是党的一种管控工具。

如今，中国的国家资本主义已迈入下一阶段，不妨称之为“习经济”。自2012年上台以来，习近平的政治目标一直是加强党的控制，铲除国内外异议。其经济目标是提升秩序和抵御威胁的韧性。这有充分理由。自2008年以来，中国的政府和私人债务已飙升至GDP的近300%。其商业分为两支，一支是臃肿守旧的国有企业，另一支是狂野西部式的私营部门，后者善于创新，但要面对虎视眈眈的官员和模糊不清的规则。随着贸易保护主义的蔓延，中国公司面临被金融市场拒之门外和被西方技术断供的风险。

习经济有三个要素。首先，严格控制经济周期和债务机器。超大规模的财政支出和贷款狂潮的时代已经结束。银行被迫承认表外业务活动并增加缓冲。更多借贷正通过已整顿过的债券市场发生。与2008年至2009年金融危机时的反应不同，政府面对新冠疫情应对克制，推出的经济刺激方案仅为GDP的5%左右，不到美国水平的一半。

第二个要素是更高效的行政国，在整个经济中实施统一的规管。习近平通过共产党强制立法在香港立威之时，他也在中国大陆建立了一套商业法律制度，大幅提升了对企业的响应。破产和专利诉讼过去在中国很少见，但自他2012年上台以来已增长了四倍。繁琐的官僚程序被简化：现在注册成立一家公司只需要九天。更可预测的规则应该会让市场更平稳地运转，从而提高整个经济的生产率。

最后一个要素是模糊国有企业与私营企业的界限。国有企业被迫提高财务回报并吸引私人投资者。与此同时，政府通过在私营企业中设立党组织来对它们实施战略控制。失信黑名单系统会惩罚不守规矩的企业。相比2015年推出的“中国制造2025”这类笼统的产业政策，习近平现在转而精准聚焦于供应链上的咽喉点——那些中国易受外国胁迫或者反过来可在海外施加

影响的环节。这意味着要在半导体和电池等关键技术上实现自给自足。

短期来看，习经济表现不俗。疫情爆发前中国的债务增长已经放缓，而贸易战和疫情的双重冲击并未导致金融危机。国有企业的生产率正缓步提升，外国投资者纷纷向新一代中国科技公司大举投资。然而，真正的考验会逐渐到来。中国希望这种以技术为中心的新型中央计划模式能让创新持续，但从历史来看，分散决策、开放边界和言论自由是带来创新的神奇原料。

有一点是明确的：希望正面对抗能让中国缴械投降，那是打错了算盘。美国及其盟国要做好准备，开放社会与中国国家资本主义之争远非一时半日能分出胜负。围堵策略是行不通的：与苏联不同，中国规模庞大的经济很是复杂，且与世界其他地区融合在一起。相反，西方需要提升外交能力，创建稳定的新规则以便在某些领域与中国合作，例如对抗气候变化和流行病，并且能在加强保护人权和国家安全的同时继续开展商务往来。中国14万亿美元的国家资本主义经济的实力不是靠一厢情愿就会灰飞烟灭的。是时候丢掉这种幻想了。 ■



Sino-American commercial relations

Endgame

The Trump administration wants to drive the Chinese and American corporate worlds apart. How far can it go?

DURING HIS term in office, Donald Trump has often bashed China while occasionally praising its leader, Xi Jinping. Similar two-mindedness characterises his administration. China hawks, led by Robert Lighthizer, his trade representative, and Mike Pompeo, the secretary of state, have tussled for influence with more dovish figures such as Steven Mnuchin, the treasury secretary, who have tried to prevent a rupture between the two giants. Companies and investors from both countries have watched the contest closely.

In the past 18 months the hawks have been ascendant. Now, blaming China for spreading the covid-19 virus that has pushed America and the rest of the world into recession, thus helping to dent the president's chances of re-election in November, they have prevailed.

On August 6th Mr Trump issued two startling executive orders giving American firms 45 days to unwind all commercial relations with ByteDance, the Chinese owner of TikTok, a video-sharing app popular with youngsters, and with WeChat, a Chinese messaging and payments super-app widely used by Chinese around the world to communicate with those back home. The previous day Mr Pompeo unveiled a "Clean Network" policy to protect America's telecoms infrastructure and services against "aggressive intrusions by malign actors, such as the Chinese Communist Party". This would extend to other Chinese firms, including mobile providers, the sanctions with which America has tried to cripple Huawei, China's telecoms-equipment giant. In response to a harsh new security law in Hong Kong Mr Trump has stripped the Chinese territory of its special

status on immigration and trade. And a presidential working group has declared that in order to trade on an American stock exchange, Chinese companies must give American regulators unfettered access to their books.

All this marks an escalation in the economic war between the two countries. The fallout could be gargantuan. Deutsche Bank reckons that lost revenues in China, the expense of moving factories out of the country and compliance with the Chinese and American technospheres' diverging standards could cost global technology firms \$3.5trn over the next five years. A large chunk of that burden would fall on American firms. The question is, how bad can things get?

It is tempting to dismiss it all as pre-election theatre. Tom Wheeler, a former regulator and venture capitalist now at the Brookings Institution, a think-tank, calls Mr Trump's moves "showbiz in lieu of substance". Mr Wheeler has a point. But rhetoric can have real-world consequences. And in some ways Mr Trump is going beyond mere play-acting.

First, explains an American lawyer involved in federal trade and security cases, the International Emergency Economic Powers Act grants the president powers to protect America against an "unusual and extraordinary threat". These powers are largely undefined but extremely broad. Hardliners sense that a window of opportunity for action will close soon and so have decided, in the lawyer's words, to "advance their agenda before November".

Second, many of the Trump administration's anti-Chinese actions may be hard to unwind, even if president's challenger, Joe Biden, wins the White House for the Democrats in November. As facts on the ground have changed, Sino-American commercial relations have undergone fundamental change in the past two years, says Edward Tse of Gao Feng, a consultancy.

If the hardline efforts to wrench the two economies further apart succeed, Chinese firms will suffer. A mainland tech entrepreneur stranded in America by covid-19 says his American partners remain keen to do business, but his lawyers warn of two to three years of tension. The TikTok case is so arbitrary, he says, that “no foreign entity in America is fully safe.”

The flows of Chinese foreign direct investment (FDI) and venture capital into America have declined (see chart). The Committee on Foreign Investment in the United States, a federal body, has come under increasing pressure to scupper Chinese takeovers. A tougher audit regime for American-listed firms—which enjoys rare bipartisan support in Congress—would mean that about \$1trn in Chinese companies’ market capitalisation “will have to start thinking about a new home”, says Arthur Kroeber of GaveKal, an advisory firm.

The Chinese would not be the only victims. American firms have robust and growing businesses in China, where they generate about 5% of global sales. Despite trade tensions American FDI in China actually rose in 2019. Before the pandemic Nike’s Chinese sales of sporting goods had grown by double digits for 22 straight quarters. GM sells more cars in China than in America. Tesla may make between 25% and 40% of its electric cars in China next year, reckons Bernstein, a research firm.

Mr Kroeber estimates American firms have over \$700bn in assets in China and book about \$500bn a year in domestic sales there. A new survey of members by the US-China Business Council, which represents big American firms, reveals that more now consider China a top strategic priority (16%) and top-five priority (83%) than did in 2019. Few plan to decamp from China.

America Inc, in other words, has a lot on the line. James McGregor of APCO, a consulting firm, says that Americans risk forsaking a market to European,

South Korean or Japanese rivals. Wall Street could get squeezed by the push to delist Chinese firms. So far this year American banks raked in \$414m in fees helping Chinese firms with initial public offerings and follow-on share sales, up by nearly a quarter from a year ago.

The biggest victim of decoupling would be America's tech giants, many of which rely heavily on Chinese demand, as well as on Chinese suppliers. China represents over a quarter of global sales in sectors ranging from electronic components to internet software to semiconductors (see chart). Qualcomm, a chip giant, earns about two-thirds of its worldwide revenues in China and is lobbying furiously to soften sanctions against Huawei, a big client. Greater China (which includes Taiwan) makes up around 15% of Apple's global revenues. If Mr Trump's executive order forces American firms to halt all dealings with WeChat's parent, Tencent, then Apple will be forced to block Weixin, WeChat's local version. If that happens, Chinese smartphone users would choose Weixin over iPhones. Ming-Chi Kuo, a seasoned Apple-watcher, warns that a harsh ban could lead to a global decline in iPhone sales of as much as 25-30%.

The new troubles reported by one executive at a big American chemicals firm may be a straw in the wind. China has been a great market for his company, he says, and the government at the national and provincial level remains solicitous and supportive. But local rivals have started making appeals to his Chinese clients. "Why would you buy products from an American firm at this time?" they ask. Why indeed. ■



中美商业关系

终局之战

特朗普政府想让中美企业界脱钩。会走到何种地步？

特朗普在任内经常抨击中国，但偶尔又会赞扬中国领导人习近平。他的政府也表现出类似的两面性。以贸易代表罗伯特·莱特希泽（Robert Lighthizer）和国务卿蓬佩奥为首的对华鹰派一直在与财政部长史蒂文·姆努钦（Steven Mnuchin）等更偏鸽派的官员争夺影响力。姆努钦试图避免两个大国关系破裂。中美企业和投资者都密切关注这场争斗。

过去18个月里，鹰派势力渐盛。现在，靠着指责中国传播新冠病毒导致美国和世界其他地区陷入衰退，进而削弱了特朗普在11月获得连任的机会，鹰派已占得上风。

特朗普于8月6日签署了两项令人吃惊的行政令，要求美国公司在45天内解除与中国公司字节跳动和微信海外版WeChat的一切商业关系。字节跳动拥有深受年轻人欢迎的视频分享应用TikTok，而WeChat是全球华人广泛用来和国内亲友联络的一款消息和支付超级应用。就在前一天，蓬佩奥宣布了“清洁网络”政策，要保护美国的电信基础设施和服务免受“中国共产党之类的恶意行为者的侵扰”。这一政策将把此前试图重创中国电信设备巨头华为的制裁手段扩展到其他中国公司，包括移动供应商。香港实施严厉的国安法后，特朗普做出反应，取消了这块中国领土在移民和贸易方面的特殊地位。同时，一个总统工作小组宣布，在美国证券交易所上市交易的中国公司必须允许美国监管机构不受限制地查阅其账目。

这一切都标志着两国经济战的升级。其负面影响可能是巨大的。德意志银行估计，未来五年，由于在中国的收入损失、将工厂迁出中国的费用，以及遵守中美日益相异的技术标准，全球科技公司可能要付出高达3.5万亿美元的代价。其中很大一部分将由美国公司承担。问题是，情况会变得多糟？

人们很容易认为这一切不过是大选前的作秀。曾是监管官员、风险投资家，现就职于智库布鲁金斯学会（Brookings Institution）的汤姆·惠勒（Tom Wheeler）称特朗普的举动是“有名无实的表演”。他说得有些道理。但虚张声势也可能产生实际后果。而在某些方面，特朗普已经不仅仅是在演戏。

首先，一名参与了联邦贸易和安全案件的美国律师解释道，《国际紧急经济权力法》（International Emergency Economic Powers Act）赋予了总统保护美国免受“特殊和超常威胁”的权力。这些权力在很大程度上没有明确定义，但范围极广。强硬派意识到行动的机会窗口稍纵即逝，因此决定“抢在11月之前推进他们的计划”，这位律师说。

其次，即使总统的挑战者拜登在11月代表民主党赢得白宫宝座，特朗普政府的许多反华措施也可能难以解除。高风咨询公司的谢祖墀表示，现实状况已经改变，中美商业关系在过去两年已发生根本性的变化。

如果强硬派成功令两个经济体进一步脱钩，中国企业将遭受损失。一位因疫情被困在美国的中国大陆科技企业企业家表示，他的美国合作伙伴仍然渴望合作，但他的律师警告说未来两三年的局势都会比较紧张。他说，TikTok事件实在太过专断，让人感觉“在美国没有什么外国实体是真的安全。”

中国对美国的直接投资和风险投资均已下降（见图表）。联邦机构美国外国投资委员会受到越来越大的压力去阻止中资收购。对在美国上市的公司实行更严格的审计制度——这一提案在国会罕见地得到了两党的一致支持——意味着约一万亿美元的中国公司市值“将不得不开始考虑到别处安家”，咨询公司佳富龙洲（GaveKal）的葛艺豪（Arthur Kroeber）说。

中国人不会是唯一的受害方。美国公司在中国的业务经营稳健、不断增长，约占其全球销售额的5%。两国贸易关系紧张之时，2019年美国对华直接投资实际上仍有增加。在疫情之前，耐克在中国的体育商品销售已连续22个季度保持两位数增长。通用汽车在中国卖出的车比在美国更多。研究公司盛博估计，明年特斯拉可能有25%到40%的电动汽车将在中国生

产。

葛艺豪估计，美国公司的在华资产超过7000亿美元，每年在中国的销售收入约为5000亿美元。代表美国大公司的美中贸易全国委员会（US-China Business Council）对成员的最新调查显示，与2019年相比，更多企业现在将中国视为首要战略重点（16%）和前五重点之一（83%）。几乎没有企业打算撤离中国。

换言之，美国企业有重大利益风险。咨询公司安可（APCO）的麦健陆（James McGregor）表示，美国有可能将中国市场拱手让给欧洲、韩国或日本的竞争对手。华尔街可能会因为受到压力要让中国公司退市而致使利润受挤压。今年迄今为止，美国各大银行协助中国公司上市和增发的佣金收入达4.14亿美元，同比增长近四分之一。

脱钩的最大受害者将是美国的科技巨头，它们中有许多不仅高度依赖中国的供应商，也严重依赖中国的需求。从电子元件、互联网软件到半导体，中国在许多行业的全球销售额中占比都超过四分之一（见图表）。芯片巨头高通全球营收的三分之二来自中国，它正在大力游说放松对其大客户华为的制裁。苹果的大中华区（包括台湾市场）约占其全球营收的15%。如果特朗普的行政令迫使美国公司中止与WeChat的母公司腾讯做任何交易，那么苹果将被迫下架中国大陆版微信。在这种情况下，中国智能手机用户将会选择微信而放弃iPhone。资深苹果分析师郭明錤警告说，严苛的禁令可能会导致iPhone的全球销量下跌25%至30%之多。

美国一家大型化工企业的高管碰到的新麻烦或许是一种征兆。他说，中国一直是他公司的重要市场，而且中央和省级政府仍然关心和支持公司。但本土竞争对手已经开始劝导他的中国客户。“这个时候你们怎么还从美国公司采购呢？”他们问。是啊，为什么呢？ ■



Artificial intelligence

Bit-lit

A new language-generating AI can be eerily human-like—for better and for worse

The SEC said, “Musk,/your tweets are a blight./They really could cost you your job,/if you don’t stop/all this tweeting at night.”/...Then Musk cried, “Why?/The tweets I wrote are not mean,/I don’t use all-caps/and I’m sure that my tweets are clean.”/“But your tweets can move markets/and that’s why we’re sore./You may be a genius/and a billionaire,/but that doesn’t give you the right to be a bore!”

THE PRECEDING lines—describing Tesla and SpaceX founder Elon Musk’s run-ins with the Securities and Exchange Commission, an American financial regulator—are not the product of some aspiring 21st-century Dr Seuss. They come from a poem written by a computer running a piece of software called Generative Pre-Trained Transformer 3. GPT-3, as it is more commonly known, was developed by OpenAI, an artificial-intelligence (AI) laboratory based in San Francisco, and which Mr Musk helped found. It represents the latest advance in one of the most studied areas of AI: giving computers the ability to generate sophisticated, human-like text.

The software is built on the idea of a “language model”. This aims to represent a language statistically, mapping the probability with which words follow other words—for instance, how often “red” is followed by “rose”. The same sort of analysis can be performed on sentences, or even entire paragraphs. Such a model can then be given a prompt—“a poem about red roses in the style of Sylvia Plath”, say—and it will dig through its set of statistical relationships to come up with some text that matches the description.

Actually building such a language model, though, is a big job. This is where

AI—or machine learning, a particular subfield of AI—comes in. By trawling through enormous volumes of written text, and learning by trial and error from millions of attempts at text prediction, a computer can crunch through the laborious task of mapping out those statistical relationships.

The more text to which an algorithm can be exposed, and the more complex you can make the algorithm, the better it performs. And what sets GPT-3 apart is its unprecedented scale. The model that underpins GPT-3 boasts 175bn parameters, each of which can be individually tweaked—an order of magnitude larger than any of its predecessors. It was trained on the biggest set of text ever amassed, a mixture of books, Wikipedia and Common Crawl, a set of billions of pages of text scraped from every corner of the internet.

| *Statistically speaking*

The results can be impressive. In mid-July OpenAI gave an early version of the software to selected individuals, to allow them to explore what it could do. Arram Sabeti, an artist, demonstrated GPT-3's ability to write short stories, including a hard-boiled detective story starring Harry Potter (“Harry Potter, in ratty tweed suit, unpreserved shirt and unshined shoes, sits behind the desk looking haggard, rumpled and embittered...”), comedy sketches, and even poetry (including the poem with which this article opens, titled “Elon Musk by Dr Seuss”). Elliot Turner, an AI researcher and entrepreneur, demonstrated how the model could be used to translate rude messages into politer ones, something that might be useful in many of the more bad-tempered corners of the internet. Human readers struggled to distinguish between news articles written by the machine and those written by people (see chart).

Given that OpenAI wants eventually to sell GPT-3, these results are promising. But the program is not perfect. Sometimes it seems to regurgitate snippets of memorised text rather than generating fresh text

from scratch. More fundamentally, statistical word-matching is not a substitute for a coherent understanding of the world. GPT-3 often generates grammatically correct text that is nonetheless unmoored from reality, claiming, for instance, that “it takes two rainbows to jump from Hawaii to 17”. “It doesn’t have any internal model of the world—or any world—and so it can’t do reasoning that requires such a model,” says Melanie Mitchell, a computer scientist at the Santa Fe Institute.

Getting the model to answer questions is a good way to dispel the smoke and mirrors and lay bare its lack of understanding. Michael Nielsen, a researcher with a background in both AI and quantum computing, posted a conversation with GPT-3 in which the program confidently asserted the answer to an important open question to do with the potential power of quantum computers. When Dr Nielsen pressed it to explain its apparent breakthrough, things got worse. With no real understanding of what it was being asked to do, GPT-3 retreated into generic evasiveness, repeating four times the stock phrase “I’m sorry, but I don’t have time to explain the underlying reason why not.”

There are also things that GPT-3 has learned from the internet that OpenAI must wish it had not. Prompts such as “black”, “Jew”, “woman” and “gay” often generate racism, anti-Semitism, misogyny and homophobia. That, too, is down to GPT-3’s statistical approach, and its fundamental lack of understanding. Having been trained partly on text scraped from the internet, it has noted that words like “woman” are often associated with misogynistic writing, and will mindlessly reproduce that correlation when asked.

This problem is a hot topic in AI research. Facial-recognition systems, for instance, notoriously do better with white faces than black ones, since white faces are more common in their training sets. AI researchers are trying to tackle the problem. Last year IBM released a set of training images

that contained a more diverse mix of faces. OpenAI itself was founded to examine ways to mitigate the risk posed by AI systems, which makes GPT-3's lapses all the more noteworthy. GPT-2, its predecessor, was released in 2019 with a filter that tried to disguise the problem of regurgitated bigotry by limiting the model's ability to talk about sensitive subjects.

Here, at least, little progress seems to have been made. GPT-3 was released without a filter, though it seemed just as ready to reproduce unpleasant prejudices as its predecessor (OpenAI added a filter to the newer model after that fact became obvious). It is unclear exactly how much quality control OpenAI applied to GPT-3's training data, but the huge quantity of text involved would have made any attempt daunting.

It will only get harder in future. Language has overtaken vision as the branch of AI with the biggest appetite for data and computing power, and the returns to scale show no signs of slowing. GPT-3 may well be dethroned by an even more monstrously complex and data-hungry model before long. As the real Dr Seuss once said: "The more that you read, the more things you will know." That lesson, it seems, applies to machines as well as toddlers. ■



人工智能

比特文学

一款新的语言生成AI诡异地说着“人话”——不论好坏

SEC说：“马斯克，/你的推文是个灾祸。/它们真的会害你丢了工作，/如果你不收手/大半夜的还在发帖。”/.....马斯克嚷嚷：“为什么？/我的帖子又没使坏，/我也没通篇用大写字母/我确信我的帖子很清白。”/“但你的帖子会让市场波动/而这让我们头痛。/你可能是个天才/还是个亿万富翁，/但你也不能就这么烦人！”

上述文字描述了特斯拉和SpaceX的创始人马斯克与美国金融监管机构SEC（证券交易委员会）之间的口舌之争。它并非出自哪个21世纪新人“苏斯博士”（Dr Seuss）之手，而是一台运行GPT-3（第三代生成式预训练模型）软件的计算机所作的诗中的一段。GPT-3由位于旧金山的人工智能（AI）实验室OpenAI开发，马斯克是该实验室的创始人之一。它代表了在AI最深入探索的领域之一中实现的最新进展。这个领域是赋予计算机能力，生成复杂精妙、近似人类书写的文字。

这个软件的基础理念是“语言模型”。这种模型使用统计学方法来组织语言，方法是找出各个单词与其他单词衔接的概率——例如“红色”后面出现“玫瑰”的频率。还可以对句子甚至整个段落做同样的分析。然后就可以给这样的模型一个关键词——比如“一首西尔维娅·普拉斯（Sylvia Plath）风格的关于红玫瑰的诗”——它就会在自己的统计关系数据集当中深入挖掘，输出一些符合描述的文字。

要真正构建这样一个语言模型却是一项浩大的工程。这时AI就派上用场了，具体来说AI一个专门的子域——机器学习。计算机梳理海量的书面文字，并在成百上千万次文本预测中通过试错来学习，最终能够完成这项艰巨的任务，绘制出文字间的统计关系。

向一个算法输入的文字资料越多，将算法设计得越复杂，它的表现就越

好。而GPT-3的独特之处在于空前的规模。GPT-3的底层模型号称有1750亿个参数，每个参数都可以单独微调——比以往任何这类模型都高出一个数量级。用来训练它的文本集也是来自有史以来最庞大的，包括书籍、维基百科，以及从互联网各个角落搜罗数十亿页文字的数据集Common Crawl。

| 从统计上来说

结果可能会令人吃惊。7月中旬，OpenAI将GPT-3的一个早期版本拿给一些人，让他们探索它的功能。艺术家阿拉姆·萨贝提（Arram Sabeti）证实了GPT-3能写短篇故事，包括一篇以哈利·波特为主角的硬汉派侦探故事（“哈利·波特穿着邈邈的斜纹软呢西装、没熨烫过的衬衫和没擦过的皮鞋坐在桌前，看上去憔悴凌乱，愤愤不平……”），还有喜剧小品，甚至诗歌（包括本文开头名为《伊隆·马斯克——苏斯博士著》的那首）。AI研究员、企业家埃利奥特·特纳（Elliot Turner）展示了如何用该模型把粗鲁的语言转换为比较礼貌的表达，或许能在网上许多戾气较重的场所派上用场。人类读者已经难以把这个机器撰写的新闻与人写的区分开来（见图表）。

鉴于OpenAI希望最终能在市场上出售GPT-3，这样的结果预示着可观的前景。但这个程序并不完美。有时候，它似乎只是搬出一些它背下来的语句片段，而不是生成全新的文字。更根本的问题是，基于统计的词语搭配并不等同于对这个世界的连贯认知。GPT-3经常生成一些语法正确但脱离现实的文本，比如它声称“从夏威夷跳到17需要两道彩虹”。圣塔菲研究所（Santa Fe Institute）的计算机科学家梅勒妮·米歇尔（Melanie Mitchell）指出：“它没有关于这个世界——或者任何世界——的任何内部模型，因此无法进行需要这种模型支持的推理。”

要揭开它欺骗性的表象，暴露其缺乏理解力的本质，让模型回答问题是个好办法。兼有AI和量子计算背景的研究人员迈克尔·尼尔森（Michael Nielsen）发布了一段与GPT-3的对话。他向程序提出了一个关于量子计算机潜力的重要的开放性问题，GPT-3自信满满地给出了断言。它的回答貌似有突破性，但尼尔森进一步追问要求它解释时，情况就不妙了。GPT-3

并不真正理解要它做什么，只好泛泛而谈，闪烁其词，把它一句现成的套话重复了四次：“对不起，我没时间解释为何不是如此的根本原因。”

GPT-3还从网上学到了一些OpenAI一定避犹不及的东西。对于“黑人”、“犹太人”、“女人”和“同性恋”这样的提示词，它往往会生成种族主义、反犹、厌女和恐同的文字。其根源同样是GPT-3的统计学方法，以及从根本上缺乏理解力。由于它一部分训练素材来自网上搜集到的文字，它注意到“女人”这种词语经常与厌女性质的文字联系在一起，于是在被问及时就会没头没脑地复制这种关联。

这是AI研究中的一个热点问题。例如，众所周知，人脸识别系统更擅长识别白人而不是黑人的面孔，这是因为它们的训练集中白人面孔更常见。AI研究人员正试图解决这个问题。去年，IBM发布了一组训练图像，其中包含了更加多样化的人脸数据。OpenAI成立的初衷就是要研究如何降低AI系统带来的风险，这就使得GPT-3的失误更加显眼。它的前身GPT-2在2019年发布时带有过滤器，限制该模型谈论敏感话题，以求掩盖它会照搬偏见言论的问题。

至少在这个方面，新程序看来几乎没有进步。GPT-3在发布时不带过滤器，但它似乎和上一代程序一样，随时可能复现令人不快的偏见文字（当这一点明显暴露出来之后，OpenAI给新模型也加上了过滤器）。目前还不清楚OpenAI对GPT-3的训练数据做了多少品质控制，但考虑到涉及的文本数量惊人，这做起来绝非易事。

在未来，这只会越来越难。在AI领域，语言已经超过视觉成为对数据和算力需求最大的分支，而且按规模获得回报的趋势还没有减缓的迹象。很可能用不了多久GPT-3就会被一个复杂度和对数据的需求都更加惊人的模型取代。真正的苏斯博士曾经说过：“你读的越多，懂得就越多。”这句箴言看来不仅适用于小孩，也适用于机器。■



The airline-industrial complex

Terminal conditions

A sudden collapse in air travel will reshape a trillion-dollar industry

LIKE MOST international jamborees these days the Farnborough air show wrapped up on July 24th as a virtual event. Webinars featuring grim-faced executives were not as entertaining as noisy acrobatic displays by fighter jets. But commercial aviation's most important showcase at least marked a point when heads began to turn away from the devastation wrought by covid-19 and towards what comes next.

As airlines sell fewer tickets, owing to pandemic travel restrictions or travellers' fear of infection, the industry that makes flying possible faces a reckoning. Aircraft-makers will make fewer passenger jets and so need fewer parts from their suppliers. Ticket-sellers will see less custom and airport operators, lower footfall. Many firms have cut output and laid off thousands of workers. The question now is how far they will fall, how quickly they can recover, and what will be the long-lasting effects.

The airline-industrial complex is vast. Last year 4.5bn passengers buckled up for take-off. Over 100,000 commercial flights a day filled the skies. These journeys supported 10m jobs directly, according to the Air Transport Action Group, a trade body: 6m at airports, including staff of shops and cafés, luggage handlers, cooks of in-flight meals and the like; 2.7m airline workers; and 1.2m people in planemaking. In 2019 they helped generate revenues of \$170bn for the world's airports and \$838bn for airlines. Airbus and Boeing, the duopoly atop the aircraft supply chain, had sales of \$100bn between them. For the aerospace industry as a whole they were perhaps \$600bn. Add travel firms like Booking Holdings, Expedia and Trip.com, and you get annual revenues of some \$1.3trn in normal times for listed firms alone, supporting roughly as much in market capitalisation before

covid-19—and rising.

| *Taxiing times*

Instead, the coronavirus has lopped \$460bn from this market value (see chart 1). Airline bosses are reassessing trends in passenger numbers, which had been expected to double in the next 15 years, just as they had with metronomic regularity since 1988, despite blips after the 9/11 terrorist attacks of 2001 and the financial crisis of 2007-09. Rather than increase by 4% this year, air-transport revenues will fall by 50%, to \$419bn. After ten years of unusual profitability the \$100bn of total losses forecast for the next two years is equal to half the nominal net profits the industry raked in since the second world war, calculates Aviation Strategy, a consultancy. Luis Felipe de Oliveira, director-general of ACI World, which represents the world's airports, gloomily predicts that revenues there will fall by 57% in 2020.

Despite signs of life, particularly on domestic routes in large markets like America, Europe and China, the outlook remains uncertain. The wide-body jets used for long-haul flights stand idle. Carriers that rely on business passengers and hub airports are struggling. Although some American airlines expect a return to near-full operation next year, a second wave of covid-19 could dash these hopes. A small outbreak in Beijing in June set back the recovery in Chinese domestic flights. As one senior aerospace executive says, "It's hardest to talk about the next 12 months."

According to Cirium, another consultancy, around 35% of the global fleet of around 25,000 aircraft is still parked—less than the two-thirds at the height of the crisis in April but still terrible. Even if traffic recovers to 80% of last year's levels in 2021, as some optimists expect, plenty of aeroplanes will remain on the ground. Citigroup, a bank, forecasts excess capacity of 4,000 aircraft in 18 months' time.

Aircraft-makers, which had been preparing to crank up production, are forced to do the opposite. Airbus, with a backlog of more than 6,100 orders for its A320 jets, was rumoured to be raising output from 60 of the popular narrow-bodies a month to 70. Instead it is making 40. Its long-haul planes have suffered similar declines. Boeing's situation is made worse by the protracted grounding in 2019 of its 737 MAX, a rival to the A320, in the wake of two fatal crashes. It has kept making the aircraft and hopes to have it recertified for flight later this year. The American firm will slowly increase production to 31 a month by the start of 2022. But like Airbus, it too has announced cuts to wide-body production.

This will open a big gap between what the pair, along with Embraer and Bombardier, makers of smaller regional jets, hoped to sell and what they actually will (see chart 2). According to consultants at Oliver Wyman, by 2030 the global fleet will be 12% smaller than if growth had continued unabated. That amounts to 4,700 fewer planes, which could translate to \$300bn or so in forgone revenue for Boeing and Airbus, according to a rough calculation by *The Economist*.

With so many aircraft sitting idle and balance-sheets in tatters, airlines are getting rid of planes. Even low fuel prices will not save older, thirstier models. Four-engine wide-bodies are all but finished. On July 17th British Airways (BA) said it would retire all 31 of its Boeing 747 jumbo jets. IBA, an aviation-research firm, expects 800 planes around the world to be retired early.

Not all orders will dry up. Airlines, as well as leasing firms, which now own close to half the global fleet, are contractually obliged to take aircraft on order. Many buyers will have made pre-delivery payments of up to 40% of the price. Airbus and Boeing are, to varying degrees, pushing customers to take deliveries. Most negotiations have centred on deferring deliveries. EasyJet, a British low-cost carrier, has pushed back delivery of 24 Airbuses

by five years. At Boeing, delays related to the problems of the 737 MAX allow airlines to ask for refunds. More assertively, Airbus's boss, Guillaume Faury, does not rule out suing customers who renege on their orders.

A stock of "white tails", as unsold planes are known in industry vernacular, may be the price to pay for protecting a supply chain that had been investing heavily for ever-higher production rates. Airbus will make 630 planes this year but deliver only 500, Citigroup reckons. It has the balance-sheet to carry inventory, thinks Sandy Morris of Jefferies, another bank. The new rate will preserve jobs and industrial efficiency, and make an eventual ramp-up easier.

Even this artificially high production will struggle to sustain the planemakers' supply chain, however. This comprises manufacturers of engines (like Rolls-Royce and GE), producers of fuselages and other parts (such as Spirit AeroSystems), specialised materials firms (Hexcel and Woodward) and companies that produce avionics and electrical systems (including Honeywell and Safran). And that is not counting their myriad smaller suppliers; Boeing's MAX supply chain stretches to around 600 firms. Many had invested heavily before the crisis, expecting strong demand. Defence contracts, which firms from Airbus and Boeing down are involved in and which covid-19 has not really affected, provide only partial respite. On July 29th Boeing said it had delivered just 20 planes in the second quarter, down from 90 a year ago, and that commercial-aircraft revenues had dropped by 65%, to \$1.6bn. The next day Airbus and Safran also disclosed sharp falls in revenue.

The engine-makers provide a case in point. Besides lower demand for their kit—Rolls-Royce was gearing up to supply 500 units a year to Airbus but will now probably make 250—they face a collapsing aftermarket for spares and fewer overhauls, points out David Stewart of Oliver Wyman. Airlines with in-house maintenance divisions can scavenge parts or whole engines

from grounded planes. Rolls-Royce, whose engines power two-fifths of all long-haul jets, has suspended dividends, said it would cut 9,000 jobs and taken a £2bn (\$2.6bn) loan. It may have to ask investors for another £2bn. GE's second-quarter revenues from its aviation business fell by 44%, year on year, dragging down the conglomerate's overall results.

At the other end of the air-travel industry are airports. About 60% of their revenues comes from charges on airlines and passengers, and the rest from things like retail and parking. All are taking a hit. Airport shops and restaurants in America will lose \$3.4bn between now and the end of 2021, forecasts the Airport Restaurant & Retail Association. As Mr de Oliveira of ACI World notes, two in three airports were losing money before the crisis; now all are. Some smaller ones may close if subsidies to support tourism from regional and national governments start to dwindle. Outside America commercial operators have not been treated by governments as generously as airlines have.

In July Standard & Poor's again downgraded the debt of four European airports, including Amsterdam's Schiphol and Zurich, and placed London Gatwick and Rome on watch, questioning their ability to raise charges while airlines continue to bleed cash. The rating agency estimates a cut of €10bn (\$11.8bn) in planned capital spending by European airports in 2020-23, which may crimp efforts to install contactless technology that could help reassure travellers that terminals are safe to re-enter.

As dark as the skies have grown for the air-travel complex, there are some opportunities. Airlines are restructuring. Europe's big legacy carriers, under pressure from low-cost rivals, are slashing costs. BA has suspended 30,000 workers and wants to rehire them on less generous terms. Bankruptcies and cutbacks will leave gaps in the market, aircraft are cheap, once-scarce pilots are plentiful, and airports will have spare slots, if they are allowed to redistribute them.

Strong challenger carriers have a chance to gain market share. Wizz Air, a Hungarian low-cost carrier, hopes to add capacity by March; its main markets in central and eastern Europe have been hurt less by the pandemic than those elsewhere, its customers are generally young and less worried about getting on a plane, and two-thirds of demand is related to visiting family and friends, which seems more resilient to covid-19 than business travel is.

Some carriers may radically rethink their financial structures, which could help leasing grow even faster. Domhnal Slattery, boss of Avolon, a big lessor, thinks that heavy debts airlines incur to survive the pandemic may convince many of them that they need not own aircraft but should instead concentrate on sales and marketing, just as hotel chains have turned their backs on owning property.

The industry is also rethinking its environmental footprint. Bolder airlines with stronger balance-sheets may use the crisis to renew their fleets, making them greener. They have bargaining power: everything is negotiable, including deferrals, prepayments and price.

| *Rolling with the punches*

Warren East, boss of Rolls-Royce, suspects that the “pre-covid call for sustainability will come back stronger than ever”. Airbus is still committed to the journey to zero-emissions flying, Mr Faury says; he sees it as an opportunity. Boeing would have to respond to stay competitive. European governments in particular regard it as a priority. France’s €15bn aid package for its aerospace sector includes a €1.5bn research-and-development fund to help Airbus launch a zero-emissions short-haul passenger jet by 2035 (probably powered by either biofuels or hydrogen). Mr Faury accepts that there is less money to invest. But also, he says, “more need”. The crisis has led to greater collaboration with suppliers that could make innovation “faster, leaner and cheaper” (though that has meant laying off 15,000

workers).

China, desperate to become a power in commercial aerospace, may see the disruption as a way to speed up entry into the global market, says Robert Spingarn of Credit Suisse, a bank. He speculates that Brazil's Embraer, whose merger with Boeing fell apart in April, might collaborate with China's COMAC to build a plane capable of competing against Airbus and Boeing. The Brazilians could supply the industrial knowhow and the Chinese the industrial might.

To the masked passengers on half-empty planes, boarded from ghost-town airports of shuttered shops, it may seem that the experience of flying will never be the same again. Yet aviation has bounced back before. It is likely to do so again—and may change for the better in the process. ■



航空运输与航空工业复合体

绝境复飞

航空旅行业的突然崩溃将重塑一个万亿美元的行业

和眼下大多数国际活动一样，于7月24日落幕的范堡罗（Farnborough）航空展是一场虚拟聚会。一帮神色凝重的高管在网上开研讨会，这可不及战斗机呼啸着表演特技飞行有趣。但是，商业航空产业这一最重要的展会至少标志着人们开始从新冠疫情造成的巨大破坏中扭过头去，把目光投向未来。

由于疫情限制出行或旅客担心感染，航空公司卖出的机票少了，这个实现人类飞行梦想的行业如今面临一次清算。飞机制造商将减产客机，需要供应商提供的零部件也相应减少了。机票销售商将更少人光顾，机场运营商也会看到客流量减少。许多公司已经降低了产出，裁减了成千上万名员工。现在的问题是谷底在哪里、多快能恢复，以及会有什么长期影响。

航空运输加之航空工业的总体规模庞大。去年，全球共45亿人次乘飞机出行。每天有超过十万架次的商业航班升空。行业机构航空运输行动组织（Air Transport Action Group）的数据显示，这些旅程直接提供了1000万个工作岗位，其中600万个在机场，包括商店和咖啡店的员工、行李搬运工、飞机餐厨师等；270万个在航空公司；120万个在飞机制造企业。2019年，它们分别为全球的机场和航空公司创造了1700亿美元和8380亿美元的收入。空客和波音在飞机供应链中享有双头垄断地位，两家公司的销售额合计1000亿美元。整个航空工业的销售额可能达6000亿美元。再加上缤客（Booking Holdings）、亿客行（Expedia）和Trip.com等旅行公司，在疫情爆发前的正常情况下，仅上市公司的年收入就达到约1.3万亿美元，支撑着差不多同样规模的市值，而且还在不断增长。

| 滑行时间

然而，新冠病毒把这一市值砍掉了4600亿美元（见图表1）。航空公司的老板们正在重新评估旅客人数的变化趋势，之前的预计是未来15年旅客人

数将翻番，保持自1988年以来的非常稳定的增长态势，尽管在2001年911恐怖袭击和2007至2009年金融危机后旅客人数曾短暂下降。今年的航空运输收入将不会像去年预期的那样增长4%，反而会下降50%，跌至4190亿美元。根据咨询公司航空战略（Aviation Strategy）的计算，在连续十年取得不寻常盈利之后，预计未来两年将录得1000亿美元的总亏损，相当于该行业自二战以来获得的名义净利润的一半。代表全球机场的国际机场协会（ACI World）总干事路易斯·费利佩·德奥利维拉（Luis Felipe de Oliveira）悲观地预测，2020年机场的收入将下降57%。

尽管有一些复苏的迹象，尤其是在美国、欧洲和中国等大型市场的国内航线上，但前景仍然不确定。用于长途飞行的宽体客机处于闲置状态。依赖商务旅客的航空公司和枢纽机场正在苦苦挣扎。尽管一些美国航空公司预计明年会恢复到接近全负荷运营的状态，但第二波疫情可能会让这些希望破灭。6月北京的一次小规模复发阻碍了中国国内航班的恢复。正如一位航空业高管所说：“接下来的12个月最难预料。”

据另一家咨询公司Cirium称，全球约2.5万架飞机中目前约有35%仍然停飞，虽然相比4月危机最严重时高达三分之二的比例已有下降，但仍然很糟糕。即使客流量如一些乐观派所预计的那样在2021年恢复到去年水平的80%，仍将有许多飞机无法起飞。花旗银行预测，未来18个月内将有4000架飞机无客可载。

一直在准备提高产量的飞机制造商现在被迫掉头。空客大受欢迎的窄体飞机A320积压了6100多架的订单，之前传言它把产量从每月60架提高到了70架，但实际上它现在月产40架。它的长途飞机的产量也同样下滑。在两次致命的坠机事故后，波音公司的737 MAX（A320的竞争机型）在2019年长时间停飞，这让波音的现状更加棘手。它一直都在生产这款飞机，希望在今年早些时候获得复飞许可。这家美国公司将缓慢提高产量，到2022年初恢复到每月31架。但和空客一样，它也已宣布减产宽体飞机。

这将令这两家公司以及小型支线飞机制造商巴西航空工业公司（Embraer）和庞巴迪公司（Bombardier）的预期销量与实际销量之间产

生巨大差距（见图表2）。奥纬咨询公司（Oliver Wyman）的顾问称，到2030年，全球飞机总数将比原本持续增长的情况下的数量少12%。据本刊粗略估算，这相当于减少了4700架飞机，可能会让波音和空客公司损失约3000亿美元的收入。

这么多飞机停飞，资产负债表也一片惨淡，航空公司正在缩减飞机数量。即使较低的燃油价格也救不了那些更耗油的旧机型。四引擎宽体飞机几乎全体下岗。7月17日，英国航空公司（BA）表示准备让自己的31架波音747巨无霸客机全部退役。航空研究公司IBA预计全球将有800架飞机提前退役。

并非所有订单都会“流产”。根据合同规定，航空公司和租赁公司（目前拥有全球近一半的飞机）必须接收已订购的飞机。许多买家会在交付前支付最高达售价40%的预付款。空客和波音都在以不同的力度催促客户收货。大多数谈判都围绕延迟交付展开。英国廉价航空公司易捷（EasyJet）已将24架空客飞机的交付推迟了五年。在波音，与737 MAX的问题相关的延误允许航空公司索要退款。空客的老板纪尧姆·傅里（Guillaume Faury）态度更明确坚决，不排除可能把拒绝收货的客户告上法庭。

业内行话叫“白尾飞机”的未售出飞机可能是为保护供应链而付出的代价，这条供应链一直在为不断提高生产速度而大量投资。花旗银行估计，空客今年将生产630架飞机，但仅会交付500架。另一家银行杰富瑞

（Jefferies）的桑迪·莫里斯（Sandy Morris）认为，空客的资产负债表承担得起库存。新的生产速度将能保留工作岗位，保持产业效率，也会让最终的增产扩容更加容易。

但是，即使这种人为的高产也将难以支撑飞机制造商的供应链。组成这条供应链的包括发动机制造商（如罗尔斯·罗伊斯和GE）、机身和其他零部件生产商（如Spirit AeroSystems）、专用材料公司（赫氏[Hexcel]和伍德沃德[Woodward]），以及生产航空电子和电气系统的公司（包括霍尼韦尔[Honeywell]和赛峰[Safran]）。这还不包括为数众多的规模更小的供应商：波音MAX的供应链涉及大约600家公司。许多公司在疫情之前预期需

求走强而大笔投资。从空客和波音到更小的供应商都有份参与的国防合同并未真正受到疫情影响，但也只能让它们略微喘口气。波音在7月29日表示第二季度仅交付了20架飞机，一年前为90架；商用飞机的收入下滑了65%，降至16亿美元。次日，空客和赛峰也公布收入急剧下滑。

发动机制造商的境遇很说明问题。罗尔斯·罗伊斯原计划每年向空客供应500台发动机，但现在可能会减少到250台。奥纬咨询公司的戴维·斯图尔特（David Stewart）指出，除了对发动机的需求下滑之外，发动机制造商还面临零部件售后市场崩盘和全面检修次数减少。有内部维护部门的航空公司可以从停飞的飞机上拆下零部件或整台发动机。五分之二长途飞机上都装有罗尔斯·罗伊斯的发动机。这家公司已暂停派发股息，并表示将裁员9000人，已贷款20亿英镑（26亿美元）。它可能不得不请求投资者再投入20亿英镑。GE的航空业务第二季度收入同比下滑了44%，拖累了集团的整体业绩。

航空行业的另一端是机场。它们约60%的收入来自对航空公司和乘客的收费，其余来自零售和停车等。这些收入来源都在经受冲击。机场餐厅和零售协会（Airport Restaurant & Retail Association）预测，从现在起到2021年底，美国的机场商店和餐厅将亏损34亿美元。国际机场协会的德奥利维拉指出，疫情之前有三分之二的机场在亏损，现在是全体在亏损。如果地方和国家政府支持旅游业的补贴开始减少，一些较小的机场可能会关门歇业。在美国以外的地方，政府对商业经营者没有对航空公司那样慷慨。

标准普尔7月再次下调了对包括阿姆斯特丹史基浦机场（Schiphol）和苏黎世机场在内的四个欧洲机场的债务评级，并将伦敦盖特威克机场（Gatwick）和罗马机场列入观察名单，质疑它们是否能在航空公司持续亏损的情况下提高收费。标准普尔估计，欧洲机场在2020至2023年间的计划资本支出将削减100亿欧元（118亿美元），这可能会阻碍部署无接触式设施，而这些设施原本有助于消除旅客的疑虑，让他们放心地重新走进航站楼。

尽管航空旅行产业复合体头顶的天空越来越阴沉，但仍有一些机遇。航空公司正在重组。因廉价航空公司而受压的欧洲老牌航空巨头正在大幅削减成本。英航已让三万名员工停职，并希望日后以下调的待遇重新雇用他们。破产和缩减规模将在市场上留下缺口，眼下飞机价格便宜，曾经稀缺的飞行员供应充足。另外，如果允许机场重新分配起降时段，它们将获得空余的时段。

那些强大的市场挑战者有机会获得市场份额。匈牙利的廉价航空公司Wizz Air希望在明年3月前增加运力。它的主要市场在中东欧，受疫情的冲击小于其他地方；它的客户主体是年轻人，对乘机出行的担心也更少，而且三分之二的的需求是走亲访友，这类出行在疫情中的复原力似乎强过商务旅行。

一些航空公司可能会从根本上重新考虑自己的财务结构，从而进一步加速租赁业务增长。大型飞机租赁公司Avolon的老板多姆纳尔·斯莱特利（Domhnal Slattery）认为，航空公司为在疫情中生存下来而欠下沉重债务，这可能会促使其中许多公司认定自己不需要拥有飞机，而应转而专注在营销上，这和连锁酒店不再自己持有物业是一样的道理。

航空旅行行业也在反思调整自己的环境足迹。资产负债表更稳健也更大胆的航空公司可能会利用此次危机来更新机队，让飞机变得更环保。它们拥有议价能力：现在一切都好商量，包括延期交付、预付款和价格。

| 因势利导

罗尔斯·罗伊斯的老板沃伦·伊斯特（Warren East）猜想，“在疫情前就已开始的对可持续发展的呼吁将比以往任何时候都更强烈”。傅里说空客依然决心实现零排放飞行，他认为这是一个机会。波音将不得不做出回应以保持竞争力。欧洲各国政府尤其重视零排放飞行。法国向航空航天业提供的150亿欧元援助计划中包括一项15亿欧元的研发基金，用于帮助空客在2035年之前推出零排放短途客机（可能由生物燃料或氢驱动）。傅里承认可供投资的资金减少了。但他也说，“需求增多了”。这场危机令飞机制造商与供应商的合作更加紧密，可以让创新“更快、更精简、更便宜”（尽

管这意味着要裁员1.5万人）。

迫切希望成为商业航空制造大国的中国或许将这场破坏视为加快进入全球市场的机会，瑞信（Credit Suisse）的罗伯特·斯宾加恩（Robert Spingarn）表示。他推测，巴西航空工业公司与波音的合并将在4月告吹后，它可能会与中国商飞合作，制造一款能与空客和波音竞争的飞机。巴西人可以提供工业技术，中国人提供制造实力。

在商店紧闭、空荡荡如鬼城般的机场，戴着口罩的乘客登上只坐了一半人的飞机。在他们看来，飞行的体验似乎永远地改变了。然而，航空业过去也曾从危机中反弹。它很可能还会再次反弹，而且也许会在这个过程中变得更好。■



Universities

The absent student

Covid-19 will be painful for universities, but it will also bring long-needed change

IN THE NORMAL run of things, late summer sees airports in the emerging world fill with nervous 18-year-olds, jetting off to begin a new life in the rich world's universities. The annual trek of more than 5m students is a triumph of globalisation. Students see the world; universities get a fresh batch of high-paying customers. Yet with flights grounded and borders closed, this migration is about to become the pandemic's latest victim.

For students, covid-19 is making life difficult. Many must choose between inconveniently timed seminars streamed into their parents' living rooms and inconveniently deferring their studies until life is more normal. For universities, it is disastrous. They will not only lose huge chunks of revenue from foreign students but, because campus life spreads infection, they will have to transform the way they operate.

Yet the disaster may have an upside. For many years government subsidies and booming demand have allowed universities to resist changes that could benefit both students and society. They may not be able to do so for much longer.

Higher education has been thriving. Since 1995, as the notion spread from the rich world to the emerging one that a degree from a good institution was essential, the number of young people enrolling in higher education rose from 16% of the relevant age group to 38%. The results have been visible on swanky campuses throughout the Anglosphere, whose better universities have been the principal beneficiaries of the emerging world's aspirations.

Yet troubles are piling up. China has been a source of high-paying foreign students for Western universities, but relations between the West and China are souring. Students with ties to the army are to be banned from America.

Governments have been turning against universities, too. In an age when politics divides along educational lines, universities struggle to persuade some politicians of their merit. President Donald Trump attacks them for “Radical Left Indoctrination, not Education”. Some 59% of Republican voters have a negative view of colleges; just 18% of Democrats do. In Britain universities’ noisy opposition to Brexit has not helped. Given that the state pays for between a quarter and a half of tertiary education in America, Australia and Britain, through student loans and grants, the government’s enthusiasm matters.

Scepticism among politicians is not born only of spite. Governments invest in higher education to boost productivity by increasing human capital. But even as universities have boomed, productivity growth in the rich-country economies has fallen. Many politicians suspect that universities are not teaching the right subjects, and are producing more graduates than labour markets need. Small wonder that the state is beginning to pull back. In America government spending on universities has been flat in recent years; in Australia, even as the price of humanities degrees doubles, so it will fall for subjects the government deems good for growth.

There are questions about the benefits to students, too. The graduate premium is healthy enough, on average, for a degree to be financially worthwhile, but not for everybody. In Britain the Institute for Fiscal Studies (IFS) has calculated that a fifth of graduates would be better off if they had never gone to university. In America four in ten students still do not graduate six years after starting their degree—and, for those who do, the wage premium is shrinking. Across the world as a whole, student

enrolment continues to grow, but in America it declined by 8% in 2010-18.

Then came covid-19. Although recessions tend to boost demand for higher education, as poor job prospects spur people to seek qualifications, revenues may nevertheless fall. Government rules will combine with student nerves to keep numbers down. Last month the Trump administration said new foreign students would not be allowed to enter the country if their classes had moved online. Sydney, Melbourne, UNSW and Monash, four of Australia's leading universities, rely on foreign students for a third of their income. The IFS expects losses at English universities to amount to over a quarter of one year's revenues.

The damage from covid-19 means that, in the short term at least, universities will be more dependent on governments than ever. The IFS reckons that 13 universities in Britain risk going bust. Governments ought to help colleges, but should favour institutions that provide good teaching and research or benefit their community. Those that satisfy none of those criteria should be allowed to go to the wall.

Those that survive must learn from the pandemic. Until now most of them, especially the ones at the top of the market, have resisted putting undergraduate courses online. That is not because remote teaching is necessarily bad—a third of graduate students were studying fully online last year—but because a three- or four-year degree on campus was universities' and students' idea of what an undergraduate education should look like. Demand for the services of universities was so intense that they had no need to change.

Now change is being forced upon them. The College Crisis Initiative at Davidson College says that less than a quarter of American universities are likely to teach mostly or wholly in person next term. If that persists, it will reduce the demand. Many students buy the university experience not just

to boost their earning capacity, but also to get away from their parents, make friends and find partners. But it should also cut costs, by giving students the option of living at home while studying.

| *Back to the mortarboard*

Covid-19 is catalysing innovation, too. The Big Ten Academic Alliance, a group of midwestern universities is offering many of its 600,000 students the opportunity to take online courses at other universities in the group. There is huge scope for using digital technology to improve education. Poor in-person lectures could be replaced by online ones from the best in the world, freeing up time for the small-group teaching which students value most.

Universities are rightly proud of their centuries-old traditions, but their ancient pedigrees have too often been used as an excuse for resisting change. If covid-19 shakes them out of their complacency, some good may yet come from this disaster. ■



【首文】大学

缺勤的学生

新冠肺炎会让大学头痛不已，但也会带来拖延已久的变革

正常情况下，每年到了夏末，新兴国家的机场里就挤满了神情紧张的18岁年轻人，他们即将飞往富裕国家的大学校园，开始新生活。这场每年有500多万名学生参与的远行是全球化的一项重大成就。学生们见了世面；大学收获了新一批支付高额学费的客户。但是，如今航班停飞，边境关闭，这场大迁移即将成为新冠疫情最新的受害者。

新冠肺炎让学生们日子不好过。许多人必须做出选择：要么克服时差带来的不便，在父母家的客厅里参加线上课程；要么承受学业推迟带来的麻烦，直到生活变得相对正常。对大学来说，新冠肺炎是一场灾难。它们不仅会失去来自留学生的巨额收入，而且因为校园生活容易扩散传染病，它们还将不得不改变自己的运行方式。

不过，这场灾难可能也有其积极的一面。多年来，有赖于政府补贴和需求激增，大学一直抵触变化，而有些变化原本可能于学生和社会都有益。它们可能没法固执太久了。

高等教育一直在蓬勃发展。自1995年以来，随着“好学校的文凭非常重要”这一观念从富裕国家传到新兴国家，上大学的年轻人占适龄人口的比例从16%上升到了38%。其结果很容易从英语国家众多时髦豪华的校园里看出来，而这些国家的名牌大学也成了新兴国家民众对教育的抱负的主要受益者。

但问题不断累积。中国一直是给西方大学带去高昂学费的留学生来源国，但如今中西方关系正在恶化。美国将禁止与军方有关联的学生入境。

政府也走到了大学的对立面。在当今这样一个政见因教育背景不同而分化的时代，大学很难让一些政客相信它们的价值所在。特朗普抨击大学“灌

输激进的左翼思想，而不是从事教育”。大约59%的共和党选民对大学持负面态度，而在民主党选民中这一比例只有18%。在英国，大学吵吵嚷嚷反对脱欧，也不利于它们自身的处境。在美国、澳大利亚和英国，政府通过学生贷款和助学金支付了25%到50%的高等教育费用，因此政府重视与否至关重要。

政客们的疑虑不仅仅源于怨憎。政府投资高等教育，是要通过提升人力资本来提高生产率。但在富裕国家，一面是大学的蓬勃发展，一面却是生产率增长放缓。许多政客怀疑大学没有在传授正确的内容，培养出的毕业生数量又超出了劳动力市场的需求。难怪政府开始打退堂鼓。美国政府对大学的投入近年一直没有增长；在澳大利亚，人文学科的学费翻了一番，而那些政府认为有助于提高生产率的学科的学费还是会下降。

上大学的好处也受到质疑。平均而言大学毕业生的薪资有足够多的溢价，让他们的文凭物有所值，但并非人人如此。英国财政研究所（以下简称IFS）估计，有五分之一毕业生如果没去上大学，经济状况反倒会更好。在美国，四成大学生在入学六年后仍然没有毕业；而那些毕业了的学生薪资溢价也在缩水。全球来看，大学入学人数持续增长。但在美国，2010年至2018年这一数字下降了8%。

然后疫情来了。尽管经济衰退往往会推动对高等教育的需求，因为惨淡的就业前景会刺激人们追逐学历，但大学的收入仍可能下降。学生的不安加上政府的各种规定会拉低入学人数。特朗普政府在7月表示，如果新入学的留学生改成上网课，将不被准许进入美国。澳大利亚的四所顶尖大学——悉尼大学、墨尔本大学、新南威尔士大学和莫纳什大学——收入的三分之一来自留学生。IFS预计，英国大学将损失全年四分之一以上的收入。

疫情造成的损害意味着，至少在短期内，大学将比以往任何时候都更依赖政府。IFS估计，英国有13所大学有破产风险。政府有责任帮助大学，但应该优先考虑那些教学和研究水平高或者让所在社区受益的院校。至于那些一条标准都不符合的大学，应该任由它们破产。

幸存下来的大学必须从疫情中吸取教训。直到现在，大多数大学，尤其是那些处于教育市场顶层的大学，都拒绝将本科课程放到网上。这并不是因为远程教学必定不好——去年有三分之一的研究生完全在网上上课——而是因为之前大学和学生都认为，本科教育就是应该在校园里学习三到四年。之前人们对高等教育的需求非常强烈，大学不需要做出改变。

而如今，大学正被倒逼着实施变革。戴维森学院（Davidson College）的“大学危机倡议”（College Crisis Initiative）指出，下学期，能全部或大部分进行当面授课的美国大学很可能不到四分之一。如果这种情况持续下去，上大学的需求就会减少。许多学生花钱上大学不单单是为了提高自己的挣钱能力，还为摆脱父母、结交朋友和寻找伴侣。但如果学生可以选择居家上大学，也应该能降低成本。

| 愿大学重抖擞

疫情也在催生创新。由美国中西部大学组成的“十大学术联盟”（Big Ten Academic Alliance）为其60万学生中的许多人提供了在该联盟中其他大学上网课的机会。利用数字技术提高教育质量还大有可为。质量不佳的当面授课可能被世界顶尖的在线课程取代，从而为学生们最看重的小班教学腾出时间。

大学理应为自己悠久的传统自豪，但它们的古老传承也常常被用做拒绝变化的挡箭牌。如果新冠肺炎逼得它们无法再安于现状，这场灾难仍可能带来一些好处。■



The Economist film

How reliable are climate models?

There is one element that is impossible to model, and it is the biggest contributor to climate change: human activity.



经济学人视频

气候模型可靠吗？

有一个因素难以被模型归纳，也是导致气候变化的重要原因：这就是人类活动。



Schumpeter

A GE whodunnit

The downfall of America's industrial giant is a cautionary tale for all big firms

ONE OF THE most intriguing questions in business is what happened to GE, a company once so dear in America that its near-collapse in 2018 beggared belief. It still limps on, but the suspects behind a destruction of \$500bn in value over little more than 20 years are so many that the mystery feels like a whodunnit.

Does blame start with the late Jack Welch, boss from 1981 to 2001, who created the myth that GE could walk on water? Does it belong to Jeff Immelt, his successor for 16 years, who continued to peddle that illusion even as the waters rose treacherously around his—and the company's—neck? Should it be shared by his short-lived successor, John Flannery? Or Larry Culp, the current boss, who has so far been unable to turn back the tide? And do the supposed guardians of corporate America—the boards, regulators, analysts, investors and CNBC talk-show hosts, none of whom can (along with Schumpeter) resist the temptation to anthropomorphise business success and failure—also bear responsibility?

Two *Wall Street Journal* reporters, Thomas Gryta and Ted Mann, have written a book, “Lights Out”, that seeks to find out what went awry. It twists and turns through almost 40 years of GE's modern history in a way that is at times as bewildering as the conglomerate itself. But the thread that runs through consistently enough to prevent motion sickness comes from a phrase Mr Flannery used shortly before taking over from Mr Immelt in 2017: “No more success theatre.” For decades GE managers had an over-exalted sense of their own abilities, which led to narcissism, hubris and the bending, if not breaking, of accounting rules to hit their profit targets. This eclipsed any strategic vision they may have had.

Welch set the tone. His tenure coincided with the dismantling of other conglomerates, such as AT&T. But he convinced investors that GE was the exception to the too-big-to-manage rule thanks to the brilliance of its executives. By slashing jobs, shutting laggard divisions and overseeing about 1,000 acquisitions, worth \$130bn, over 20 years, he rejuvenated the company—and the reputation of American capitalism. Yet, as the book shows, his main contribution was building up GE Capital, the finance arm. It could borrow cheaply because of its AAA credit rating derived from GE's industrial strength. Its success ensured that GE shares traded at a high price relative to earnings, helping Welch use stock to pay for takeovers. And it helped smooth group-wide earnings in opaque ways, which may have made it easier to hit Welch's exacting profit targets.

GE Capital eventually came to drag the company down. Within months of Mr Immelt's taking over in 2001, the scandal surrounding Enron, an energy giant, drew scrutiny of earnings-enhancing accounting tricks, forcing GE to show it was playing by the book. Mr Immelt failed to tame it in time for the financial crisis of 2007-09, which became a near-death experience for GE. For years afterwards, the perception of riskiness weighed on its share price, encouraging Mr Immelt to move away from financial services in order to reinvigorate the industrial heart of the company: jet engines, power turbines and health care. Yet after he launched the sale of much of GE Capital in 2015, the relief was short-lived. A disastrous \$10bn acquisition of the power and grid businesses of Alstom, a French competitor, the same year would become Mr Immelt's biggest mistake. Problems in GE's power business have dogged the company since. They contributed to the huge cash crunch that culminated in Mr Flannery's dethronement in October 2018, a mere 14 months after he became boss.

The book puts most of the blame for GE's woes on Mr Immelt, a salesman who appeared to treat it more as a company to sell to investors than a maker of products to sell to the world. He used Botox-like gimmicks,

produced by his biker-jacket-clad marketing sidekick, Beth Comstock, to persuade markets that GE was no hoary industrialist but a digital innovator. But he came up with little that was fresh or exciting. He wasted money on dinosaur industries like oil and gas. He gave away cash via share buy-backs. And he betrayed hints of pharaonic delusion: when he travelled on business, his retinue reportedly sometimes included not one but two company jets.

Still, blaming one man, or even several men, for the collapse of an empire as closely watched as GE is a bit glib. It is, using Tolstoy's conceit in "War and Peace", like attributing the fall of Moscow only to Napoleon and Alexander. Bigger factors were at play.

Start with size. Almost every boss wants to run a bigger company. Investors often applaud size for its own sake. But the more complicated a business becomes, the greater the information gap between managers and markets. That makes it easier to disguise what is really going on. Next is America's cult of the chairman-chief executive. When both roles are held by one man (they are mostly men), underlings and boards find it harder to challenge big decisions, even when potentially ruinous.

A third common problem is stockmarket mythmaking. Ms Comstock's approach to digging GE out of a hole was to, as she put it, "pick a simple story...and tell it again, and again". Analysts, business editors, even the occasional columnist, fall for this far too often. In GE's case, this included articles with titles likening the company to a whizzy startup. Better to have kept a closer eye on its old-economy power division, the company's real Achilles heel.

| *Mr Immelt, with the turbine blade, in the private jet*

Ultimately, firms are never fully in charge of their own destinies. The internet, the rise of China, the financial crisis and greener energy all played

a role in GE's downfall. Second-quarter results on July 29th revealed that covid-19 has halted Mr Culp's rescue mission, hurting GE's most profitable industrial businesses, especially aviation. As businesses age, events will inevitably wear them down. To forestall that, companies have few better options than to perfect what they are good at and embrace the simple life—even if this makes for less suspense. ■



熊彼特

谁杀死了GE

美国工业巨头的衰落为所有大企业撰写了一则警世故事

商界最耐人寻味的问题之一是通用电气（GE）到底发生了什么。这家公司在美国曾经如此受爱戴，让人难以相信它在2018年一度濒临倒闭。如今它仍在艰难维持。但是，究竟是谁害得这家公司在仅仅20年出头的时间里就蒸发掉了5000亿美元的市值？嫌疑人之多，使得这个谜团俨然成了一部猜测凶手的悬疑片。

是否先要向已故的杰克·韦尔奇（Jack Welch）追责？他在1981至2001年间担任老板，创造了GE“水上飘”的神话。或者应归咎于他的继任者杰夫·伊梅尔特（Jeff Immelt）？他执掌GE16年，期间继续兜售这种幻觉，尽管水已经极其危险地漫到了他和公司的脖子了。他那任期短暂的继任者约翰·弗兰纳里（John Flannery）是否也该一起背锅？现任老板拉里·卡尔普（Larry Culp）是不是也有份？目前为止他仍未能力挽狂澜。另外，美国企业界所谓的守护者——董事会、监管者、分析师、投资者和全国广播公司商业频道（CNBC）的脱口秀主持人——是否也得担责？他们当中没有一个人（本专栏作者也一样）能抵挡将商业成败人格化的诱惑。

《华尔街日报》的两位记者托马斯·格里塔（Thomas Gryta）和特德·曼恩（Ted Mann）合著的《熄灯》（Lights Out）一书试图找出哪里出了错。这本书迂回曲折地穿行于GE近40年的现代历史之中，有时读来简直和这家企业集团本身一样令人困惑。但一条主线令全书足够连贯，让读者不至于晕车。它来自弗兰纳里在2017年接替伊梅尔特的前不久说过的一句话：“不会再自导自演‘成功大戏’了。”几十年来，GE的管理者自视过高，导致自恋、傲慢，以及为达到利润目标不惜扭曲甚至破坏会计准则。就算他们真有什么战略眼光，也因为这样的行径黯然失色。

定下基调的是韦尔奇。在他任职期间，美国电话电报公司（AT&T）等其他企业集团纷纷解体。但他说服投资者相信，GE的管理层才华过人，所以

公司是“大到没法管理”这条规律的例外。20年间，他裁员，关闭拖后腿的部门，并主导了约1000笔收购，价值总计1300亿美元，从而重振了公司——以及美国资本主义的声誉。然而正如这本书所示，他的主要贡献是建立了金融部门通用电气资本（GE Capital）。它能以低利率借款，因为它借助GE的工业实力获得了AAA信用评级。它的成功确保了GE的高市盈率，从而帮助韦尔奇用股票支付收购。这也有助于用不透明的方式平滑整个集团的收益，可能令实现韦尔奇艰巨的利润目标变得容易了些。

GE Capital最终拖累了整个公司。2001年伊梅尔特接手后的几个月内，围绕能源巨头安然的丑闻令美化收益的会计伎俩受到审视，迫使GE表明自己都是照章行事。伊梅尔特没能在2007年至2009年的金融危机爆发前及时控制住局面，结果令GE经历了一次濒死体验。多年后，对风险的感知令GE的股价承压，促使伊梅尔特放弃金融服务业务，以重振公司的工业心脏：喷气发动机、动力涡轮和医疗保健。2015年他开始出售GE Capital的大部分股份，但只短暂地缓解了局面。同年，GE以100亿美元收购法国竞争对手阿尔斯通（Alstom）的电力和电网业务，这起灾难性的交易日后将成为伊梅尔特最大的失误。自那以后，GE电力业务的问题一直困扰着公司。这些问题造成了巨大的现金短缺，最终导致弗兰纳里在2018年10月被免职，在位仅14个月。

这本书把GE的不幸主要归咎于伊梅尔特。这个“推销员”似乎更多地将GE视作一家需要被推销给投资者的公司，而不是向全世界销售各种产品的制造商。他使出了给老黄瓜刷绿漆的把戏——这是他那位爱穿机车皮夹克的营销助手贝丝·康斯托克（Beth Comstock）想出来的——好让市场相信GE不是老朽的实业家，而是个数字创新者。但他没有得出什么新鲜或令人兴奋的东西。他把钱浪费在了石油和天然气等“恐龙产业”上，并通过股票回购来往外撒钱。他还暴露出帝王般的作风：据传他出差时，随从人员之多，有时要用到两架而不是一架公司专机。

即便如此，对于GE这样一个万众瞩目的帝国，将其坍塌怪罪到一个或者几个人头上，还是有点肤浅。借用托尔斯泰在《战争与和平》中表达的观点，这就像把莫斯科的陷落仅仅归咎于拿破仑和沙皇亚历山大。实际上还

有更大的因素在起作用。

先说规模。几乎每个老板都想经营一家更大的公司。投资者也常赞许规模本身。但企业变得越复杂，管理者和市场之间的信息鸿沟就越大。这使得掩盖真实状况变得更加容易。还有一个因素是美国对“董事长兼CEO”们的崇拜。当这两个角色由同一人担任（大多是男性）时，下属和董事会就更难质疑公司的重大决策，即使这些决策有可能造成毁灭性后果。

第三个常见问题是股市造神。用康斯托克的话来说，她把GE从困境中捞出来的方法就是“挑一个简单的故事……一遍接一遍地讲。”分析师、商业编辑，甚至偶尔还有专栏作家，都太常对这样的故事信以为真。在围绕GE的神话编造中，有些文章的标题将它比作一家掌握先进技术的创业公司。他们本应更密切地关注GE真正的软肋所在——电力这个传统经济部门。

| 伊梅尔特和涡轮叶片一道，在私人飞机上

说到底，企业从来都不能完全掌控自己的命运。互联网、中国崛起、金融危机和更清洁的能源都是GE衰败的原因。7月29日公布的第二季度业绩显示，新冠肺炎令卡尔普的救援行动陷于停顿，损害了GE最有利可图的工业业务，尤其是航空业务。随着企业年龄增长，它们将不可避免地被各种事件日渐损耗。要防范这一点，除了完善自身所长和拥抱简单生活，企业并没有什么更好的选择——即使这会让故事不再有那么多的悬念。■



Vaccine economics

A bigger dose

The world is not spending anywhere near enough on a coronavirus vaccine

CONSIDER THE following thought experiment. If you fail to eat a pizza within an hour, you will die from hunger. What do you do? Most people would immediately order a pizza—and not just one Margherita, but lots of them, from several different parlours. In order to maximise the chances that at least one pizzeria got you what you needed in time, you would not care that some of the pizza would be sure to go to waste.

The world is hungry for a vaccine against covid-19. So far about 700,000 deaths have been recorded from the disease, and the total is increasing at a rate of roughly 40,000 a week. If you also include unrecorded deaths, the actual numbers are much higher. Meanwhile, the global economy is experiencing its sharpest contraction since the Great Depression, of perhaps 8% of GDP in the first half of 2020.

In the face of this catastrophe, scientists look likely to produce a vaccine much faster than almost anyone could have predicted at the start of the pandemic. Yet global efforts to manufacture and distribute vaccines do not measure up. A mere \$10bn or so has been devoted to the cause—the equivalent of ordering one pizza, rather than the several that are needed.

The figures are murky, but on a rough estimate the world has bought about 4bn doses of covid-19 vaccines for delivery by the end of next year, which is in theory enough to give half the planet one dose. In practice, however, far fewer people will secure protection from the disease. Some of the vaccines in production will fail to get regulatory approval, and a potential candidate that reaches a large-scale clinical trial—as several have—still has a 20% chance of failure. Others will be approved but may not provide full

protection. They may not be suited to the elderly, for instance, or they may stop people dying from covid-19 but not from passing it to others. Other vaccines will require more than one dose in order to be effective. Because of these contingencies, even those countries, such as Britain and America, that have bought more than two doses for each of their citizens have still not bought enough.

Instead of seeing unproven vaccines as an extravagance, the world needs to think of them as an insurance policy. Research suggests that if ten or more vaccines are in development, there is a 90% chance of finding one which works. Once one of these candidates proves to be effective, billions of doses will need to be distributed quickly. But it is impossible to know in advance which candidate will succeed. Governments should therefore help pharmaceutical firms produce vast quantities of a range of different vaccines—ideally, numbering tens of billions of doses in all—long before regulatory approval is or is not granted. The winning vaccine could thus start to get to people quickly, even as doses of failed vaccines might be thrown away unused.

That may seem deliberately and needlessly lavish. Yet even boosting vaccine funding tenfold to \$100bn or more, in line with the most ambitious proposals, pales in comparison with the \$7trn which governments across the world have spent or pledged since the pandemic began in order to preserve incomes and jobs. The real extravagance would be to wait until a successful vaccine candidate emerges before rushing to boost production. In terms of the economic output that is saved, to say nothing of lives, it would make sense for the world to spend as much as \$200bn on bringing forward an effective covid-19 vaccine by just one week.

For some, the prospect of such a heavy investment raises fears of “vaccine nationalism”, in which rich countries outspend poor ones in an attempt to corner the market for their citizens. The world as a whole can wring the

most benefit out of limited supplies of vaccine by pooling resources and allocating doses on the basis of need—health-care workers first, vulnerable people next, and so forth. Around 80 countries are interested in such a deal. Unfortunately, however, politicians in some countries with manufacturing capacity are likely to put their own people first. One way to minimise the international scramble over who gets vaccines and when is to maximise supplies up front and to spread manufacturing capacity. Vaccines for the poorest countries would need to be subsidised, perhaps through GAVI, the alliance that already pays for other vaccines there.

The idea of deliberately overproducing something does not sit easily with politicians, especially in a world where there are so many claims on public funds. Faced with a large manufacturing capacity that turns out to be useless, politicians risk being accused of having wasted money—as the British government was when the emergency hospitals it had built early in the pandemic were not needed. Yet politicians must be rational. You buy insurance before you know what will happen, not after. ■



【首文】疫苗经济学

加大剂量

全球在新冠疫苗上的支出还远远不够

来做一个思维实验：如果你不能在一小时内吃到一份披萨，就会饿死。你会怎么做？大多数人会立马下单——而且不只点一份玛格丽特披萨，而是从几家不同的店点很多份。你想要最大限度地增加机会，争取至少有一家披萨店能及时把你需要的东西送到，所以不会在意有些披萨肯定会被浪费掉。

全世界亟需一种能对抗新冠肺炎的疫苗。截至目前大约已录得70万人死于这种疾病，而且这个数字还在以每周约四万人的速度增长。如果把未被记录的死亡人数也计算在内，实际数字还要高得多。与此同时，全球经济正在经历自大萧条以来最剧烈的收缩，2020年上半年GDP可能收缩8%。

面对这场灾难，科学家们研发出疫苗的速度看起来很可能大大快于几乎所有人在疫情刚开始时的预测。然而，全球在制造和分配疫苗上所做的努力达不到预期。截至目前大约只有100亿美元被投入到这项工作中——这就相当于只订了一份披萨，而不是所需的好几份。

相关数字并不确切，但据粗略估计，全球已订购了约40亿剂新冠疫苗，等待明年年底前交付。理论上，这足够让世界一半的人口接种一剂疫苗。但实际上，能得到保护的人远远没有这么多。部分生产中的疫苗将无法获得监管机构的批准，而已开展大规模临床试验的候选疫苗（已有若干进入此阶段）仍有20%的失败几率。其他一些将会获批，但可能无法提供全面的保护。例如，它们可能不适合老年人，或者它们也许能避免人们死于新冠，却不能阻止他们传染他人。其他疫苗将需要注射一剂以上才能起效。由于这类可能性，即使是英、美等已为每个公民购买两剂以上疫苗的国家，购买的量也还是不够。

世界不应将效用未经证实的疫苗视作奢侈，而需要视之作为一种保险。研究

表明，如果有十种或更多的疫苗正在研发中，就有90%的机会找到一种有效的疫苗。一旦这些候选疫苗中有一种被证明有效，就需要将数十亿剂疫苗迅速分发出去。但是，由于无法提前知道哪种候选疫苗会成功，政府应该在监管机构做出批准或不予批准的决定前，早早帮助制药公司大量生产一系列不同的疫苗——最好是能总共生产出数百亿剂。这样一来，就可以在第一时间启动向人们派发胜出的疫苗，尽管那些失败的疫苗可能会被丢弃不用。

这看起来也许像蓄意且不必要的铺张。然而，即使按照最雄心勃勃的提议将疫苗研发资金增加10倍至1000亿美元或更多，相比疫情爆发以来各国政府为保收入和就业而支出或承诺支出的七万亿美元，仍是小巫见大巫。真正的奢侈是等到一个成功的候选疫苗出现后，才着急忙慌地提高产量。且不说人命，单就被保住的经济产出看，世界就算花2000亿美元在仅仅一周内研制出一种有效的新冠疫苗也仍是合理的。

如此巨额投资的前景引发了一些人对“疫苗民族主义”的担忧，即富国比穷国投入更多，以求垄断市场来让本国民众受益。世界作为一个整体，可以从有限的疫苗供给中“挤出”最大的益处，方法是汇集资源并按需分配疫苗——首先是医护人员，然后是弱势群体，诸如此类。大约有80个国家对这样的方案感兴趣。但遗憾的是，一些有疫苗生产能力的国家的政客很可能把本国人民放在第一位。要使国际上对谁能获得以及何时获得疫苗的争执最小化，一个方法是最大限度地增加预先供应，并扩散生产能力。提供给最贫穷国家的疫苗将需要补贴，这或许可以通过全球疫苗免疫联盟（GAVI）来实现，这个组织已经在为穷国使用的其他疫苗买单。

故意过度生产某样东西的想法不太容易为政客所接受，尤其是在一个对公共基金的索求如此之多的世界里。一旦大规模的生产能力到头来毫无用处，政客就有可能被指斥白白浪费钱——就像英国政府在疫情早期建了临时医院，结果却没派上用场一样。但政客们必须要理性明智。你并不是在知道了会发生什么之后才去买保险的。■



Free exchange

The Replacements

The fear of robots displacing workers has returned. But do not expect tech-induced layoffs just yet

COVID-19 PRESENTED employers with a simple choice: find ways for workers to do their jobs safely, or shut down. At least some have chosen a third option, of dispensing with humans altogether. Among the many breathless headlines prompted by the pandemic are those warning of a new wave of job-destroying automation. The pace of automation in some parts of the economy, like factory floors and warehouses, is almost certain to accelerate. Yet on the whole, robot-induced mass unemployment should remain near the bottom of workers' lists of worries.

The world has only recently recovered from a bout of robophobia. In the early 2010s advances in robotics and artificial intelligence (AI), described ominously in countless papers and books, seemed to portend a wave of job destruction. High unemployment after the global financial crisis of 2007-09 added to fears of a job scarcity. Fretting about robots in a downturn is not entirely irrational: firms appear to do most of their job-slashing during slumps. Nir Jaimovich of the University of Zurich and Henry Siu of the University of British Columbia argue that labour-market recoveries have grown weaker in recent decades as a result. Worries can be overdone, though. By the end of the decade unemployment had dropped like a stone and driverless vehicles were struggling to turn left. The earlier panic seemed a touch hysterical.

High rates of joblessness and eye-catching technological advances are again contributing to a new round of fears. In recent weeks, for instance, mind-boggling examples of the capabilities of GPT-3—an AI-based language-processing model developed by OpenAI, a research

organisation—have zoomed around the internet. Another cause for anxiety has been businesses' strategies for coping with the pandemic. Anecdotes of covid-motivated automation are easy to find. Many organisations have turned to software to automate paper-processing tasks that cannot be done by homebound workers. Those facing a deluge of customer enquiries, such as hospitals, are supplementing human assistants with chatbots. Employers' interest in automating tasks in high-risk environments, such as slaughterhouses, is reportedly on the rise.

Any effect of these on unemployment has almost certainly been swamped by stronger economic forces, such as social-distancing measures and collapsing aggregate demand. And the pace of automation is likely to be gradual rather than disruptively speedy. Many jobs, even those commonly classified as "low-skilled", require manual and social dexterity that machines cannot yet match. Workers in face-to-face industries—in bars or restaurants, say, or hair and nail salons—are especially vulnerable to covid-19. But there is little scope for, or interest in, replacing them with robots. In New York thousands of public-transport workers caught the virus, and dozens died. Despite billions of dollars of investment in driverless vehicles, though, computers cannot yet pilot buses through chaotic city streets.

Furthermore, automation is only one of the technological solutions available to firms as they weather the crisis. The pandemic's most profound labour-market legacy will probably be a rise in remote work. About half of all Americans who were working before the arrival of covid-19 were doing their jobs remotely by May, according to one estimate. Surveys of firms indicate that some of the shift will not be reversed. If remote work slashes overheads and enables people to move to cheaper cities, it could preserve jobs, by alleviating cost pressures on struggling firms.

Telework may have some job-destroying effects, though. The pandemic has

sped the adoption of technology in labour-intensive sectors like education and health care. Telemedicine and distance learning might mean that fewer doctors and teachers can serve more patients and students. Their largest impact is likely to be on blue-collar workers, such as clerical and janitorial staff, whose services become less necessary as the physical footprint of education and health institutions gets lighter. In a recent essay David Autor and Elisabeth Reynolds of Massachusetts Institute of Technology warn that such a dynamic could play out more widely. Over the past half-century employment growth in cities polarised: middle-skill work declined, and employment grew in white-collar professions and the services that support them. If remote working proves a lasting shift, then the café staff, taxi drivers and cleaners who depend on their custom could find themselves out of work.

Such severe, lasting labour-market pain in the aftermath of the pandemic may actually delay automation, by depressing wages. Developing and deploying new technologies costs money. Would-be automators deciding whether or not to make the needed investment could be swayed by the large reservoir of underemployed labour, willing to work for low pay. In America slaughterhouses—which often hire from a big pool of low-wage workers, many of them undocumented immigrants—are far less automated today than in parts of northern Europe, for example.

| *Automatic transition*

Tech-induced mass unemployment, then, seems unlikely. But there is one scenario where covid-19 could unleash the robots—if labour costs start to drift upwards, perhaps as global supply chains break down, or minimum wages rise. The reshoring of manufacturing jobs could lead to pressure to replace cheap foreign labour with robots at home. Production could no longer take advantage of low-cost labour, as America's meat-processing industry does.

Years of economic dysfunction have energised campaigns for higher minimum wages and a more generous welfare state. The economic devastation wrought by the pandemic lends them momentum; like past crises, it could lay the groundwork for a new social contract. If post-pandemic policy were to enable workers to enjoy more security on fewer hours worked, firms might then face some genuine labour scarcity. And that would really work up an appetite for disruption. ■



自由交流

后备队

对机器人取代工人的恐惧卷土重来。但技术导致的裁员不会马上发生

新冠疫情要雇主做个简单的选择：要么想方设法让员工安全工作，要么关门大吉。不过也有人选了第三条路——完全不使用人类员工。在疫情带来的众多令人窒息的头条新闻中，有一些警告人们当心新一轮自动化对就业的破坏。在经济的某些方面，如工厂车间和仓库，自动化几乎必然会提速。不过总的来说，机器人引发大规模失业应该依旧是员工们最不需要担心的事项之一。

全世界刚刚才从一轮对机器人的恐惧中恢复过来。2010年代初，不计其数的文章和书籍都充满不祥色彩地描述了机器人技术和人工智能（AI）的进步，似乎预示着就业岗位被摧毁的浪潮即将到来。2007年至2009年全球金融危机后的高失业率加剧了人们对职位短缺的担忧。在经济低迷期担心机器人的冲击并非毫无根据：企业大部分裁员似乎都是在低迷期实施的。苏黎世大学的尼尔·贾伊莫维奇（Nir Jaimovich）和不列颠哥伦比亚大学的亨利·邵（Henry Siu，音译）认为，这导致近几十年来劳动力市场的复苏越来越疲弱。不过，这些担心可能过度了。到2010年代末，失业率大跌，而无人驾驶汽车还很难完成左转弯。早些年恐慌看来有点歇斯底里了。

高失业率和引人注目的技术进步引发了新一轮恐慌。例如，最近几周，由研究机构OpenAI开发的基于AI的语言处理模型GPT-3令人惊叹的功能示例在互联网上迅速蹿红。另一个引发焦虑的因素是企业应对疫情的策略。有关疫情推动自动化的传闻轶事比比皆是。许多组织已经转而使用软件来自动处理无法由在家工作的员工完成的文书任务。像医院等面临大量客户咨询的企业正部署聊天机器人协助人类助理。据称雇主越来越有意向把屠宰场等高风险环境中的工作自动化。

几乎可以肯定的是，这些措施对失业率的任何影响已被更强大的经济力量

盖过，比如需要保持社交距离和总需求崩溃。而且自动化的步伐很可能是渐进的，而不是破坏性地快速。许多工作，甚至是那些通常被归类为“低技能”的工作，所需的操作和社交熟练度是机器尚无法匹敌的。在酒吧、餐馆或美发美甲店等直接面对客户的行业里工作的人尤其容易感染新冠病毒，但商家用机器人取代他们的空间或兴趣都不大。在纽约，成千上万名公交系统的工作人员感染了新冠，其中几十人死亡。尽管为研发无人驾驶汽车已经投入了数十亿美元，但计算机仍无法在闹哄哄的城市街道上驾驶公共汽车。

此外，自动化只是企业捱过疫情危机可用的技术解决方案之一。新冠疫情对劳动力市场最深远的影响可能是远程工作增加。据一项估计，所有在疫情发生之前有工作的美国人中约有一半到了5月份仍在远程工作。对公司的调查表明，这样的转变中有一部分将不会再逆转。如果远程工作降低了日常管理费用，让人们能够搬到生活成本更低的城市，就能为那些陷入困境的公司减轻成本压力，从而保住工作岗位。

不过，远程办公也可能会导致一些工作岗位消失。疫情加速了教育和医疗等劳动密集型部门对技术的运用。远程医疗和教学可能意味着用更少的医生和教师就能服务更多的病患和学生。这可能对蓝领工人影响最大，比如文员和保洁员，随着教育和卫生机构的实体设施越来越少，他们的服务也变得不那么必要了。在近期一篇文章中，麻省理工学院的戴维·奥托尔（David Autor）和伊丽莎白·雷诺兹（Elisabeth Reynolds）警告称，这种动态可能会在更大的范围里上演。过去半个世纪里，城市的就业增长呈现两极分化：中等技能的工作减少，专业白领和支持他们的服务业的就业增加。如果事实证明远程工作是一种持久的转变，那么依赖白领光顾的咖啡馆员工、出租车司机和保洁员可能就会失业。

在新冠疫情的余波中，如此严重而持久的劳动力市场阵痛实际上可能会因为工资被压低而延迟自动化进程。开发和部署新技术需要资金。有意转向自动化的企业在决定是否做出必要的投资时，可能会因为大量未充分就业、愿意接受低薪的劳动力而动摇。例如，美国的屠宰场经常雇用大批低薪工人，其中很多是非法移民，这些屠宰场如今的自动化程度远低于北欧

部分地区。

| 自动转变

因此，技术引发大规模失业似乎不太可能。但在一种情况下疫情可能会推动机器人的大量使用：可能是因为全球供应链崩裂，也可能是因为最低工资水平提高，导致劳动力成本开始上行。制造业岗位回流可能会造成压力，促使企业在本国用机器人取代廉价外国劳动力。生产部门不能再像美国的肉类加工业那样利用低成本劳动力了。

多年的经济失灵激起了要求提高最低工资和构建更慷慨的福利国家的运动。新冠疫情造成的经济破坏给了它们推动力；和以往的危机一样，它可能为新的社会契约奠定基础。如果疫情后的政策让工人能工作更少的时间却享受更多的保障，那么企业可能会真正面临一些劳动力短缺问题。而这将真正激发企业对颠覆的渴望。 ■



Electric cars

Million-mile car batteries are coming

But they are more about improving reliability than driving the same car for ever

AS EVERY MOBILE-PHONE owner knows, after a year or so the battery starts to fade and the beast needs recharging more frequently. That is a nuisance, but a phone's batteries can be replaced fairly cheaply—or the whole handset traded in for the latest model. An electric car, however, is a much bigger investment. And batteries are its priciest component, representing around 30% of an average mid-size vehicle. Apart from increasing the risk of running out of juice and leaving a driver stranded, a deteriorating battery quickly destroys a car's second-hand value.

To provide buyers with some peace of mind, carmakers guarantee their batteries, typically for eight years or around 200,000km. Producers are now, though, planning to go much further than that, with the launch of “million mile” (1.6m kilometre) batteries. Zeng Yuqun, the boss of Contemporary Amperex Technology, a giant Chinese firm which produces batteries for a number of carmakers, said in June that his company was ready to start manufacturing batteries which would last for 16 years or 2m kilometres. Elon Musk has hinted that Tesla, a Californian maker of electric vehicles of which he is boss, has a million-mile battery in the works. Rumours suggest this could be unveiled in September. And over in Detroit, General Motors (GM) is in the final stages of developing an advanced battery which it says has similar longevity.

| *To the Moon and back, twice*

“It's a great catchphrase; the million-mile battery,” says George Crabtree, director of the Joint Centre for Energy Storage Research at Argonne National Laboratory, near Chicago. “But the fact you can drive a million miles may

not be the most relevant parameter to look at.” Thrash a car and its battery will deteriorate faster. Regular fast-charging also reduces battery life, as do overcharging and deep discharging. Driving in extremely hot or cold weather does not help either. And battery life will diminish even if you just leave the car in the garage. The real point of a million-mile battery is that the technological advances required to make it possible will deal with these things as well.

The lithium-ion (Li-ion) batteries which power electric cars age in two ways: with time and with use. Battery-makers call time-dependent ageing “calendar ageing”. It is a consequence of the gradual degradation of some of the materials employed in battery construction. This degradation reduces a battery’s ability to hold a charge—though even here it is possible to ameliorate the problem to a certain extent. Leaving a car with a fully rather than partly charged battery, for example, can increase the rate of calendar ageing.

Use-dependent ageing is a consequence of the number of discharge-recharge cycles a battery goes through. It is caused by the complex chemical reactions that take place when a battery is operating. Some of these are essential to a battery’s job of storing and releasing energy. “But there are also side reactions that you can’t stop and some of those are harmful,” explains Dr Crabtree.

As a battery discharges, lithium ions (lithium atoms with an electron missing) are created at one electrode, the anode. These then shuttle through a liquid electrolyte to a second electrode, the cathode. The electrons stripped away at the anode, meanwhile, travel towards the cathode along an external electrical circuit, which powers the car. Ions and electrons are reunited at the cathode and remain there until the battery is plugged into a charger and the process is reversed.

Each cycle of discharge and recharge takes its toll. Lithium is so highly reactive that stopping it getting tied up in other chemical compounds while a battery is in use is hard. Even a small amount of diversion per cycle adds up, reducing the amount of the element available to store energy. On top of this, charging up faster than ions can be absorbed by the anode may result in a layer of lithium “plating” building up on the anode’s surface, reducing its storage capacity.

Plating becomes yet more of a problem if it leads to the development of structures called dendrites. These are small, finger-like fibres which project into the electrolyte from points on the anode where plating is especially elevated. If a dendrite reaches the cathode the battery will short-circuit, causing it to heat up rapidly and possibly catch fire. Other side reactions can have similarly adverse consequences.

It is difficult to generalise about the extent to which these processes reduce a battery’s lifetime. Not only does it depend on how that battery is used, but also how it is made. Li-ion cells come in different forms and a variety of chemistries, some of which have not been around long enough in cars for people to know for sure how long they will last. Nor is there any independent testing, says Dr Crabtree.

Nevertheless, the industry has a few rules of thumb. Once a battery’s capacity falls below 80% of its starting value, it is generally thought no longer suitable for use in vehicles. Some reckon that, on average, Li-ion batteries lose 2% of their capacity a year. This may not seem much, but by the time a vehicle is six years old it could mean it is halfway through its useful life.

| *The long road ahead*

Battery technology is improving all the time. As a consequence, so are calendar and use-dependent lifetimes. Getting direct experience of how

electric cars are used is helping researchers come up with ways to mitigate some of the side reactions, says Tim Grewe, the head of GM's electrification strategy. The company employs remote, "telematic" monitoring to keep track of how batteries are performing in its cars, and also takes back some batteries from high-mileage drivers and those living in extreme environments, such as deserts and mountainous regions, for analysis.

Dealing with impurities which get into batteries helps to extend their lives. Water, for example, reacts with salts in the electrolyte to form an acid, which attacks the electrodes. To prevent this, GM has developed an additive made from a type of material called a zeolite. Zeolites are molecular sponges. GM's version serves to mop up any moisture which enters a battery cell.

Adding a little aluminium to a nickel-cobalt-manganese cathode, a type that is widely used in Li-ion batteries, saves on cobalt, the most expensive ingredient in a battery. But the aluminium delivers other benefits as well, adds Mr Grewe. It boosts the battery's energy density, meaning a car can travel farther on a single charge. It also makes the battery last longer.

GM will be using these cathodes in a new battery, called Ultium, that it has developed in partnership with LG Chem, a South Korean firm. Ultium batteries, production of which is planned to start next year at a factory in Ohio, should provide electric cars with single-charge ranges of 650km or more. That compares with the 400km range which might these days reasonably be expected from a mid-size electric car. Asked if the Ultium is a million-mile battery, Mr Grewe replied, "Many customers could get that."

| *On to two million!*

As a marketing device, the million-mile battery will give electric-car buyers—even those never likely to put a million miles on the clock—more confidence that their batteries are robust. But some users might truly desire

a lifetime range that great.

Jeff Dahn, who leads a group of battery researchers at Dalhousie University in Halifax, Canada, who are sponsored by Tesla, points out that autonomous electric vehicles like “robo taxis” could clock up vast mileages by operating around the clock. So, too, would long-haul lorries and electric buses. And some cars may end up being more than just means of transport. Plans are afoot to let electric-vehicle owners connect their jalopies to the grid in a way that will store surplus electricity generated in times of plenty by wind and sunshine and release it during hours of peak demand, with the owner collecting a fee for doing so. That means these grid-buffering vehicles will be racking up lots of charging cycles even when they are not moving.

Nor are million-mile batteries the limit of engineers’ aspirations. The next objective is to replace Li-ions’ liquid electrolytes with solid ones. That would keep the ions under stricter control and allow even longer driving ranges. This could make a two-million-mile battery a feasible objective. If that day comes, the tables would have been turned. From being the first part of a car to fail, its battery will have become the last. ■



电动汽车

百万英里电池

它们更多是为提高汽车的可靠性而非使用寿命

有手机的人都知道，新机使用大概一年后，电池就开始老化，需要更频繁地充电。这挺烦人的，但更换手机电池并不太贵，或者还可以干脆把整部手机以旧换新成最新款。相比之下，电动汽车可是一项大得多的投资，而电池又是其中最昂贵的组件，大概占一辆普通中型车成本的30%。电池持续老化不但会增加汽车半路没电抛锚的风险，还会导致一辆车在二手市场上快速贬值。

为让买家多少安心些，汽车公司通常会为电池提供八年或20万公里左右的保修。但现在有些生产商计划推出保修“百万英里”（160万公里）的电池，大大超越之前的标准。为多家汽车制造商生产电池的中国大型企业宁德时代老板曾毓群在6月表示，其公司已准备就绪，即将生产寿命长达16年或200万公里的电池。加州电动汽车制造商特斯拉老板马斯克暗示，公司正在开发一款百万英里寿命的电池。传闻它可能在9月面世。而在底特律，通用汽车也在研发一款据称寿命差不多长的先进电池，已进入最后阶段。

| 往返月球两次

“百万英里电池，这真是个好口号。”芝加哥附近的美国阿贡国家实验室（Argonne National Laboratory）能源存储联合研究中心（JCESR）的主管乔治·克拉布特里（George Crabtree）表示。“但能续航一百万英里可能不是最应该关注的参数。”激烈驾驶会让电池老化得更快。常规快速充电、过度充电和深度放电也会缩短电池的寿命。在极热或极寒天气下驾驶也会损害电池。就算把车停在车库不用，电池寿命也在缩减。百万英里电池的真正意义在于它背后的技术进步也能解决上述问题。

电动汽车使用的锂离子电池有两种老化方式：时间老化和使用老化。电池制造商将随时间推移发生的老化称为“日历老化”，是构成电池的某些材料

逐渐损耗的结果。这种退化会降低电池的蓄电能力，但这个问题在一定程度上是可以改善的。例如，汽车如果充满电停着，电池的日历老化速度会比没充满电时更快。

使用老化是电池经过多次充放电循环的结果。这是由电池运作时发生的复杂化学反应引起的。其中一部分反应对于电池存储和释放能量必不可少。“但也会产生不可抑制的副反应，有些是有害的。”克拉布特里解释道。

电池放电时，阳极产生锂离子（即失去一个电子的锂原子）。然后这些锂离子会通过液体电解质转移到阴极。同时，在阳极失去的电子会沿着外部电路向阴极移动，从而为汽车供电。锂离子和电子在阴极重新结合，并停留在那里，直到电池接入充电器使上述过程反向进行。

每一次充放电循环都会损耗电池。锂具有很高的反应活性，很难在使用电池时阻止它与其他化合物结合。即便每次充放电只有少量损失，加起来也会导致用于储能的锂减少。此外，充电速度快于锂离子被阳极吸收的速度可能导致阳极表面积聚一层锂“镀层”，降低蓄电容量。

假如这样的镀层再进一步形成“枝晶”，问题就更大了。枝晶是一种细小的指状纤维，从阳极上镀层特别厚的地方探伸至电解质中。当枝晶接触到阴极，电池就会短路，导致其迅速发热并可能自燃。其他副反应也可能产生类似的不良后果。

这些过程会在多大程度上缩短电池的寿命很难一概而论。这不仅取决于电池的使用方式，也取决于其制造方式。锂离子电池各式各样，化学原理也各异，其中一些被应用到汽车上的时间还不长，让人难以确切知道电池的寿命如何。而且也没有任何独立测试，克拉布特里表示。

但业内有几条经验法则。一旦电池容量下降到初始值的80%以下，通常认为这块电池已不再适用于汽车。据称，锂离子电池每年平均损耗2%的容量。听上去好像不多，但这意味着在新车落地的第六年电池的使用寿命就已过半了。

| 前路漫漫

电池技术一直在提升。电池的时间寿命和使用寿命也随之延长。通用汽车的电气化战略负责人蒂姆·格雷威（Tim Grewe）表示，了解电动汽车如何被使用的直接数据有助于研究人员找到减轻某些副反应的方法。该公司采用远程“车载通讯”功能追踪车内电池的使用情况，还取回了一些高行驶里程以及在沙漠和山区等极端环境下使用的电池做分析。

去除混入电池内的杂质有助延长其寿命。例如，水与电解质内的盐反应形成的一种酸会腐蚀电极。为防止这种情况，通用汽车开发了一种由名为沸石的物质制成的添加剂。沸石堪称分子“海绵”。通用汽车的这款添加剂可以吸走进入电池内的任何水分。

往镍钴锰型阴极（在锂离子电池中广泛使用）上添加少量铝可以节省钴这种电池中最昂贵的成分。但铝还会带来其他好处，格雷威补充道。它能提高电池的能量密度，意味着汽车充一次电可以跑更远。它还能延长电池的寿命。

通用汽车将在与韩国公司LG化学合作开发的新型电池Ultium中使用这种阴极。这款电池计划明年在俄亥俄州的一家工厂启动生产，应该能为电动汽车提供650公里或以上的单次充电续航里程。相比之下，目前一般中型电动汽车能指望的续航里程为400公里。当被问及Ultium是不是一款百万英里电池时，格雷威回答：“许多客户能得到。”

| 向两百万进发！

作为一种营销手段，百万英里电池将使电动汽车的购买者（甚至那些根本不会用一辆车跑上百万英里的人）更确信其电池坚固耐用。但的确可能有一些用户希望拥有如此耐用的电动汽车。

位于加拿大哈利法克斯（Halifax）的戴尔豪西大学（Dalhousie University）的电池研究小组获得了特斯拉的赞助，小组负责人杰夫·戴恩（Jeff Dahn）指出，诸如“机器人出租车”之类的无人驾驶电动汽车全天候运行，将会达到超长的行驶里程。长途卡车和电动巴士也一样。而且有

些汽车最终可能不会只充当交通工具。有的项目正在研究让电动汽车车主把自己的旧车接入电网，将风力和日照充足时生成的多余电力存储起来，然后在用电高峰时段释放，车主可以就此收费。这意味着，这些旧的电动汽车即便上不了路，也能作为“电网缓冲站”再做很多次充放电。

工程师的追求也不止于百万英里电池。下一个目标是以固态电解质代替锂离子电池中的液体电解质。这将能更严格地控制锂离子，进一步延长电池的续航里程。“两百万英里”电池因而可成为切实可行的目标。等到它实现的那一天，局面将完全扭转，电池将从汽车中最先报废的部分变成最耐用的。■



Microsoft and TikTok

Unproductivity puzzle

What does a middle-aged tech giant want with a teen sensation?

ON JULY 29TH the bosses of Alphabet, Amazon, Apple and Facebook endured a five-hour videoconference with a congressional subcommittee on antitrust. Satya Nadella, chief executive of Microsoft, America's other technology titan, spent the day talking to investors, recruiting new hires and reviewing the latest quarterly numbers. His presence was not required—Microsoft no longer attracts the controversies that bring politicians running.

Or does it? On August 2ND the firm said it was in talks to buy the American, Canadian, Australian and New Zealand operations of TikTok, a wildly popular but problematic Chinese-owned video-sharing app. President Donald Trump had mused about banning it over fears that it could hand data on Americans to China's Communist authorities, despite protestations by its parent company, ByteDance, that it would never do such a thing. After some unusual steps to mollify Mr Trump—including a statement in which it thanked him effusively for his "personal involvement"—Microsoft has until September 15TH to hash out a deal.

Other suitors may cut in. ByteDance's venture-capital backers, most of whom are American, will try to flush out rival bidders. They are disappointed that ByteDance failed to head off TikTok's political travails. The Chinese group should have spun off the American unit this spring, keeping a big minority stake, says an investor close to the firm. But the ambition of its founder, Zhang Yiming, led ByteDance mistakenly to calculate that it could muscle through geopolitical tensions, the investor says.

TikTok's price could rise if more bidders emerge, but it will still go for far less than ByteDance's estimation of its value. ByteDance believes TikTok US would have been worth \$200bn within a few years. Now it may have to sell the business for between \$15bn and \$40bn. That would be one of the year's biggest deals. But once TikTok US, with its 100m or so users in America alone, turns profitable—which it is widely expected to soon—it may look like a bargain.

TikTok would propel Microsoft into the social-media big league. That may be Mr Nadella's strategic aim. Google, the main division of Alphabet, is challenging Microsoft in cloud computing and office software. Nabbing TikTok would be a counter-strike against Google's YouTube, notes Mark Moerdler of Bernstein, a research firm. The app would also give Microsoft a trove of data on young people, putting it on a par with the likes of Snapchat and Facebook's Instagram.

At the same time, TikTok is a departure from Microsoft's core competence of business-productivity tools. The app is unproductivity software par excellence. Microsoft's gaming business, including the Xbox console, brought in only 8% of its \$143bn in revenues in the 12 months to June. The firm has a mixed record with consumer technology. In July it shut Mixer, a live-streaming service for gamers that had failed to gain traction. And with TikTok Mr Nadella may expect an invitation to Big Tech's next roasting on Capitol Hill. Controversies around TikTok's content moderation and data protection will keep cropping up.

The next 40 days will be busy. Microsoft may try to buy more of TikTok than just the four English-speaking markets. But ByteDance will want to keep as much of its global presence as possible, especially with Mr Zhang under fire in China for selling out to the Yankees. The world may end up with two TikToks, one American-run, one controlled by ByteDance.

How an American TikTok would work is unclear. Microsoft would need to replace the app's Chinese infrastructure, presumably by copying ByteDance's code and auditing it. If it wants American teenagers to be able to view videos uploaded by Japanese or even British ones, it would have to license them from ByteDance, which may run afoul of Mr Trump. TikTok's current appeal rests in part on its global assortment. Both versions of the app will be diminished by a split. Instagram's Reels, a TikTok lookalike launched on August 5th, will try to woo disenchanted TikTokers. For the 45-year-old Microsoft, navigating the Sino-American tech tussle may be the easy part next to keeping teenagers' attention. ■



微软与TikTok

无生产力谜题

一个中年科技巨头要一款青少年流行应用做什么？

上月29日，Alphabet、亚马逊、苹果和Facebook的老板与美国国会的反垄断小组委员会开了长达五小时的视频会议。当天，美国另一家科技巨头微软的首席执行官萨提亚·纳德拉（Satya Nadella）忙着游说投资者，招募新员工，检视最新一季的业绩数字。他不需要出席反垄断会议，因为微软已不再引发那类令政客奔忙的争议。

真是这样吗？8月2日，微软表示正就收购TikTok的美国、加拿大、澳大利亚和新西兰业务展开谈判。TikTok是一款爆红全球但引发了问题的中资视频分享应用。特朗普担心它会把美国人的数据交给中国的共产党政府而考虑禁用它，尽管TikTok的母公司字节跳动已郑重声明绝不会这样做。在用一些不寻常的手段安抚过特朗普（包括在一份声明中热情洋溢地对他的“亲身参与”表达感谢）之后，微软必须在9月15日之前谈妥交易。

其他求购者可能会插足。字节跳动的风险投资者（大多为美国籍）会设法让竞购对手现身。他们对于字节跳动未能阻止TikTok陷入政治困境感到失望。一位知情的投资者表示，字节跳动本应于今年春天剥离其美国业务，持有比例不低的少数股权，但创始人张一鸣野心太盛，导致字节跳动做出了错误估计，以为公司能在紧张的地缘政治局势中突围。

如果有更多求购者出现，TikTok的价格可能会上升，但仍将远低于字节跳动自己的估计。字节跳动认为TikTok美国业务的价值会在几年内跃升至2000亿美元。但现在它可能不得不以150亿至400亿美元的价格出售该部门。这会是今年最大的收购案之一。但TikTok美国业务仅在美国就约有一亿用户，一旦开始盈利（普遍认为这很快会发生），这笔收购可能会显得非常划算。

TikTok将带动微软跻身社交媒体巨头之列。也许这正是纳德拉的战略目

标。Alphabet最大的部门谷歌正在云计算和办公软件方面挑战微软的地位。收购TikTok将是对谷歌旗下YouTube的一记反击，投资公司盛博的马克·莫德勒（Mark Moerdler）指出。该应用还将为微软提供有关年轻人的大量数据，使其与Snapchat和Facebook的Instagram等社交平台平起平坐。

不过，微软的核心竞争力是一系列商业生产率工具，TikTok却与此相悖。该应用是一款典型的无生产力软件。在截至今年6月的12个月中，微软包括Xbox游戏机在内的游戏业务仅贡献了其1430亿美元收入的8%。微软在消费类技术方面的表现一直起伏不定。7月，它关闭了热度不高的游戏直播服务Mixer。而若是收购了TikTok，纳德拉估计会被邀请到国会山与其他科技巨头一起接受下一轮拷问。TikTok在内容审查和数据保护方面的争议将不断涌现。

未来40天会很忙碌。微软可能会争取收购TikTok更多的业务，而不仅仅是四个英语国家的市场。但字节跳动会想要尽量保住自己的全球影响力，尤其是在张一鸣因为把TikTok卖给美国佬而备受国人抨击的情况下。世界上最终可能会有两款TikTok，一款由美国运营，另一款由字节跳动控制。

尚不清楚美版TikTok将如何运作。微软将需要替换应用的中方基础架构，想来是通过复制字节跳动的代码并加以审核。如果能让美国年轻人也能观看由日本甚至英国年轻人上传的视频，微软就必须向字节跳动申请许可，而这又可能触怒特朗普。TikTok当前的吸引力部分在于形形色色的全球性内容。一经拆分，两个版本的吸引力都将被削弱。Instagram于8月5日推出了类似TikTok的Reels，将努力吸引幻想破灭的TikTok博主。对45岁的微软来说，在中美科技战中周旋进退可能倒还容易，难的是如何继续抓住青少年的目光。 ■



Google

How to cope with middle age

The firm has outgrown its uninhibited corporate culture. It is time to learn from its elders

IT MAY BE just 21 years old, but Google is in the midst of a mid-life crisis. As so often in such cases, all seems well on the surface. Every day its search engine handles 6bn requests, YouTube receives 49 years' worth of video uploads and Gmail processes about 100bn emails. Thanks to its dominance of online advertising, Google's parent company, Alphabet, made a profit of \$34bn last year. Beyond its core operations, it is a world leader in artificial intelligence (AI), quantum computing and self-driving cars. Along with the bosses of Amazon, Apple and Facebook, its chief executive, Sundar Pichai, was grilled in late July by lawmakers in Washington, DC, who fret that America's tech giants need to be restrained because they are so profitable. Crisis? What crisis?

Being hauled before Congress is, on the face of it, a sign of success. But it also marks a difficult moment for Google's leaders: the onset of corporate middle age. This is a problem as old as business itself. How do companies sustain the creativity and agility that made them great, even as they forge a culture and corporate machine that is built to last? For Google the transition is especially dramatic because its founders, Larry Page and Sergey Brin, tried from the start to build a firm in which this moment would never arrive. As Google prepared to go public in 2004 they declared that it was not a conventional company, and "we do not intend to become one". They hoped playground-like offices, generous perks and a campus atmosphere would allow it to retain the agility and innovation of a startup as it grew. The appearance of wrinkles on the corporate forehead is an admission of failure.

The signs of ageing are apparent in Google's maturing business, its changing culture and its ever-more-entwined relationship with government. Take the business first. The firm is running up against growth constraints in its near-monopolies of search and online-advertising tools. Its market share in search ads is around 90%. Unearthing other gold mines has proved difficult. None of the ambitious "moonshot" projects into which Alphabet has poured billions, such as delivery drones and robots, has been a breakout success. To keep growing, Google is having to try to muscle in on the turf occupied by big tech rivals, such as cloud computing and enterprise software and services.

The cultural challenge is fuzzier but no less urgent for a firm that is proud of its unusual corporate character. The freewheeling ethos that was so successful in Google's early days has become a liability. It works much less well at scale. Google now has nearly 120,000 employees, and even more temporary contractors. Doing things from the bottom up has become harder as the workforce has grown larger and less like-minded, with squabbles breaking out over everything from gender politics and the serving of meat in cafeterias to Google's sale of technology to police forces.

The third sign of lost youth, the attention of trustbusters, has long looked inevitable. As big tech has grown, so have its interactions with government—as an institution to lobby, as a customer and as a regulator. America's Justice Department is poring over Google's online-ads businesses and may soon file an antitrust suit. Scrutiny is unlikely to wane as the tech titans break out of their silos and compete more. Indeed, regulators may take it as a sign of broadening power.

How should Google respond? To be both innovative and mature is a hard trick to pull off. History is littered with failed attempts. In giving it a go, the firm has to decide who it puts its faith in: managers, investors or geeks?

The first route would involve taking a strong dose of managerial medicine to become a more tightly run conglomerate. The archetype for this approach is GE in its heyday under Jack Welch, who persuaded shareholders that sprawling businesses could work well, provided they were run by expert managers. But it turned out that GE was disguising weaknesses in its industrial units by leaning on its financial arm, GE Capital. GE's subsequent woes offer a warning of the peril of relying on one hugely successful division to subsidise less profitable units elsewhere—as Google does with its advertising business.

If doubling down on the conglomerate model is not the answer, what about the opposite approach: spinning off, selling or closing some units and returning money to shareholders? That would please many investors. By some calculations, Alphabet is worth \$100bn less than the sum of its parts. Spinning off YouTube would increase competition in internet advertising—a handy sop to regulators—as well as unlocking value. It might be worth more than Netflix, because it need not pay for content, most of which is user-generated. But the experiences of firms like AT&T and IBM highlight the danger that downsizing hollows out innovation. And while Google might hope to retain its distinctive culture in whittled-down form, the truth is that no matter how much it wants to be as youthful and free-spirited as Peter Pan, it is no longer a startup.

That leaves trusting the geeks. Becoming a glorified venture-capital outfit has appeal, but the woes of SoftBank's Vision Fund warn of hubris. Google would do better to examine how two older tech giants overcame their own mid-life crises (and near-death experiences): Microsoft, nearly broken up by antitrust regulators, and Apple, which spent years in the wilderness before Steve Jobs returned to reinvent it as a maker of portable devices. Both bounced back by rediscovering their core purpose and applying it in a new way. Under Satya Nadella, Microsoft has reinvented itself as a provider of cloud-based software tools and services, rather than its Windows

operating system. And Apple, previously known for its elegant, easy-to-use computers, has minted money by applying its genius to smartphones.

Could Google similarly identify what it does best and apply it in new areas? It could decide its mission is helping consumers trade their personal data for goods and services; or using AI to solve more of the world's problems; or being the data processor of net-enabled gadgets. At the moment it is betting on almost everything. Indiscipline can lead to unexpected innovations, but more often saps vitality. Google's best way forward is to follow the advice often given to victims of a mid-life crisis: slim down, decide what matters and follow the dream. ■



谷歌

应对中年危机

长大了的谷歌不能再沿用它放纵不羁的企业文化。是时候向前辈们学习了

眼下的谷歌或许才21岁，却已迎来了中年危机。与这类危机中常见的一样，表面看来一切都好。每天，谷歌的搜索引擎要响应60亿次请求，上传到YouTube的视频总共可以播放49年，Gmail要处理大约1000亿封电子邮件。凭借在线上广告业务中的统治地位，谷歌的母公司Alphabet去年实现了340亿美元的利润。除了其核心业务，谷歌还是人工智能（AI）、量子计算和无人驾驶等领域的全球领军者。7月底，谷歌CEO桑达尔·皮查伊（Sundar Pichai）和亚马逊、苹果及Facebook的老板们一起，接受了华盛顿的国会议员们的质询，因为议员们担心美国科技巨头的利润过于丰厚而需要加以限制。中年危机？哪有什么危机？

表面上看，被国会质询是企业成功的体现。但对谷歌的领导层来说，它同样标志着一个艰难时刻的到来：公司开始步入中年。这个问题和商业活动本身一样历史悠久。公司如何在打造一种经久不衰的文化和企业机制的同时，保持曾让自己发家兴业的创造力和敏捷性？对谷歌来说，这种转变尤其引人瞩目，因为其创始人拉里·佩奇（Larry Page）和谢尔盖·布林（Sergey Brin）从一开始就试图打造一家永远不会迎来这一时刻的公司。2004年谷歌准备上市时，他们宣称谷歌不是一家传统公司，而且“我们也不打算让它成为这样的公司”。他们希望游乐场式的办公区、优厚的福利待遇和校园般的氛围能让谷歌在成长过程中保持自己还是创业公司时的那种敏捷度和创新力。但它额头上出现的皱纹表明这未能成功。

谷歌的衰老正从几个方面显现出来：趋于成熟的业务、演变的企业文化，以及和政府的关系日益纠缠。先说业务。在被它近乎垄断的搜索和在线广告工具领域，谷歌的扩张开始触顶。它在搜索广告市场所占份额已达到90%左右。而到别处掘金的历程并不顺利。Alphabet已为雄心勃勃的“登月”项目投入了数十亿美元，包括送货无人机和机器人，但无一取得突破性成就。为保持增长，谷歌不得不费力挤进已被其他大型科技竞争对手占

领的地盘，比如云计算、企业软件和服务等。

对于谷歌这样一家以独特的企业性格为荣的公司来说，文化上的挑战虽没有那么明显，却同样紧迫。谷歌自由自在的气质在早期极为成功，如今却成了一种包袱。公司规模变大后这种气质的好处大打折扣。谷歌目前有近12万名员工，合同工的数量甚至更多。随着员工人数的增加，这个群体的观念也更多元，围绕性别政治、餐厅肉食供应、公司向警方出售技术等各种问题的争吵声不绝于耳，想要自下而上做成一件事情变得更加困难。

被反垄断机构盯上是青春流逝的第三个迹象，而这在很久以前似乎就已不可避免。大型科技公司与政府的关系随着公司的发展而发展——政府是它的游说对象、客户，也是监管者。美国司法部正在审查谷歌的在线广告业务，可能很快就会提出反垄断诉讼。随着科技巨头们走出各自的传统领地，展开更多竞争，它们受到的审查不太可能减少。事实上，监管机构可能会把它们扩展看成是扩大势力范围的表现。

谷歌该如何回应？既有创新精神又要成熟稳重是很难做到的。历史上失败的例子比比皆是。想试着做到两者兼具，谷歌就必须决定寄希望于谁：管理层、投资者，还是极客？

第一种解决方法是给它服用一剂管理上的强效药，让它成为管理更严格的企业集团。这种方法的原型是杰克·韦尔奇（Jack Welch）领导下的全盛时期的GE。韦尔奇让股东们相信，假如那些庞杂的业务由职业经理人来管理，就能很好地运作。但结果证明，GE是在依赖其金融部门GE资本（GE Capital）掩盖工业部门的劣势。GE后来的困境提醒人们，指望一个极为成功的部门来补贴其他盈利能力较弱的部门是很危险的——谷歌对广告业务的依赖也一样。

如果大力实施企业集团模式不能解决问题，那么采取相反的方法——拆分、出售或关闭部分业务，然后将资金返还给股东，又会怎样呢？这会取悦很多投资者。按照一些估计，Alphabet的市值比拆分后的总价值少1000亿美元。把YouTube拆分出去会加大互联网广告业的竞争——这能讨得监

管机构的欢心——也会释放其价值。YouTube的价值可能会高于奈飞

（Netflix），因为它的大部分内容是用户生成的，不用为它们付费。但AT&T和IBM等公司的经历清楚地表明，缩小规模有掏空创新的危险。虽然谷歌可能希望以瘦身的方式保留自己独特的文化，但事实是，无论它多么希望自己像彼得·潘一样青春永驻、自由自在，它都已经不再是一家创业公司了。

那就只剩下信赖极客了。成为一家风光的风险投资机构有其吸引力，但软银愿景基金的遭遇警示了狂妄自大的危险。谷歌最好还是看看两家科技巨头前辈是如何化解各自的中年危机甚至起死回生的：微软差点被反垄断机构拆分；苹果沉寂多年，直到史蒂夫·乔布斯回归并将它重塑为便携设备制造商。它们都是重新发现了自己的核心目标，并采取新的方法实施目标，才得以重整旗鼓。在萨提亚·纳德拉（Satya Nadella）的领导下，微软转型成为云软件工具和服务供应商，而不仅仅提供Windows操作系统。而之前就以简洁易用的电脑著称的苹果则将才能运用到智能手机上，开始大赚特赚。

谷歌是否也可以确定自己最擅长的是什么，并把它应用到新的领域？它可以决定自己的使命是帮助消费者用他们的个人数据换取商品和服务，还是运用AI解决世界上更多的问题，亦或是为各种基于网络的设备处理数据。目前它几乎方方面面都押注。不受约束会带来意想不到的创新，但更多时候却会渐渐削弱活力。谷歌最理想的前进之路是遵循那些陷入中年危机的人通常会得到的建议：瘦身，决定什么是重要的，并追随梦想。■



The Economist film

How scientists calculate climate change

Climate activists talk a lot about following “the science” around climate change. What actually is the science and how is it calculated?



经济学人视频

科学家如何计算气候变化程度

气候活动家常常提到关于气候变化的科学，那么气候究竟是如何被计算的呢？



Understanding data

Sums of all fears

How to debunk dodgy data

ON JULY 2ND the American state of Georgia counted a total of 87,709 cases of covid-19. Fifteen days later the number had risen to 135,183. Yet the state government's online heat map looked largely the same. There appeared to be no increase in the number of crimson red areas where the outbreak was most severe. How come?

As it turned out, the threshold for places to turn red had been lifted from 2,961 cases to 3,769. This example of misleading data visualisation was called out by Carl Bergstrom and Jevin West. It joined the ever-growing catalogue of “bullshit”, malign and otherwise, which they debunk for students at the University of Washington.

Out of that course they have spun “Calling Bullshit”, a helpful guide to navigating a world full of doubtful claims based on spurious data. Using clever anecdotes, nods to online culture and allusions to ancient philosophy, the book tells ordinary readers how to spot nonsense—even if they are not numerical whizzes. As well as sketching the difference between correlation and causality, the authors outline visualisation techniques and explain machine learning to arm people against assertions that seem, and so probably are, either “too good or too bad to be true”.

There is, alas, no shortage of material. In one of their examples, a widely shared scholarly article seems to show that musicians from genres such as rap and hip-hop die much younger than those who play blues or jazz. The researchers in question calculate that half of all hip-hop musicians are murdered—a classic case of a claim too bad to be true. Messrs Bergstrom and West show where they went wrong: the raw numbers are not incorrect,

but the picture they paint is incomplete, because they discount performers who are still alive. As rap music only began in the 1970s, rappers who have already died tend to have done so younger than those from the more venerable genres cited in the article.

The ways of deceit and error with data are many—and the authors point them out ruthlessly. Their fellow scientists, the media, the “TED brand of bullshit”: no one is spared. They describe how the findings of a study can be manipulated to make them seem statistically important even when they are not, and how feeding an algorithm skewed inputs yields unreliable results. For instance, in 2017 two scientists sparked ethical concerns by claiming to have built an algorithm that could guess whether a person was gay or straight on the basis of pictures gleaned from a dating site. The paper, which *The Economist* covered at the time, failed to mention that their “gaydar” may have been responding to variations in how people choose to present themselves (make-up, poses and so on), rather than to authentic physical differences.

While charts depicting the life expectancy of musicians are hardly lethal themselves, purporting to discern a person’s character from dodgy variables is perilous. Amid the pandemic, misinformation about infection rates and the efficacy of drugs—often bolstered by sneaky graphics, as in Georgia—is a particular concern. Some scientists are bypassing the usual peer-review process. Meanwhile newsrooms are under ever-greater pressure to attract clicks. More and more bullshit is contaminating debate. Mr Bergstrom and Mr West picked a good time to expose it. ■



认识数据

数字恐怖

如何看穿骗人的数据【《拆穿胡扯》书评】

美国佐治亚州到7月2日共有87,709例新冠肺炎病例。15天后，病例数增加到了135,183例。但州政府的线上数据热图看上去却没有什麼变化。代表疫情最严重的深红色区块的数量似乎并没有增加。怎么回事？

原来，热图中区块变为深红的阈值从原来的2961例上调到了3769例。卡尔·伯格斯特龙（Carl Bergstrom）和杰文·韦斯特（Jevin West）拆穿了这个可视化数据误导受众的案例。他们在华盛顿大学向学生们揭露日益增多的各种恶意或无意的“胡扯”，这便是其中之一。

他们也把课程内容写成了《拆穿胡扯》（Calling Bullshit）一书。这是一本十分有用的指南，帮助读者分辨生活中充斥的各种基于欺骗性数据的可疑说法。这本书通过讲述趣闻轶事、引用网络文化和古代哲学典故来告诉普通读者如何识别骗人的鬼话——即便他们不是数学奇才。作者概述了相关关系与因果关系的区别，简要介绍了可视化技术，解释了机器学习原理，从而让读者有能力去辨别那些听上去（因此很可能确实也是）“好到或坏到不真实”的断言。

糟糕的是，这样的素材比比皆是。在他们举出的例子中有一篇被广泛传播的学术文章，文章似乎表明说唱和嘻哈等类型歌手的死亡年龄比蓝调或爵士音乐人要年轻得多。进行该项研究的人员计算出，有一半嘻哈歌手是被谋杀的——这种说法就是典型的“坏到不真实”。伯格斯特龙和韦斯特指出了他们的谬误：原始数字没有错，但他们的研究范围并不完整，因为他们忽略了仍然健在的歌手。说唱乐从上世纪70年代才开始兴起，因此与文中提及的那些比较严肃的音乐流派相比，现在已经去世的说唱歌手自然比较年轻。

数据的欺骗性和谬误多种多样，作者无情地予以揭露。无论是科学家同

行、媒体，还是“打着TED旗号的胡扯”，谁也不能幸免。他们描述了如何操纵研究结果，让它们看起来具备统计上的重要性，尽管实际并非如此；以及如何将经过扭曲的数据输入算法，从而得到不可靠的结果。例如，两位科学家在2017年声称开发出了一种算法，可以根据从约会网站上采集的图片来推测一个人是同性恋还是异性恋，结果引发了伦理担忧。当时本刊也报道了这篇论文，但该论文并没有提到他们的“同性恋雷达”可能只是根据人们不同的自我展现方式（化妆、姿势等）做出判断，而并非根据真实的体貌差异。

描绘音乐人预期寿命的图表本身没什么杀伤力，但声称能靠一些不明不明的变量辨别一个人的性格就相当危险了。在这次疫情中，关于感染率和药物疗效的错误信息尤其令人担忧，其背后往往有搞鬼的图表在支撑，正如佐治亚州的例子那样。一些科学家已经绕过了常规的同行评议程序。与此同时，新闻媒体也日益面临吸引点击量的压力。越来越多的胡扯正在混淆视听。伯格斯特龙和韦斯特的揭露正当时。 ■



Digital currencies

Bips and bytes

A shift from paper to virtual money will give central banks more power

AMERICA'S FEDERAL RESERVE recognised the disruptive potential of electronic money long ago. "This is a service which it is expected will be more and more availed of as the ease and economy of using it are understood," its New York arm declared in a report. The year was 1917, and the Fed had just started allowing banks to transfer funds by telegram free of any interest charge. More than a century on, central banks are grappling with another technological revolution: the rise of mobile payments and the turn away from cash.

Just as in the early 20th century, when central banks created telegraph transfer networks, they are now coming to the view that they must design their own digital-payment networks in order to retain control of their monetary systems. One idea gaining favour is to issue a so-called central-bank digital currency (CBDC), which would exist only as electrons on a computer chip, rather than a coin or bill. Roughly 80% of central banks are doing some kind of CBDC work, from research to trials, according to one survey. Although still early, it is a trend that could give rise to tantalising new possibilities for monetary policy.

Most central bankers were sceptical about CBDCs at first, but in recent months their views have turned more positive, according to an analysis of their speeches by the Bank for International Settlements (BIS), a club of central banks (see chart). Partly, that is because they are now more familiar with the concept. China has already put the digital yuan into use on a limited test basis, and Sweden is close to that with the e-krona. The coronavirus pandemic has added to the urgency as more people shop online or pay with contactless cards or phones rather than cash.

The primary motivation for issuing a CBDC is likely to be defensive. The gradual demise of cash poses two basic risks. First, online-payment systems could fail, suffering outages or hacks. To safeguard the integrity of their currencies, central banks hope to offer fail-safe digital alternatives.

The second risk is that private-sector systems are too successful, with more people switching to payment platforms offered by big tech firms such as Facebook or Tencent. Many central banks began taking this risk more seriously when Facebook unveiled its plans for a digital currency in 2019. As Hyun Song Shin, head of research at the BIS, has put it, a shift towards such currencies would be like moving the economy from a town-square market—where all vendors happily accept cash—to competition between full-service department stores. Once popular enough, the department stores could stop you from shopping elsewhere and might also introduce new fees. Regulators could require private payment platforms to interconnect, but a well-designed CBDC would help ensure that this happens, by forming a digital bridge between different systems.

European central bankers are most exercised by the effects of a privately run digital currency on competition and the consumer interest. The Fed seems farther away from considering the idea, in part because Americans are keener on cash.

CBDCs also give central banks more control. They could allow for transactions to be easily tracked, perhaps making them more alluring to China's authorities. In the West, where surveys show that the public cares more about privacy, CBDCs may need to ensure anonymity, without circumventing anti-money-laundering checks.

Where things get really interesting from a theoretical perspective are the implications for monetary policy. This is particularly the case if the new currencies are “retail” CBDCs, made available for use by the public. (A less

exciting option would be to issue “wholesale” CBDCs exclusively to commercial banks, much as they already get funds from the central bank, albeit underpinned by whizzier technology.)

CBDCs may make it easier to implement negative interest rates. Unlike old-fashioned cash, digital fiat can be programmed. For now, rates cannot go too negative, because savers can always demand cash, which by definition offers an interest rate of zero. But if digital cash is programmed to have a negative interest rate, people would have fewer fallbacks and central banks more flexibility.

Central bankers might also be tempted by the potential for targeted interventions—much to the horror of those already worried about the clout of unelected monetary officials. Rather than lending to commercial banks, central banks would be able to top up individual currency accounts. During a downturn, they could transfer funds to those with low balances. After a natural disaster, they could direct support to affected areas. And they could offer consumption rebates depending on how and where the money is spent.

Yet these newfound powers would have drawbacks. For the CBDC to be a conduit for negative rates, countries would probably need to have eliminated cash, otherwise people could still opt for physical over virtual money. Moreover, if the CBDC does have a deeply negative interest rate, people might lose confidence in it. Savers could demand another currency or a different asset, such as gold. As for targeted interventions, there is a danger in programming too many special features into digital currencies. They would start to resemble securities with specific purposes, undermining the fungibility that has been a feature of money since the days of cowrie shells.

Central banks would also have to pay heed to new vulnerabilities. In the

event of a panic, savers could convert their bank deposits into their CBDC accounts, adding to stresses on the financial system. Even without a panic, strong demand for CBDCs could chip away at banks' deposit bases, making them more reliant on wholesale funding, which is often more costly and less stable. Some economists argue that limits on withdrawals and on issuance might help avoid some of these effects.

In any case, the policy ramifications are the stuff of monetary fiction for now. A more practical concern is whether central banks can succeed in building sturdy, easy-to-use CBDCs. The past few months have brought several examples of failures in public technology, from overwhelmed unemployment websites in America to an abandoned coronavirus-tracing app in Britain. No government wants to see its currency crash, even if only virtually. ■



数字货币

字节支付

从纸币到虚拟货币的转变将赋予央行更多控制权

美联储很早就认识到了电子货币潜在的颠覆性。“随着它的便利性和经济性逐渐为人所知，预计会有越来越多人使用这种服务。”纽约联储曾在一份报告中这样宣称。时值1917年，美联储刚刚开始允许银行通过电报汇款而不收取任何利息。一个多世纪后的今天，各国央行正在努力应对另一场技术革命——移动支付的兴起和对现金的摒弃。

和在上世纪初创建电汇网络时一样，央行现在开始认识到，必须设计出自己的数字支付网络以保持对货币体系的控制。一种日渐流行的构想是发行所谓的央行数字货币（以下简称CBDC），它不是硬币或纸币，而只是存在于电脑芯片上的电子。一项调查显示，大约80%的央行正在开展某种CBDC方面的研究和试点等工作。尽管还处于初始阶段，但这种趋势可能给货币政策带来诱人的新契机。

大多数央行官员起初都对CBDC持怀疑态度，不过央行俱乐部国际清算银行（BIS）分析了他们的讲话（见图表），显示他们的态度在近几个月变得更正面了。部分原因是他们现在对这一概念有了更多了解。中国已经在小范围试点使用数字人民币，瑞典的电子克朗也已接近试点阶段。新冠疫情让更多人选择网购或采用非接触式银行卡或手机来支付，而不再使用现金，令发行CBDC愈加迫切。

发行CBDC的初衷很可能是出于防御的需要。现金的逐渐消失构成了两大风险。首先，在线支付系统可能因故障或黑客入侵等问题而失灵。为保护本国货币完好无损，各国央行希望发行有故障保险功能的数字货币。

第二个风险是私营部门的系统太过成功，更多的人都转向了Facebook或腾讯等大型科技公司提供的支付平台。Facebook在2019年公布其数字货币计划后，许多央行开始认真看待这一风险。正如国际清算银行的研究部门负

责人申炫松所说，向这类数字货币的转变就像是让经济从一个现金大行其道的城镇集市走向提供全方位服务且彼此竞争的百货公司体系。一旦这些百货公司占领了足够大的市场，它们就可以阻止人们在别处购物，还可能加收新费用。监管机构可以要求不同的私人支付平台之间实现互通，但设计良好的CBDC将有助于确保真的做到这一点，因为它可以在不同系统之间搭建数字桥梁。

欧洲的央行官员最担心的是私营数字货币对竞争和消费者利益的影响。而美联储似乎更不愿意考虑CBDC，部分原因是美国人更热衷使用现金。

CBDC还赋予央行更多控制权。它们让交易更容易被追踪，这或许会增加它们对中国政府的吸引力。在西方，调查显示民众更关心隐私，因此它们可能需要在不逃避反洗钱检查的前提下保证匿名性。

从理论上讲，让这件事变得真正有意思的是它对货币政策的影响。如果新的数字货币是可供民众使用的“零售型”CBDC，就更是如此。而如果是仅向商业银行发行“批发型”CBDC，就像它们现在已经在从央行获得资金那样，相对而言就没那么激动人心，尽管它们有更先进的技术做支撑。

CBDC也许能让负利率更易实施。与传统的现金不同，法定数字货币可被编程。就目前而言，利率还不能降为太大的负值，因为储户总可以要求拿回现金，而现金本质上提供的是零利率。但如果数字货币被设定为负利率，人们的回退策略更少，央行却有了更大的操作空间。

吸引央行官员的另一点是他们有可能采取有针对性的干预措施——这让一些人感到非常恐惧，他们本就对非民选货币官员的影响力感到担忧。央行将能够向个人货币账户发钱，而不用向商业银行放贷。在经济低迷期，它们可以向低余额账户转账。自然灾害发生后，它们可以直接向灾区提供援助。此外它们还可以根据消费方式和地点提供消费补贴。

不过，这些新获得的权力也有其弊端。为了能通过CBDC实现负利率，各国很可能需要取消现金，否则人们仍然可以选择实体货币而避开虚拟货币。此外，如果CBDC真的实行过低的负利率，人们也可能对它失去信

心。储户可能会选择另一种货币或者黄金等其他资产。至于针对性的干预措施，为数字货币设计过多的特殊功能也存在危险。它们会慢慢变得类似于特殊目的证券，削弱自贝币时代以来货币一直具有的可互换性。

央行还必须留意新的系统脆弱性。一旦出现恐慌，储户可能会将银行存款转换到CBDC账户中，从而增加金融体系的压力。即使没出现恐慌，对CBDC的强劲需求也可能侵蚀银行的存款基数，从而使它们更加依赖于成本往往更高且更不稳定的批发性融资。一些经济学家认为，限制提款和发行量可能有助于避免一部分影响。

不管怎样，目前对货币的政策影响还只是一种假设。更实际的担忧是各国央行能否成功创建出牢靠易用的CBDC。过去几个月已经发生了好几起公共技术失败的例子，比如美国申领失业救济的网站被挤崩、英国新冠病毒追踪应用夭折等。没有哪个政府愿意看到本国货币崩溃，即使只是虚拟的钱。■



Buttonwood

Snake in the grass

Chapter 11 is no longer a haven for deadbeat debtors

IN THE EARLY 1980s Houston lived through a real-estate frenzy. Then the oil price crashed. Humble Place, a 30-acre tract divided into land parcels, was one of many unfinished projects. The developer filed for Chapter 11 bankruptcy. By the start of the 1990s, his creditors were still unpaid. A court heard that his recovery plan amounted to “mowing the grass and waiting for the market to turn”.

Such cases shaped a particular view of Chapter 11, the bit of America’s bankruptcy code directed at preserving businesses rather than winding them up. It was widely seen as a way to enrich lawyers and a means for debtors to frustrate creditors endlessly. The growing caseload in the wake of the covid-19 recession is likely to give new life to critics of Chapter 11. There are serial users. NorthEast Gas Generation, of Texas, recently joined the “Chapter 33” club. It has filed three times in six years.

A perennial bugbear is that Chapter 11 keeps the debtor in possession of the business. If unpaid debts do not spell the sack for management, say critics, then where is its incentive to be prudent? Yet a system that leans towards keeping a firm alive helps preserve its value. Bankruptcy is no longer creditor versus debtor, if it ever was. It is—as it should be—a wrangle between creditors. And these days it is secured bondholders who appear to be in control of the process.

Why involve the courts at all? In the case of a single debtor and a single creditor, there is not much to adjudicate. A property firm owes \$2m to a bank. It defaults. The bank seizes the assets. Case closed. Things become messier when there are lots of competing claims on a troubled company.

There is then an incentive for creditors to rush to get their money out while they can, which can undermine the business and destroy value for other creditors. Bankruptcy allows for a stay on legal action while the parties sort out what happens to the business and decide who gets what.

The first goal of a bankruptcy process is to maximise the proceeds. For a business that is bleeding cash, the best option may be liquidation: selling off buildings, equipment, patents and other assets. But a lot of the value of an enterprise is tied up in intangible assets, such as the skills of its workforce or its relationships with suppliers and customers. So getting the most value often means selling the business as a going concern, or finding other ways for it to continue. The second goal is to preserve the priority of claims so that senior creditors are paid first and common-equity holders paid last. This is vital to the working of capital markets. Securities should be priced according to their risks.

A third goal may be ensuring that a firm's managers pay a penalty for its going bankrupt. But that may clash with the first goal. Managers who know a business are probably best placed to preserve its value.

A big sticking point is working out just how much value is in the business. Take Broke N Hungry, a hypothetical casual-dining chain, which has filed for Chapter 11. It has two creditors, Narcissus Capital, which owns \$100m of senior debt and CovLite Capital, which owns \$100m of junior debt. The liquidation value of Broke N Hungry's assets is \$100m. But there is uncertainty about its value as a going concern. There is a 50-50 chance that a vaccine for covid-19 is found. If it is found, Broke N Hungry is worth \$200m; if not, the business is worth \$50m. The expected value of it is thus \$125m. The right decision is to keep it going. But Narcissus will not see it that way. In a liquidation it is sure to get its money back. If the business carries on, it gains nothing extra if things go well and loses \$50m if things go badly. So it will favour liquidation, denying CovLite the chance to get its

money back.

Reality is trickier still. The uncertainty is greater and there are many different classes of debt. But today senior creditors seem to be getting the upper hand. Perhaps that is because more and more of them are savvy distressed-debt specialists, often from the world of private equity. They buy up the secured debt of troubled firms with the aim of becoming owners. They offer a financing package to tide the business over. And they make a bid to buy out other creditors.

Do the unsecured bondholders get a raw deal? “Put it this way”, deadpans a law professor, “everybody wants to be a senior secured creditor.” The power in Chapter 11 ebbs and flows. The shift might even be traced back to the Humble Place case. An appeals-court judge eventually ruled against the debtor. The case notes do not record whether a lawnmower was one of the seized assets. ■



梧桐

潜藏敌人

美国《破产法》第十一章不再是“老赖”的庇护所

上世纪八十年代初，休斯顿经历了一场房地产狂潮。后来油价暴跌。占地30英亩、划分成很多小地块的亨布尔地（Humble Place）是众多烂尾项目之一。开发商根据美国《破产法》第十一章申请了破产保护。到90年代初，他的债权人仍未得到偿付。在法庭上，他说复苏计划大概就是“继续除草并等待市场好转”。

这类案例让人们对《破产法》第十一章这个意在保留企业而不是让其关门的条款生发出一种别样的观感。人们普遍认为，它成了律师的致富之道和债务人无休止赖账的手段。疫情引发经济衰退后，申请破产保护的案例增加，第十一章很可能会引来新一轮的批评。有些公司是“惯犯”。德克萨斯州的东北天然气发电公司（NorthEast Gas Generation）最近加入了“第三十三章”俱乐部——它在六年内提交了三次申请。

第十一章一个长期存在的问题是申请破产的企业一直都留在债务人手中。批评人士说，如果还不了债务管理层却不用下岗，那谁还会有动力去谨慎经营呢？不过，一个倾向于让企业生存下去的制度有助于留存企业的价值。破产也许曾是债权人和债务人之间的事，但现在不再如此了。破产是（也理应是）债权人之间的角力。而今天，掌控了整个过程的似乎是有担保债权人。

为什么破产需要法院的介入？如果债务人和债权人分别只有一个，那就没什么需要裁定的。一家房地产公司欠银行200万美元，违约了，银行没收其资产，结案。如果一家陷入困境的公司有许多不同债务主张的债权人，情况就更复杂纷乱。这就会鼓励债权人争相趁着还有机会的时候拿回自己的钱，而这会削弱企业并破坏它对于其他债权人的价值。破产程序允许延缓法律行动，让各利益方厘清公司现状，决定分配方案。

破产程序的首要目标是使收益最大化。对于正在流失现金的企业来说，最好的选择可能是清算：出售物业、设备、专利和其他资产。但是，企业的很多价值都与员工技能、与供应商和客户间的关系等无形资产捆绑在一起。因此，获得最大价值通常意味着在出售资产时企业要能继续经营，或者找到让企业存续的其他方式。第二个目标是确保清偿的优先次序，按照优先债权人最先、普通股持有人最后的顺序清偿。这对于资本市场的正常运作至关重要。证券应根据风险定价。

第三个目标可能是确保管理者为公司破产付出代价。但这可能与第一个目标有冲突。熟悉公司情况的管理者或许最能保持公司的价值。

整个过程中最大的分歧点在于确定公司的价值。假设有一家名为“破多饥”（Broke N Hungry）的餐饮连锁店，它已经走了第十一章破产程序。它有两个债权人：拥有一亿美元优先级债务的“水仙资本”（Narcissus Capital）和拥有一亿美元次级债务的“疫轻资本”（CovLite Capital）。连锁店资产的清算价值为一亿美元。但其持续经营的价值存在不确定性。找到新冠疫苗的机会是50%。找到的话，破多饥的价值将达到两亿美元，如果找不到，则将跌至5000万美元。因此其预期价值为1.25亿美元。正确的决定是让它继续经营下去。但水仙资本不会这么想。一旦清算，它就能收回自己的资金。继续经营的话，如果进展顺利，它也得不到额外的好处；而如果不顺利，它将损失5000万美元。因此，它将赞成清算，而这样一来疫轻资本就没机会拿回自己的钱。

现实还要更复杂。不确定性会更大，且债务的种类繁多。但如今，优先债权人似乎占据了上风。这也许是因为越来越多的优先债权人都是精明的不良债务专家，通常是来自私募股权领域。它们会购买陷入困境的公司的有担保债务，目的是成为公司的所有者。它们为公司提供融资方案，帮助它们渡过难关。然后出价买断其他债权人的债务。

无担保债权人是不是就吃亏了？“这么说吧，”一位法学教授冷冷地说笑道，“人人都想成为有担保的优先债权人。”第十一章赋予债务人的权力有涨有落。这种变化甚至可以追溯到亨布尔地的案例。一位上诉法院的法官

最终裁定债务人败诉。案件记录中没有记录割草机是否属于被查封资产。





Metals

Shining brightly

An odd recovery means that copper and gold prices are both rising

THERE IS, SUPPOSEDLY, a neat choreography to copper and gold prices. When one rises, the other tends to fall. In an economic downturn, for instance, gold climbs as investors seek a haven. Copper prices dip as manufacturing and construction slow. But these are unusual times, and gold and copper are moving in unusual ways. Rather than continue their customary do-si-do, they are leaping upwards together.

The price of copper surpassed \$6,000 a tonne in June, up about 30% since the depths of March. Gold last month topped \$1,800 an ounce, approaching a record reached in 2011. Many analysts reckon it may exceed \$2,000 this year or next. As the world continues to reel from covid-19, the economic outlook is uncertain and the recovery uneven from one country to the next. For those betting on gold and copper, this has proved a winning formula.

Gold started its recent climb from an already lofty perch. The ascent began at the end of 2018, as a trade war between America and China clouded the prospects for economic growth. Sinking interest rates in America lowered the yield on ten-year inflation-indexed Treasury bonds, making gold shine brighter. From November 2018 to late 2019 the price of the yellow metal jumped by about 25%, to \$1,515.

Now covid-19 is propelling gold to even more vertiginous heights. Investors are scrambling for security, fearing a prolonged downturn as the virus continues to ravage giant economies such as America and Brazil. Gold-backed exchange-traded funds attracted \$40bn in the first half of the year, a record. The dollar has weakened, making it cheaper for holders of other currencies to buy gold. Rates remain low. Jerome Powell, the chairman of

the Federal Reserve, said in June that he was not even “thinking about thinking about” raising them. China, hit first by the virus, is recovering first, too, offering further upside. It is gold’s biggest retail market, and more shopping there would lift prices higher.

Copper’s rise this year may be even more striking. Its price sank by more than a quarter from January to mid-March when covid-19 spread across China, which accounts for about half of the red metal’s consumption. Now, however, efforts to stimulate China’s economy are spurring investment. In June a tracker of sector-level demand for copper in China used by Citigroup, a bank, rose by 5.5% on the year, its biggest jump in over two years.

As China invests to recover from the pandemic, though, the Americas are still grappling with it, explains Jeff Currie of Goldman Sachs, a bank. Because copper production is concentrated in South America, that has constrained supply. Some mines in Peru, shut because of the virus, are only slowly resuming production, points out Susan Bates of Morgan Stanley, another bank. In Chile, where mines have been operating with reduced staff, the deferral of needed maintenance may restrict supply in the months to come. And miners may strike, further threatening output.

It is unclear how long copper prices can be sustained by investment in one place and infection in another. The metal’s traditional engine—strong global economic growth—is sputtering. Continued infections in America or a resurgence of the virus elsewhere could further depress demand for appliances, cars and other copper-dependent goods.

That said, on July 21st European leaders agreed to new stimulus; and demand for copper may rise as countries outside China invest in electric grids and solar farms veined with the metal. Gold’s rally may be even more persistent, argues Mr Currie, supported by factors that linger through the

2020s: high debt levels that weigh on the dollar, and low interest rates. The journey skyward may not be over yet. ■



金属

熠熠发光

复苏不同步导致铜价和金价都在涨

铜价和金价本应跳着非常整齐的双人舞。当一个上升时，另一个往往会下降。例如，在经济低迷期，投资者寻求避风港，金价随之攀升；而制造业和建筑业放缓，所以铜价下跌。但现在是非同寻常的时期，金价和铜价的变化模式也不同以往。它们不再继续传统的换位舞步，而是一起往上跳。

今年6月，铜价突破了每吨6000美元，较3月的低点上涨了约30%。7月金价突破每盎司1800美元，接近2011年创下的纪录。许多分析人士认为，今年或明年金价可能会超过2000美元。新冠疫情仍在肆虐，世界经济前景尚不明朗，各国经济复苏情况也不平衡。对于那些押注黄金和铜的人来说，事实已经证明这是个制胜方案。

金价近期开始攀升时的起点已然很高。金价上涨始于2018年底，当时中美贸易战给经济增长前景蒙上了阴影。美国不断下降的利率压低了10年期通胀保值国债的收益率，让黄金更显耀眼。从2018年11月到2019年底，金价上涨了约25%，达到每盎司1515美元。

如今新冠疫情正将金价推至更令人眩晕的高位。病毒仍在美国和巴西等大型经济体肆虐，投资者们担心经济会持续低迷，都在争先恐后地寻求安全之地。今年上半年，黄金支持的交易所交易基金创纪录地吸引了400亿美元资金。美元走弱，因此其他货币的持有者购买黄金的成本变低。利率维持低位。美联储主席杰罗姆·鲍威尔（Jerome Powell）6月表示他连“想都没想过”加息。首先遭受病毒冲击的中国也首先恢复，提供了更多利好。中国是最大的黄金零售市场，中国的购买量增加会让金价更高。

铜价今年的上涨可能更加引人注目。中国的铜消费量约占全球消费总量的一半，今年1月至3月中旬，也就是新冠疫情在中国蔓延期间，这种红色金属的价格下跌逾四分之一。不过，眼下中国刺激经济的举措正在推动投

资。花旗银行使用的一个跟踪中国行业级铜需求的指数6月同比上涨了5.5%，是两年多来的最大涨幅。

高盛的杰夫·柯里（Jeff Currie）解释说，中国展开投资以求从疫情中恢复经济之时，美洲国家仍在与病毒搏斗。而铜的生产集中在南美，因此供应受限。另一家银行摩根士丹利的苏珊·贝茨（Susan Bates）指出，秘鲁的一些矿山因疫情关闭，现在还只是在缓慢地恢复生产。在智利，矿山一直在人员不足的情况下运营，必要的维护工作的延期可能会限制未来几个月的供应。而且矿工们可能会罢工，进一步威胁产量。

尚不清楚一地的投资加之另一地疫情流行能支撑铜价多久。铜价的传统推动力是强劲的全球经济增长，但现在这个引擎已经熄火。美国疫情的持续或其他地方的疫情复发可能会进一步抑制对家电、汽车和其他依赖铜的商品的需求。

不过，欧洲领导人在7月21日同意了新的经济刺激方案；随着中国以外的国家投资大量用到铜的电网和太阳能发电厂，对铜的需求可能会上升。柯里认为金价的上涨可能会更持久，因为令美元承压的高债务水平以及低利率这两个支撑金价的因素可能贯穿整个2020年代。一飞冲天的旅程可能还未结束。■



Corporate taxes

Digital divide

The row over taxing big tech firms heats up

WHEN G20 FINANCE ministers met on July 18th and 19th, avoiding a new trade war was high on the agenda. Cash-strapped governments around the world are planning to whack taxes on online services. But America regards these as a grab for its companies' profits, and is considering retaliation against ten digital-tax proposals. On July 10th it said it would respond to France's tax by hitting French handbags, lipstick and soap with tariffs of 25%. Unless a truce is struck, the tariffs will go into effect in January.

The root cause of the dispute is a flaw in the international tax system. In order to avoid taxing businesses twice, governments typically apply the corporate tax to firms that are legally domiciled on their shores or have a local physical base, and link the amount due to the location of their assets and production. But now many companies provide online services and can shift intellectual property to low-tax regimes with the click of a button. A system intended to stop profits being taxed too much allows them to be taxed too little.

In 2017 40% of profits made by multinational firms outside their home country were shifted to tax havens, reckon Thomas Torslov, now at the Danish Ministry of Taxation, and Ludvig Wier and Gabriel Zucman of the University of California, Berkeley. That meant more than \$200bn in forgone tax revenue, equivalent to 10% of global corporate-tax receipts. This is a relatively small amount: by comparison, governments worldwide have unleashed stimulus of \$5.4trn in response to covid-19. But it is symbolically important and rightly irks taxpayers, who must fill the hole.

For several years now, the OECD, a club of rich countries, has convened

governments in the hope of plugging the tax leaks. The idea was that the G20 meeting would lay the groundwork so that the OECD's summit, planned for October, yields results.

The talks cover two proposals, or "pillars", in OECD-speak. The first is meant to direct more of the global-tax take towards places where the customers of digital firms live. Corporate-tax liability will depend not on whether companies are physically present in a country, but on whether they have a "sustained and significant involvement" there. Pillar two establishes a global minimum tax. The OECD reckons that the two proposals could together raise corporate-tax revenue by up to 4%.

Pillar two has the greater chance of being agreed—and would raise more revenue. The idea of a global minimum is to blunt companies' incentives to shift profits to low-tax jurisdictions. There is still some haggling to be done. But some sort of agreement should be possible, if only because governments can go it alone. The Americans, for example, enacted a version in 2017, with a tax on global intangible low-taxed income (GILTI). Havens can offer all the perks they want, but American companies still face a rate of at least 10.5% on GILTI associated with their foreign affiliates.

That might explain why Steven Mnuchin, America's treasury secretary, was reasonably positive about the second pillar in June. But he wants to put talks on the first on hold. In December he proposed that the new system should be optional for American firms. The suggestion, which would in effect neuter any new rules, was badly received by other countries. But as it stands, the OECD's plan is unbalanced: it asks America to hand over the right to tax its companies to other countries, without getting much in return.

Without an agreement on pillar one that divvies up tax rights, a proliferation of digital-tax schemes seems likely. (The European Union's

resolve to implement one may have been stiffened by its loss on July 15th of a big tax case against Apple.) These taxes are a much cruder fix than a pillar-one solution. Companies could face a stack of competing tax bills. The levies also mostly apply to revenues rather than profits, and often try to exempt domestic champions. To top it all off, they are a recipe for trade conflict. ■



公司税

数字鸿沟

围绕向科技巨头征税的争执愈演愈烈

上月18日至19日二十国集团（G20）财长会议期间，避免爆发新的贸易战是重要议程。资金短缺的各国政府正计划对在线服务征税。但美国认为这些举措是要分美国企业利润的羹，正在考虑对十项数字税提案发起报复。7月10日，美国表示将对法国的手袋、口红和香皂加征25%的关税，以回应法国的数字税。除非双方休战，否则这些新关税将于明年1月生效。

争议的根本原因是国际税收制度存在缺陷。为避免对企业双重征税，政府通常会对在本国合法注册或在本地有实体经营的企业征收公司税，并将应纳税额与其资产和生产所在地挂钩。但现在很多公司都提供在线服务，只需按一下键就可以将知识产权转移到低税率地区。一个原本旨在防止多重征税的体系结果却对企业征税过少了。

据任职于丹麦税务部的托马斯·托尔斯洛夫（Thomas Torslov）以及加州大学伯克利分校的路德维格·维尔（Ludvig Wier）和加布里埃尔·祖克曼（Gabriel Zucman）估算，2017年跨国公司在母国之外赚取的利润中有40%被转移到了避税天堂。这意味着2000多亿美元的税收付诸东流，相当于全球公司税收入的10%。这个数额相对较小——各国政府针对新冠疫情推出的刺激计划规模达5.4万亿美元。但这笔钱具有重要的象征意义，而且让纳税人不满，这也合情合理，因为缺口得由他们来填补。

过去几年来，富国俱乐部经合组织（OECD）多次召集各国政府讨论，希望能堵住这些税收漏洞。此次G20会议意在奠定基础，以求在定于10月举行的经合组织首脑会议上取得成果。

讨论涵盖了两个方案，用经合组织的说法就是双“支柱”。第一个支柱是要将全球更多税收收入导向数字企业的客户所在的地方。公司应否纳税将不取决于它们在一国是否有实体经营，而是取决于它们在该国经济中是否有

“持续且重要的参与”。第二个支柱设定了全球最低税率。经合组织估计，这两个方案总共可使公司税收入增加多达4%。

支柱二获得认可的可能性更大一些，可以增加的收入也更多。设定全球最低税率意在抑制公司将利润转移到低税辖区的动机。各方还会就此进一步讨价还价，但应该可以达成某种形式的协议，哪怕只是因为各国政府原本也可以各行其是。例如，美国人在2017年就制定了一个类似的税收政策，对全球无形资产低税收入（GILTI）征税。避税天堂仍可以提供企业想要的各种优惠，但美国公司仍需为其海外子公司相关GILTI缴纳至少10.5%的税。

这或许可以解释为何美国财长史蒂芬·姆努钦（Steven Mnuchin）在6月表达出对支柱二较肯定的态度。但他想搁置关于支柱一的谈判。去年12月，他提出美国公司应该可以选择是否加入新的税收制度。该提议实际会让任何新规则都失去意义，其他国家对此非常不满。但目前而言经合组织的计划也不够公正：它要求美国把对本国公司的课税权移交给其他国家，却没有给美国什么对等的益处。

如果无法就划分课税权的支柱一达成协议，就很可能涌现出各种各样的数字税计划。（7月15日，欧盟在起诉苹果公司的巨额税收案中败诉，这可能坚定了它征收数字税的决心。）这些税制要比支柱一的解决方案简单粗暴得多。企业可能要面临一大堆重复的税单。课税对象也大多是收入而非利润，而且往往会试图豁免本国领军企业。最糟糕的是，它们可能会成为贸易冲突的配料。■



Macroeconomics

Free money

Governments can now spend as they please. That presents opportunities—and grave dangers

IT IS SOMETIMES said that governments wasted the global financial crisis of 2007-09 by failing to rethink economic policy after the dust settled. Nobody will say the same about the covid-19 pandemic. It has led to a desperate scramble to enact policies that only a few months ago were either unimaginable or heretical. A profound shift is now taking place in economics as a result, of the sort that happens only once in a generation. Much as in the 1970s when clubby Keynesianism gave way to Milton Friedman's austere monetarism, and in the 1990s when central banks were given their independence, so the pandemic marks the start of a new era. Its overriding preoccupation will be exploiting the opportunities and containing the enormous risks that stem from a supersized level of state intervention in the economy and financial markets.

This new epoch has four defining features. The first is the jaw-dropping scale of today's government borrowing, and the seemingly limitless potential for yet more. The IMF predicts that rich countries will borrow 17% of their combined GDP this year to fund \$4.2trn in spending and tax cuts designed to keep the economy going. They are not done. In America Congress is debating another spending package. The European Union has just agreed on a new stimulus funded by common borrowing, crossing a political Rubicon.

The second feature is the whirring of the printing presses. In America, Britain, the euro zone and Japan central banks have created new reserves of money worth some \$3.7trn in 2020. Much of this has been used to buy government debt, meaning that central banks are tacitly financing the

stimulus. The result is that long-term interest rates stay low even while public-debt issuance soars.

The state's growing role as capital-allocator-in-chief is the third aspect of the new age. To see off a credit crunch, the Federal Reserve, acting with the Treasury, has waded into financial markets, buying up the bonds of AT&T, Apple and even Coca-Cola, and lending directly to everyone from bond dealers to non-profit hospitals. Together the Fed and Treasury are now backstopping 11% of America's entire stock of business debt. Across the rich world, governments and central banks are following suit.

The final feature is the most important: low inflation. The absence of upward pressure on prices means there is no immediate need to slow the growth of central-bank balance-sheets or to raise short-term interest rates from their floor around zero. Low inflation is therefore the fundamental reason not to worry about public debt, which, thanks to accommodative monetary policy, now costs so little to service that it looks like free money.

Don't fool yourself that the role of the state will magically return to normal once the pandemic passes and unemployment falls. Yes, governments and central banks may dial down their spending and bail-outs. But the new era of economics reflects the culmination of long-term trends. Even before the pandemic, inflation and interest rates were subdued despite a jobs boom. Today the bond market still shows no sign of worrying about long-term inflation. If it is right, deficits and money-printing may well become the standard tools of policymaking for decades. The central banks' growing role in financial markets, meanwhile, reflects the stagnation of banks as intermediaries and the prominence of innovative and risk-hungry shadow banks and capital markets. In the old days, when commercial banks ruled the roost, central banks acted as lenders of last resort to them. Now central banks increasingly have to get their hands dirty on Wall Street and elsewhere by acting as mammoth "marketmakers of last resort".

A state with a permanently broader and deeper reach across the economy creates some opportunities. Low rates make it cheaper for the government to borrow to build new infrastructure, from research labs to electricity grids, that will boost growth and tackle threats such as pandemics and climate change. As societies age, rising spending on health and pensions is inevitable—if the resulting deficits help provide a necessary stimulus to the economy, all the more reason to embrace them.

Yet the new era also presents grave risks. If inflation jumps unexpectedly the entire edifice of debt will shake, as central banks have to raise their policy rates and in turn pay out vast sums of interest on the new reserves that they have created to buy bonds. And even if inflation stays low, the new machinery is vulnerable to capture by lobbyists, unions and cronies.

One of monetarism's key insights was that sprawling macroeconomic management leads to infinite opportunities for politicians to play favourites. Already they are deciding which firms get tax breaks and which workers should be paid by the state to wait for their old jobs to reappear. Soon some loans to the private sector will turn sour, leaving governments to choose which firms fail. When money is free, why not rescue companies, protect obsolete jobs and save investors?

However, though that would provide a brief stimulus, it is a recipe for distorted markets, moral hazard and low growth. Fear of politicians' myopia was why many countries delegated power to independent central banks, which wielded a single, simple tool—interest rates—to manage the economic cycle. Yet today interest rates, so close to zero, seem impotent and the monarchs who run the world's central banks are becoming rather like servants working as the government's debt-management arm.

| *Free markets and free lunches*

Each new era of economics confronts a new challenge. After the 1930s the

task was to prevent depressions. In the 1970s and early 1980s the holy grail was to end stagflation. Today the task for policymakers is to create a framework that allows the business cycle to be managed and financial crises to be fought without a politicised takeover of the economy. This may involve delegating fiscal firepower to technocrats, or reforming the financial system to enable central banks to take interest rates deeply negative, exploiting the revolutionary shift among consumers away from old-style banking to fintech and digital payments. The stakes are high. Failure will mean the age of free money eventually comes at a staggering price. ■



宏观经济

白来的钱

各国政府现在可以随心所欲地花钱。这带来了机会——和严重的危险

人们有时会说，各国政府白白浪费了2007至2009年的那场全球金融危机，因为它们在危机过后并没有反思经济政策。这次新冠疫情不会再招来同样的非议了。疫情爆发以来，各国争先恐后地出台在几个月前还难以想象或者会被视为离经叛道的政策。因此，经济运作正在发生一场深刻的转变——二三十年一遇的那种。正如上世纪70年代排外的凯恩斯主义阵营让位于米尔顿·弗里德曼（Milton Friedman）严格的货币主义，以及90年代央行获得独立性一样，这次疫情也标志着一个新时代的开始。在这个时代，国家以超大规模干预经济和金融市场，第一要务将是抓住由此带来的机遇并遏制其中的巨大风险。

这个新时代有四个基本特征。首先，如今各国政府举债规模之大令人瞠目结舌，而且似乎还有无限潜力继续下去。国际货币基金组织（IMF）预测，发达国家今年的债务规模将占其GDP总量的17%，为它们4.2万亿美元的支出和减税措施提供资金，从而维持经济运转。还不止于此。美国国会正在辩论另一项开支计划。欧盟在政治上破釜沉舟，刚刚就一项基于共同借款的新刺激计划达成一致。

第二个特征是印钞机的轰鸣声。美国、英国、欧元区和日本的央行在2020年已经发行了约3.7万亿美元的新货币储备。大部分已经用来购买政府债券，这意味着央行正在心照不宣地为刺激计划提供资金。其结果是，即使公共债务发行量飙升，长期利率仍然维持在低位。

国家日益成为“资本配置总监”是新时代的第三个特征。为避免信贷紧缩，美联储与财政部一起介入金融市场，大举购买AT&T、苹果甚至可口可乐等公司的债券，并直接向从债券交易商到非盈利医院的各类机构放贷。现在，美联储和财政部一起为美国全部企业债务的11%提供了担保。在整个富裕世界，政府和央行正纷纷效仿。

最重要的是最后一个特征：低通胀。既然没有价格上涨的压力，那么央行既不需要着急放缓扩表的速度，也不用急于将短期利率从接近于零的底部上调。因此，低通胀是无需担心公共债务的根本原因，而由于宽松的货币政策，公共债务现在的偿债成本极低，钱几乎就是白来的。

千万不要天真地以为，一旦疫情过去、失业率下降，政府的角色就会神奇地回归常态。没错，政府和央行可能会降低支出和纾困力度，但经济运作的新时代反映了一些长期趋势达到顶点。即使在疫情爆发之前，在就业市场繁荣的情况下，通胀和利率依然低迷。今天的债券市场仍然没有表现出对长期通胀的丝毫担忧。如果真是如此，赤字和印钞很可能会成为未来几十年制定政策的标准工具。与此同时，央行在金融市场中的作用日益加强，反映出银行的中介作用陷入停滞，而富于创新、敢冒风险的影子银行和资本市场正大行其道。过去商业银行当家作主的时候，央行是它们的最后贷款人。而现在越来越多央行被迫亲自上阵，直接介入华尔街和其他市场，充当巨人般的“最后做市商”。

政府对经济的干预不断扩大和加深会创造出一些机会。低利率让政府能以低成本举债，建设从科研实验室到电网的各种新基础设施，从而促进经济增长，并应对流行病和气候变化等威胁。随着社会人口老龄化，医疗和养老金支出增加将不可避免——如果由此产生的赤字有助于为经济提供必要的刺激，那就更应该欣然接受。

然而，新时代也预示着严重的风险。如果通胀率出乎意料地飙升，各国央行就必须提高政策利率，进而又得为购买债券而发行的新储备支付巨额利息，整座债务大厦将摇摇欲坠。而即使通胀保持在低位，新机制也容易被说客、工会和朋党钻空子。

货币主义的一个关键见解是，无节制的宏观经济管理会给政客无限的机会去偏袒徇私。他们现在已经在决定哪些公司可以享受减税，哪些劳动者应由国家支付工资直到可以重回旧岗位。用不了多久，给私营部门的一些贷款将变成坏账，届时政府又要决定该让哪些企业倒闭。既然钱是白来的，何不救助公司、保护该淘汰的职位、拯救投资者？

尽管这会带来短暂的刺激，却会导致市场扭曲、道德风险和增长低迷。正是出于对政客短视行为的担心，许多国家才将权力授予独立的央行，而央行在管理经济周期时只使用一种简单的工具——利率。但如今利率已接近于零，这种工具似乎已经失去效力，而世界各国掌管央行的君主们正在沦为替政府管理债务的仆人。

| 自由市场和免费午餐

经济运作的每个新时代都在对抗一项新挑战。上世纪30年代之后的任务是防止经济萧条。在70年代和80年代初，梦寐以求的目标是结束滞胀。而今天，政策制定者的任务是创建一个框架，在不对经济做政治化接管的情况下管理经济周期和应对金融危机。这可能包括将财政权交给技术官僚，或者改革金融体系从而允许央行将利率下调至远低于零，充分利用消费者从传统银行服务转向金融科技和数字支付的革命性转变。这事关重大。一旦失败，这个白来钱的时代最终将付出惊人的代价。■



Resource economics

Capital pains

The world's wealth is looking increasingly unnatural

NATURE'S BOUNTY is not easy to count, partly because she was kind enough not to bill us for it. Some economists, however, have attempted to put a dollar figure on the value of the world's land, forests, fisheries, minerals and fossil fuels—or what is left of them. Their work has fed into the Inclusive Wealth project, initiated by the United Nations, directed by Managi Shunsuke of Kyushu University and advised by Sir Partha Dasgupta of Cambridge. They estimate the world's natural capital amounted to over \$91trn in 2014, or over \$13,000 per person. (The estimates use 2005 exchange rates and prices.) New Zealand has more natural capital per person (\$380,000) than oil-rich Kuwait (\$362,000) or Saudi Arabia (\$180,000). Gabon has more than anywhere else.

Many researchers now think of natural resources as a “curse” that erodes competitiveness and breeds corruption—economies which are heavily dependent on exporting raw materials are often dominated by small, rapacious elites. For example, Congo, which relies on mining, has about 25% more natural capital per person than the global average, but remains desperately poor. Conversely, countries like Singapore enjoy a high GDP per person despite an utter lack of God-given resources. About two-thirds of Singapore's wealth consists instead of traditional capital: infrastructure, buildings, plant and equipment. The rest is the “human capital” reflected in its people and their skills.

On average, however, countries with more natural capital also tend to have a higher GDP per person. So is it a curse or a blessing? Some economists argue that natural bounty raises the level of GDP but slows its growth rate: it provides an additional, steady stream of income that grows less quickly

than the rest of the economy.

One reason may be that resources become harder to extract as they are depleted. According to the Inclusive Wealth Report, 47% of the world's natural capital comprises fossil fuels (oil, natural gas and coal) and minerals (copper, gold, iron and so on) that took an eternity to form and will not be replaced. From 1990 to 2014, the stock of natural capital per person fell in 128 out of the 140 countries in the report.

Will that trend continue? Together with Yogi Sugiawan, formerly of Kyushu University, and Robi Kurniawan of Tohoku University, Mr Managi has calculated the future trajectory of natural capital under a variety of scenarios. In a future of continued high energy demand, carbon emissions can be expected to grow by 7% in high-income countries and by 44% in the rest of the world over the next two decades.

In such a scenario, the world will continue to grow wealthier, but natural assets will diminish rapidly as a share of its portfolio. A typical person in one of today's high-income countries will have 21% less natural capital at their disposal in 2040 than they do today. In other, poorer countries they will have 17% less.

According to these projections, only 12 countries will increase their stock of natural capital per person over the next two decades. And in 39 countries, including resource superpowers like Brazil, Russia and Saudi Arabia, the stock will fall by over 30%. Financial capital tends to accumulate. Natural capital seems destined to do the opposite. ■



资源经济学

资本损耗

自然资源在世界财富中的占比日渐降低

自然的恩赐不容易计算，部分原因是大自然够宽容，没给我们开账单。不过，一些经济学家尝试计算出世界上的（或者说世界上尚存留的）土地、森林、水产、矿产和化石燃料的美元价值。他们的研究成果已被纳入“包容性财富”（Inclusive Wealth）项目，该项目由联合国发起，由日本九州大学的马奈木俊介主持，剑桥大学的帕萨·达斯古普塔（Partha Dasgupta）担任顾问。据他们估算，2014年世界自然资本总值超过91万亿美元，人均超过1.3万美元。（该估算使用了2005年的汇率和价格。）新西兰的人均自然资本（38万美元）高于盛产石油的科威特（36.2万美元）或沙特阿拉伯（18万美元）。加蓬领先所有其他国家。

现在许多研究人员认为自然资源是一种“诅咒”，它会削弱竞争力并滋生腐败——高度依赖原材料出口的经济体往往被少数贪婪的精英所控制。以依赖采矿业的刚果为例，虽然其人均自然资本比全球平均水平高出约25%，但仍然极度贫困。相反，像新加坡这样的国家几乎没有什么天赐的资源，人均GDP却很高。新加坡的财富中约三分之二都属于传统资本：基础设施、建筑、工厂和设备。其余是体现在人民及其技能上的“人力资本”。

但是，平均而言，自然资本更多的国家，其人均GDP往往也更高。那么它到底是一种诅咒还是祝福？一些经济学家认为，自然财富提高了GDP的水平，但减缓了其增长速度：它带来了额外的、稳定的收入来源，但这种收入的增速要低于其他经济部门。

其中一个原因可能是，随着资源枯竭，开采变得越来越难。《包容性财富报告》认为，全球47%的自然资本为化石燃料（石油、天然气和煤炭）和矿产（铜、金、铁等），这些资源历经亿万年才能形成，且无法更新。从1990年到2014年，报告涵盖的140个国家当中，128个国家的人均自然资本存量都在减少。

这种趋势会持续下去吗？马奈木俊介与曾在九州大学任职的约吉·苏吉阿弯（Yogi Sugiawan）以及日本东北大学的罗比·古尼阿弯（Robi Kurniawan）一起计算了各种情景下自然资本未来的变化轨迹。在未来能源需求持续高企的情况下，预计未来20年高收入国家的碳排放将增长7%，世界其他地区将增长44%。

在这种情景下，世界将继续变得更加富裕，但自然资产在全球财富中所占的份额将迅速降低。在当今的高收入国家，一个普通人在2040年可支配的自然资本将比现在减少21%。在其他较贫穷的国家将减少17%。

根据这些预测，未来20年内只有12个国家的人均自然资本存量会增加。而在39个国家，包括巴西、俄罗斯和沙特阿拉伯等资源超级大国，其自然资本存量将减少30%以上。金融资本趋于不断累积，而自然资本似乎注定要日趋耗尽。■



Schumpeter

The wannabe Alibaba

MercadoLibre is shaking up both retail and finance in Latin America

SINCE YOUR columnist first moved to a debt-ridden Latin America in the 1980s, he has seen many aspects of business in the region change for the better. Two have not. The first is the plethora of small businesses, from family-run corner shops and ice-cream parlours to hardware stores, that by and large are as scruffy as they were back then, eke out a meagre existence and remain stubbornly cash-only (even if cashiers still struggle to work out how much change you are due). The second is a visit to a bank, where, it sometimes seems, the only people who get what they need are those with a stocking over their head and an Uzi in their hands.

The two traits reinforce each other. Small businesses fail to modernise because they struggle to tap credit. Oligopolistic banks feel vindicated in not caring a hoot about firms stuck in the past. The resulting lack of dynamism among the small and medium-sized firms that account for more than 99% of enterprises in Latin America is a brake on economic activity. With covid-19 still wracking the region, the vulnerability has become worse. Total or partial lockdowns as well as fear of contagion and a deep recession have put many of the region's smaller businesses in mortal danger.

Not all, though. To see why, look at MercadoLibre. The pan-Latin American e-commerce and fintech firm's market value has doubled to \$50bn during the pandemic as it has provided online sales and payments lifelines to such vulnerable companies. Since it was founded in 1999 by, among others, Marcos Galperin, an MBA graduate from Stanford University, it has become the region's biggest tech darling, even though in 2020 revenues are projected to be just \$3.2bn and it will lose money for a third year running.

Profit, though, is for the future. Meanwhile, it is part of a wave of digital disruption that may propel smaller firms—which make up about 80% of those using its platforms—into the modern era.

Typically, MercadoLibre, which means “free market” in Spanish, has been compared to eBay, the American online marketplace that was an early investor. It is now worth more than its erstwhile mentor. It shares some characteristics with Amazon, with which it competes, especially in Mexico. For instance, like Amazon in its early days, it is prepared to forsake short-term profit for rapid growth. It has also been developing a logistics network. But unlike the American titan, it rarely trades on its own behalf; its e-commerce business earns a fee from transactions between buyers and sellers on its platform. In that way it resembles Alibaba, owner of China’s online emporiums. Its fintech arm, Mercado Pago, is loosely modelled on Alipay, Alibaba’s payments system. Plans announced on July 20th by Alipay’s owner, Ant Group, to issue shares that could value it at \$200bn have MercadoLibre’s investors salivating over the prospect of a Latin American equivalent.

What attracts those investors most is the promise of a digital revolution in Latin America. It has been slow to get going. Last year less than 5% of retail sales in the region took place online, compared with 12% in America and 20% in China. Half of all Latin Americans lack a bank account. Fear of credit-card fraud has held back e-commerce, as have logistical nightmares in Brazil, where MercadoLibre generates more than half its revenues. Yet in a mixture of luck and good timing, the firm had invested in logistics just as e-commerce penetration surged into double digits amid the pandemic. Pedro Arnt, its finance chief, says Latin America’s move online has been “fast-forwarded” by three to five years in the past few months. That is true everywhere. But if first-time online shoppers in Latin America make it a habit, MercadoLibre has plenty to gain. According to Barclays, a bank, the value of merchandise traded on MercadoLibre averaged \$30 per Latin

American last year. The equivalent figure for Amazon in its core markets of America, Europe and Japan was \$405.

The potential for payments may be even greater, though this business has had a bumpier ride in the pandemic. Beforehand, MercadoLibre was busily trying to bring offline merchants into its orbit by encouraging them to accept mobile payments via QR codes at bricks-and-mortar outlets. With the closure of restaurants and shops this initiative slowed. But QR adoption as a social-distancing measure may flourish as businesses reopen. Marvin Fong of BTIG, a broker, says a push by Latin American central banks to promote QR-style digital payments could galvanise fintech platforms in Latin America, such as Mercado Pago.

| *The Amazon delta*

Mr Arnt admits it would be foolish to savour these “once-in-a-generation” opportunities and ignore the competitive threats. The biggest is Amazon, against which his firm has waged a costly battle in Mexico. So far Amazon has paid more attention to e-commerce opportunities in India than in Central and South America, but that could change. The second threat is that covid-19 convinces big physical retailers of the urgency to build online networks. He calls this the “empire strikes back” scenario. The third is in payments, whether in the form of competition from regional fintech startups or from WhatsApp (linked, perhaps, with the e-commerce ambitions of Facebook, its owner). MercadoLibre executives must have breathed a sigh of relief last year when they received a \$750m investment from PayPal, a potential rival, to help them expand their company’s digital payments.

But MercadoLibre also has some built-in advantages. Its e-commerce success has given it enough brand recognition to support a region-wide payments business. Its small and medium-sized business customers rely on it for e-commerce, payments and, increasingly, credit; that helps

entrench their loyalty. And its Latin American heritage means it understands not just the countries' commonalities, but also their differences. Locals say it is a collegiate company that the brightest people in the region want to work for—more so than Amazon. If it inspires them to create their own businesses to sell via its platform, so much the better. ■



熊彼特

向阿里巴巴看齐

美卡多正在撼动拉丁美洲的零售业和金融业

自上世纪80年代刚搬到负债累累的拉丁美洲至今，本专栏作者目睹了这个地区的商业在许多方面都有所好转。但有两个方面例外。一是小企业数量过多，家庭经营的街角小店、冰淇淋店和五金店多如牛毛。它们大体上还和从前一样脏乱，勉强维持着惨淡的生计，依然顽固地只收现金（即使收银员仍旧得抓耳挠腮地计算该找给你多少钱）。二是去银行的体验，有时候会让你觉得只有头套长筒袜、手端乌兹冲锋枪的人才会得到自己需要的东西。

这两个方面彼此强化。小企业未能实现现代化是因为难以获得信贷。而寡头垄断的银行觉得对停留在过去的企业漠不关心是理所应当的。这就导致在拉美企业中占比超过99%的中小型企业活力不足，进而阻碍了经济活动。新冠肺炎仍在该地区肆虐，更加剧了这种脆弱性。全面或部分封锁、对疫情蔓延和深度衰退的担忧已将拉美众多规模较小的企业置入极度危险的境地。

不过也不尽然。为什么这么说？来看看美卡多（MercadoLibre）。疫情期间，这家泛拉美电子商务和金融科技公司的市值翻了一番，达到500亿美元，因为它向那些脆弱的企业提供了在线销售和支付服务这一救生索。自1999年由斯坦福大学的MBA毕业生马科斯·加尔佩林（Marcos Galperin）等人创立以来，这家公司已成为拉美最大的科技宠儿，尽管它在2020年的收入预计仅为32亿美元，而且将连续第三年亏损。但利润是未来的目标。与此同时，它还投身于一股数字颠覆的浪潮之中，这股浪潮可能会推动小企业——约占其平台的企业用户的80%——向现代迈进。

MercadoLibre在西班牙语中意为“自由市场”，人们常拿它与它的早期投资者、美国在线市场eBay作比较。现在它的价值已超过了这位昔日的导师。它和竞争对手亚马逊（特别是在墨西哥）有些共同点。例如，和早年的亚

亚马逊一样，它甘愿为快速增长放弃短期利润。它也一直在发展物流网络。但与这家美国巨头不同的是，它很少开展自营业务：它的电商业务会从平台上买卖双方的交易中赚取费用。在这方面，它与中国的网上商城所有者阿里巴巴类似。其金融技术部门Mercado Pago大致仿照了阿里巴巴的支付系统支付宝。7月20日，支付宝的母公司蚂蚁集团宣布了上市计划，可能会使其估值达到2000亿美元。这令美卡多的投资者无比憧憬“拉美蚂蚁”的前景。

最吸引这些投资者的是拉美有望掀起一场数字革命。一直以来，这场革命迟迟未发动。去年，该地区在网上实现的零售额不到5%，而美国的数字是12%，中国是20%。一半的拉美人没有银行账户。对信用卡诈骗的担忧阻碍了电子商务的发展，巴西的物流恶梦也是个因素，而美卡多在巴西的收入超过公司总收入的一半。但它撞上了好运气和好时机——疫情期间电子商务渗透率飙升至两位数，而它已经投资了物流。公司财务总监佩德罗·阿恩特（Pedro Arnt）表示，过去几个月里，拉美的电商化“快进”了三到五年。这在所有地方都是如此。但如果拉美首次网购的用户养成了习惯，美卡多会获得丰厚的收益。根据巴克莱银行的数据，去年拉美人在美卡多交易的商品价值为人均30美元。亚马逊在其美欧日核心市场的数字是405美元。

支付的潜力可能还要更大，尽管这项业务在疫情中遭遇的挫折也更大。在这之前，美卡多就在积极鼓励线下商户在实体商店内接受基于二维码的移动支付，从而将它们纳入自己的轨道。但随着餐馆和商店关闭，这方面的动作放慢了。但随着商家重新开放，二维码作为一种保持社交距离的措施可能会大行其道。券商BTIG的马文·方（音译）表示，拉美各国央行对二维码式数字支付的推动可能会提振Mercado Pago之类的拉美金融科技平台。

| 亚马逊三角洲

阿恩特承认，沉浸于这些“二三十年一遇”的机会而忽视竞争的威胁，就是在犯傻。最大的威胁来自亚马逊，美卡多与它在墨西哥展开了一场较量，代价高昂。比起中南美洲，亚马逊目前还是更关注印度的电子商务机会，

但这可能会改变。第二个威胁是新冠肺炎让大型实体零售商相信建设在线网络刻不容缓，阿恩特称之为“帝国反击战”式的场景。第三个威胁在支付领域，无论是来自区域性金融科技公司的竞争，还是来自WhatsApp的竞争（WhatsApp或许承载着其所有者Facebook在电子商务领域的雄心）。去年，美卡多的高层拿到了潜在竞争对手贝宝（PayPal）7.5亿美元的投资，帮助他们扩大数字支付业务。他们当时肯定松了一口气。

但美卡多也有些固有优势。凭借在电子商务上的成功，它赢得了足够的品牌认知度来扶持一项覆盖整个区域的支付业务。中小企业客户要靠它开展电子商务和支付，并越来越依赖它提供信贷；这有助于巩固它们的忠诚度。而它的拉美血统意味着它不仅明白拉美各国的共性，也了解它们的差异。当地人说这是一家“学院派”公司，拉美最聪明的人都想为它工作，在这一点上更甚于亚马逊。如果美卡多能激励他们创立自己的企业并通过其平台销售，那就更好了。■



Bartleby

Parkinson's law updated

How the lockdown has affected a classic dictum about work

AS LAWS GO, the dictum devised by C. Northcote Parkinson, a naval historian, was admirably succinct: “Work expands so as to fill the time available for its completion.” His essay, first published in *The Economist* in 1955, has stood the test of time, in the sense that people still refer to “Parkinson’s law”. But the experience of working life during the pandemic means that Bartleby would now like to suggest three corollaries to the theorem.

At the start of his essay, Parkinson cited the case of an elderly lady requiring a day to send a postcard to her niece. The process involved time spent searching for spectacles, postcard and umbrella, as well as composing the message. The details may be dated but the idea is still resonant—faced with a task, people procrastinate.

When it comes to office work, the incentives to dawdle are pretty clear. Finish an assignment quickly, and the employee will just be given another. That second task may be even more unpleasant than the first. Workers may end up like a hamster on a treadmill, stuck in an endless cycle of needless effort.

Office workers know, however, that the mission itself is not the only thing. It is important to be seen to be working. This leads to “presenteeism”—being at your desk for long enough to impress the boss (and even turning up while sick). In the pre-internet era this would involve endless redrafting of memos, long phone calls, or staring meaningfully at documents. Thanks to the pioneering work of Tim Berners-Lee, presenteeism now requires less effort: many hours can be wasted on the

world wide web.

When working at home, the boss is out of sight but not out of mind. Broadly speaking, the result is to divide workers into two factions. The first group, the slackers, has spent the lockdown working out the minimum level of effort they can get away with. They have no need to drag out each task; they do what is required and spend the rest of the day at leisure, submitting the work just before deadline. For this group, Parkinson's law can be amended as follows: "For the unconcerned, when unobserved, work shrinks to fill the time required."

The second group takes the opposite approach. Consumed by guilt, anxiety about their job security or ambition, they work even harder than before. Being at home, they find no clear demarcation between work time and leisure time. This group is the Stakhanovites (named after a heroically productive miner in the Soviet Union). They require their own amendment: "For anxious home workers, work expands to fill all their waking hours."

But Parkinson was making a much broader point than people's tendency to be dilatory. The bulk of his essay was concerned with the growth of bureaucracy in government. He warned that hiring more civil servants did not necessarily lead to more effective work.

This tendency resulted from two factors. First, officials want to multiply subordinates, not rivals. Second, officials tend to make work for each other. Any official who feels overworked will ask to be given two subordinates (asking for just one would create a rival). The senior official will then spend lots of time checking their subordinates' work.

How does this process apply in the lockdown? Like their staff, managers also want to appear useful. In the office, they can seem busy by walking around and talking to their teams. At home, this is more difficult; a phone

call is more intrusive than a casual chat. The answer is to organise more Zoom meetings.

Bartleby has heard from a number of contacts in recent weeks that they spend their day going from one Zoom meeting to another. Just as Parkinson suggested, managers are making more work for each other. Hence the third amendment to his law: “In lockdown, Zoom expands to fill all of the manager’s available time.”

To the extent that these meetings are voluntary, this creates another divide between slackers and Stakhanovites. The first group will avoid such meetings and the latter group will sign up for all of them. Furthermore, in the pre-lockdown days, staff could earn brownie points by turning up for such gatherings, provided they caught the boss’s eye. Mere attendance is insufficient for a Zoom meeting; one must be seen and heard. In turn, that makes Zoom meetings longer, further using up the time of managers and their Stakhanovite subordinates (many slackers have yet to learn how to use the “raise hand” button). It is a digital version of the paperwork shuffling described by Parkinson 65 years ago. ■



巴托比

帕金森定律更新

封城如何改写了一则关于工作的经典论断

跟一般的定律相比，海军历史学家C.诺思科特·帕金森（C. Northcote Parkinson）的一句论断实在简洁明了：“工作会扩展，直到填满所有可用时间。”提出这句话的文章最早发表在1955年的《经济学人》上。它经受住了时间的考验，因为直到今天人们还是会提到“帕金森定律”。但体验过疫情期间的工作状态后，本专栏作者想就这则定律做出三点推论。

帕金森在他文章的开头引用了一个案例：一位老奶奶需要一整天的时间给侄女寄一张明信片。这个过程包括花时间找眼镜、明信片和雨伞，还要写问候语。这些细节可能已过时，但传达出的信息仍能引起共鸣——当一项任务摆在面前，人们总是拖拖拉拉磨磨蹭蹭。

当在办公室里工作时，拖拉的动机相当清晰。员工如果早早完成了一项任务，只会再被分派另一项工作，而且可能比刚完成的那件更让人烦心。到头来，员工可能会像迷你跑步机上的一只仓鼠，没完没了地瞎忙。

然而上班族明白，任务本身并不是唯一要紧的事。让别人看到自己在工作也很重要。这就导致了“假性出勤”——长时间坐在办公桌前，只为表现给老板看（甚至生病时也不缺勤）。在前互联网时代，假性出勤包括没完没了地改写备忘录、长时间打电话，或者盯着文件作若有所思状。多亏了蒂姆·伯纳斯-李（Tim Berners-Lee）的开创性成果，现在不需要那么费劲了：在万维网上就可以浪费掉很多时间。

在家工作时，老板远在天边，近在心田。大体上说，其结果是把员工分成了两类。第一类是懒鬼，他们在封城期摸索出了如何花最少的力气应付完差事。他们不必把每项任务都拖长；他们会完成必做之事，然后悠闲地度过一天剩余的时间，踩着最后期限交差。对于这类人，帕金森定律可以修正如下：“漫不经心之人，一旦不被看见，工作会收缩，直到塞进必需的

时长。”

第二类人正相反。他们满脑子都是负罪感、对职业保障的焦虑或自身的抱负，工作之勤勉更甚以往。在家中，他们找不到工作和闲暇之间的明确界限。这群人是斯达汉诺夫式铁人（这个名字来源于苏联一位英勇的高产矿工Stakhanov），需要针对他们将帕金森定律修正为：“对于焦虑的居家工作者，工作会扩展，直到填满他们全部的清醒时间。”

但帕金森观点的覆盖面远不止人们爱拖延这一点。他文章的大部分篇幅都与政府中官僚架构日渐臃肿有关。他警告说，雇用更多的公务员并不一定会让工作更有成效。

这种趋势源于两个因素。首先，官员想要增加下属，而不是对手。其次，官员之间往往会给对方找活干。任何自认工作超量的官员都会要求配两个下属（如果只要求一个，就会产生一个竞争对手）。这样一来，高级官员会花大量时间检查下属的工作。

这个过程在封城期间又是怎样的表现形式呢？和员工一样，管理者也想让自己显得有用。在办公室，他们可以四处走动，与团队交谈，让自己看起来很忙。在家里这就比较难办了：一通电话比随意的聊天更让人感觉唐突。对策就是组织更多场Zoom会议。

本专栏作者近几周从一些相识的人那里听说，他们每天都在一场接一场地参加Zoom会议。就像帕金森认为的那样，管理者们正给彼此制造更多的工作。因此，帕金森定律的第三个修正版本就是：“在封城期间，Zoom会议会扩展，直到填满管理者所有可用时间。”

如果这些会议是自愿参加，那就在懒鬼和铁人之间划开了另一道鸿沟。第一类人会避免参会，而后者会报名参加所有会议。此外，在封城前的日子里，员工在会议上露面能讨老板欢心，只要能有和老板四目交汇的一瞬。而对于Zoom会议来说，光是出席还不够，还得被看见和听见才行。这就又导致Zoom会议越开越久，进一步消耗了管理者和铁人下属的时间（许多懒鬼都还没学会用“举手”按钮）。帕金森在65年前描述的文件满天飞的

场景如今有了数字版。■



Banyan

A charged relationship

Infrastructure investment in Pakistan reveals the limits of Chinese development aid

WHEN XI JINPING launched his Belt and Road scheme of global development aid with Chinese characteristics, he needed a country to showcase it. Pakistan seemed the obvious choice. It was China's only real ally, a security partner on a vulnerable flank. Meanwhile a new prime minister, Nawaz Sharif, and his business-friendly Pakistan Muslim League had just come to power pledging big infrastructure projects and an end to the country's notorious brownouts. In 2015 the China-Pakistan Economic Corridor (CPEC) was announced, involving promised sums that soon topped \$60bn. This was a "game- and fate-changer" for the country, Mr Sharif crowed. What could possibly go wrong?

Quite a lot, as it happens. The latest evidence is a fresh report by a committee convened by Mr Sharif's successor, Imran Khan, to look at problems in power generation. It accuses Chinese companies of "malpractices", including inflating costs. The contractors of two coal-fired plants, at Port Qasim in Sindh province and Sahiwal in Punjab, are allegedly overcharging by \$3bn. Construction costs alone were padded by over \$200m, it claims.

Pakistan's indebted power industry is notorious for sleaze, and the findings of the committee, which also faulted local contractors, should come as no surprise. Mr Khan himself campaigned for office by attacking corruption on CPEC projects. After he won the election in 2018, with a little help from Pakistan's powerful generals, he thought to berate China into renegotiating terms and offering other financial help—he had, after all, inherited a full-blown balance-of-payments crisis. Yet Mr Khan's first trip to Beijing was mortifying. He got nothing like the money he demanded. And China's

leaders scolded him for airing dirty laundry in public—a Belt and Road no-no.

By late last year things were looking better. Mr Khan had secured an IMF bail-out. The China relationship was back on track, albeit with a greatly pared-down CPEC. Gone were the proposals for industrial co-operation and most of a welter of special economic zones. But work had restarted on other projects. They included a port at Gwadar on the Arabian Sea and a railway from Peshawar to Karachi: that cost a ruinously expensive \$8bn, but was too conspicuous a project to abandon. Reassuring both China and Pakistan's top brass, a retired general was put in charge of a new CPEC authority. It was to serve as a one-stop shop and cut through Pakistan's enterprise-choking red tape.

Even before the authority had a chance to fail, along came covid-19. Specialist Chinese workers were stuck in their hometowns celebrating the Chinese new year. The government hardly wants to see 75,000 Pakistani employees on CPEC projects laid off, but it cannot afford to keep them at work either. The economy faces its first recession in decades, and yet another balance-of-payments crisis. And since the government eased lockdown regulations in May, coronavirus infections are rising. Mr Khan is desperately pushing for debt relief from all Pakistan's creditors.

The committee's report, which the generals presumably approved, is part of the campaign. It raises the stakes with China, which must be appalled at the display of laundry just as America is loudly contending that Belt and Road is all about entrapping poor countries through debt. Yet the evidence of malpractice Mr Khan has revealed may give him leverage to seek better terms; a similar gambit worked for Malaysia last year. To save China's face, Mr Khan's government has postponed a corruption investigation. Instead, according to the *Financial Times*, it is asking to delay repayments for up to a decade.

More concessions are coming. In other words the CPEC game, as a prominent economic commentator, Khurram Husain, puts it, is still on. Yet it will be a much reduced one, with some projects stalled or slowed, and others abandoned. There will be some real benefits: brownouts in much of the country are a memory. But, says Andrew Small, author of a book on China and Pakistan, CPEC“will be defined by the things that might have happened but won’t”.

Pakistan, for instance, will not stop lurching from one economic crisis to the next. Nor will it have the economic confidence to transform its paranoid relations with India. Above all, it will not serve as a model to the world of a new form of relations with a magnanimous China, in which mutual advances in security and economic development are forever blissfully intertwined. ■



榕树

高压电关系

在巴基斯坦的基础设施投资揭示了中国发展援助的局限性

习近平启动具有中国特色的“一带一路”全球发展援助计划时，需要一个国家来作展示。巴基斯坦似乎是明摆着的选择。它是中国唯一真正的盟友，是其脆弱侧翼上的安全伙伴。而当时刚刚上台的总理纳瓦兹·谢里夫（Nawaz Sharif）和他亲商的巴基斯坦穆斯林联盟（Pakistan Muslim League）承诺要上马大型基础设施项目，终结该国臭名昭著的停电限电问题。2015年，中巴经济走廊（以下简称CPEC）宣布启动，承诺的投资金额很快就突破600亿美元。谢里夫夸口说这是巴基斯坦“改变游戏规则和命运的项目”。可能会出什么问题呢？

事实是，问题可多了。最新的证据是一份新出炉的报告，由谢里夫的继任者伊姆兰·汗（Imran Khan）召集的一个委员会研究了发电行业的问题之后编写。报告指责中国公司存在“不当行为”，包括夸大成本。据称位于信德省（Sindh）的卡西姆港（Port Qasim）和旁遮普省（Punjab）的萨希瓦尔（Sahiwal）的两家火电厂的承包商多收了30亿美元。报告称，仅建设成本一项就虚报超过2亿美元。

巴基斯坦负债累累的电力行业乌烟瘴气众所周知，该委员会得出这样的调查结果（报告也指摘了本地承包商）应该并不让人意外。汗本人在竞选时打的就是大力抨击CPEC项目腐败这张牌。他从强势的巴基斯坦将军们那里得到少许帮助，在2018年赢得了大选，之后他想要通过严厉指责中国来迫使其重新谈判条件并提供其他金融援助——毕竟他接手的可是一个全面的国际收支危机。不过，汗的首次北京之行可谓屈辱。他拿到的钱远远不是他要的数目。而且中国领导人责备他家丑外扬——这可是“一带一路”的大忌。

到去年年底，情况看起来有所好转。汗获得了国际货币基金组织（IMF）的救助。与中国的关系重回正轨，尽管CPEC的规模大幅缩减。关于工业

合作的提议以及一大堆经济特区计划中的大部分都已不予考虑。但其他项目已经重新启动，包括阿拉伯海沿岸城市瓜达尔（Gwadar）的一个港口，还有从白沙瓦（Peshawar）到卡拉奇（Karachi）的铁路——这条铁路80亿美元的造价高得吓人，但关注度太高，无法放弃。为了让中巴双方的高层都安心，新设立的CPEC管理机构由一位退役将军负责。该机构旨在充当一站式窗口，简化巴基斯坦扼杀企业发展的官僚程序。

还没等这个机构有机会出问题，新冠疫情爆发了。返乡过年的中国专业工人被困在家乡。巴基斯坦政府不想看到参与CPEC项目的7.5万名巴基斯坦人被裁员，但也无力承担保住他们的工作的成本。该国经济正面临几十年来的首次衰退，以及又一次的国际收支危机。而自政府5月份放松封城规定以来，新冠病毒感染人数正在上升。汗正在竭力向所有债权国争取减免巴基斯坦的债务。

委员会的报告是这项努力的一部分，事先想必是得到了将军们的首肯。这加大了对中国的筹码——在美国高调指称“一带一路”就是想用债务控制穷国之时，这般揭短必然令中国大为震惊。但汗揭露的有关不当行为的证据也许能帮他寻求更好的条件——去年马来西亚就用类似的招数达到了目的。为了保住中国的面子，汗的政府推迟了一项腐败调查。据《金融时报》报道，它转而要求将偿债期限延后十年。

越来越多的让步将随之而来。换言之，用著名经济评论员库拉姆·侯赛因（Khurram Husain）的话说，CPEC游戏仍在继续。不过，它的规模将大大缩小，其中一些项目将被搁置或放缓，另一些被放弃。它将带来一些真实的益处：巴基斯坦大部分地区的缺电限电已成为历史。但是，一本关于中巴关系的书的作者安德鲁·斯莫（Andrew Small）说，CPEC“将由那些本可能发生却不会发生的事情来定义”。

例如，巴基斯坦不会停止从一个经济危机跌入另一个。它也不会有经济自信来改变自己与印度互相猜忌的关系。最重要的是，它不会成为这样一个全球典范：与一个慷慨大度的中国建立一种新型关系，双方在安全与经济发展上的进步永远幸福交缠，无忧无虑。■



Bartleby

A question of judgment

A quality that is hard to define but important to possess

THE PANDEMIC has required many people to make difficult judgments. Politicians have had to decide which restrictions to impose on citizens' behaviour and individuals were forced to assess how much personal risk to take. Managers, faced with tough calls like which parts of their operations to close, have not been spared.

Good judgment is a quality everyone would like to have. But it is remarkably difficult to define precisely, and many people are not sure whether they personally possess it. Sir Andrew Likierman of the London Business School has spent a long time talking to leaders in a wide range of fields, from business and the army to the law and medicine, in an effort to create a framework for understanding judgment.

First he had to define the word. He suggests that judgment is “the combination of personal qualities with relevant knowledge and experience to form opinions and take decisions”. And he argues that, thus defined, judgment involves a process—taking in information, deciding whom and what to trust, summarising one's personal knowledge, checking any prior beliefs or feelings, summarising the available choices and then making the decision. At each stage, decision-makers must ask themselves questions, such as whether they have the relevant experience and expertise to make their choice, and whether the option they favour is practical.

Expertise can be useful in making judgments. But it is not the same thing. “Academics have expertise,” Sir Andrew observes. “They don't necessarily have judgment.” People with judgment know when they are out of their depth in making a decision and typically then seek the advice of someone

who has the right background and knowledge.

It is, of course, possible to follow all these steps and still make the wrong choice. But Sir Andrew argues that a sensible process improves the chance of getting it right. The temptation is to look at people's track records when assessing when they have good judgment, but luck may have played a huge part. "While good judgment is important to success," Sir Andrew cautions, "success is not a signal that there has been good judgment."

The degree of judgment required tends to increase as people take on more responsibility. Those with routine tasks generally have limited scope for judgment. Line supervisors have some discretion. For a chief executive, the proportion of decisions involving judgment is high. Deciding not to take action is also a judgment with potentially serious consequences (for example, "I won't get vaccinated" or "I won't pay my bills"). The world is full of people whose lack of judgment brought their careers or personal life crashing down. Many made the common mistake of assuming everything was fine.

Some people think that good judgment is innate. Sir Andrew accepts that some individuals are born with the ability to listen, be self-aware and better understand other people: all qualities that make good judgment easier. People with good judgment tend to have a breadth of experiences and relationships that enables them to recognise parallels or analogies that others miss. The ability to be detached, both intellectually and emotionally, is also a vital component.

Others may have the wrong sort of characteristics; a tendency to ignore others, stick to rules irrespective of context, rush into action without reflection and struggle to make up their minds. Many leaders make bad judgments because they unconsciously filter the information they receive or are not sufficiently critical of what they hear or read. The danger is that

people ignore insights that they don't want to hear, a tendency that can increase with age.

As artificial intelligence gets used for more and more routine tasks in the service sector, exercising judgment may be one area where humans retain an edge over machines. This is far from certain, however. What people perceive as good judgment may stem from the ability to spot certain cues in the environment. This ability may be unconscious, just as a dog can catch a Frisbee in mid-air without knowing how to calculate wind speed and air resistance.

With enough practice, machines may be able to recognise these implicit cues and thus display the equivalent of good judgment. But then, perhaps humans can be taught, too. In the long run one of the trickiest aspects of human judgment may be knowing precisely when to let machines take decisions and when to leave it to people. ■



巴托比

判断力问题

一种难以定义却很重要的能力

新冠疫情迫使许多人做出艰难的判断。政客们必须决定采取哪些措施来限制民众的行动，个人必须评估自己要冒多大的风险。公司主管们也未能幸免，他们面临诸如关闭哪些业务部门等艰难的决定。

人人都希望自己拥有良好的判断力。但要精确地定义这种能力却相当困难，很多人也并不确定自己是否具备。伦敦商学院的安德鲁·李柯曼爵士（Sir Andrew Likierman）花了很长时间与商业、军事、法律和医学等众多领域里的领袖交流，试图创建一个框架，以更好地了解判断力。

首先，他必须给这个词下个定义。他认为，判断力是“将个人特质与相关知识和经验相结合，进而形成看法并做出决策”。他同时指出，根据该定义，判断力是这样一个过程——接收信息，判定该相信哪些人和事，总结个人知识，核查任何以往看法或感受，归纳出可做的选择，然后做出决定。在每个阶段，决策者都必须问自己一些问题，比如自己是否具备做决定的相关经验和专业知识，自己的选择是否切实可行。

专业知识有助于做出判断。但两者不是一码事。“学者拥有专业知识，”安德鲁说，“但不一定有判断力。”有判断力的人知道，当自己缺乏能力做出决定时，通常会向有恰当背景和知识的人征求建议。

当然，即使遵循所有这些步骤，仍可能做出错误的选择。但安德鲁认为，合理的过程可以提高做出正确选择的几率。在评估某人是否具有良好判断力时，人们往往禁不住要去看他的过往记录，但其中运气可能起了巨大的作用。“虽然良好的判断力对成功很重要，”他提醒道，“但成功并不代表过去做出了良好的判断。”

承担更多责任的人，往往需要更好的判断力。做例行工作的人做判断的空

间往往不大。生产线主管有一定的自由裁量权。而首席执行官则需要做很多涉及判断力的决策。决定不采取行动也是一种判断，它可能带来严重后果，比如“我不会接种疫苗”或者“我不会支付账单”等。世界上有太多人因为缺乏判断力而毁掉了自己的事业和人生。他们当中很多人的通病就是想当然地认为一切都好。

有些人认为良好的判断力是与生俱来的。安德鲁承认，有些人天生具有倾听、自我认知和更好地理解他人的能力：所有这些品质都有助于做出正确判断。具有良好判断力的人往往拥有广泛的经验和人际关系，从而能够发现他人看不出的相似或可类比之处。在理智和情感上都能做到独立客观，也是判断力的重要组成部分。

还有人可能有存在于判断力不利的特质：常常忽视他人，不顾具体情况而墨守成规，不加思考匆忙行事，以及优柔寡断举棋不定。很多领导者会做出错误的判断是因为他们会在无意中筛选接收到的信息，或者对所见所闻没有足够的批判力。一种危险是人们对他们不想听到的见解置若罔闻，这种倾向会随年龄增长而加剧。

如今服务业中有越来越多的常规工作使用人工智能，做判断可能是人类仍能胜机器一筹的一个环节。然而这远不是板上钉钉的事。人们所认为的良好判断力或许源于在环境中发现某些线索的能力。这种能力可能是无意识的，就像狗在不知道如何计算风速和空气阻力的情况下也能叼住空中的飞盘一样。

经过足够多的训练，机器或许能够识别这些隐含的线索，从而展示出某种相当于良好判断力的东西。不过话说回来，也许人类同样可以通过训练做到这点。从长远来看，人类判断力中最棘手的环节之一可能恰恰是知道什么时候把做决策交给机器，什么时候留给人。■



Genomics

Dawn of an era

The Human Genome Project has transformed biology and medicine

TWENTY YEARS ago, on June 26th 2000, those running the public Human Genome Project and its private-sector shadow, a firm called Celera Genomics, decided to declare victory. In a simultaneous breasting of the tape, each published a “working draft” of the genome. The broker, Bill Clinton, hosted the chief scientists at the White House. Hyperbolic comparisons were made to the Apollo project to land people on the Moon.

Unlike Apollo, though, this announcement marked a beginning rather than an end. Genomics is now so embedded in biology that it is hard to recall what things were like before it. Those first human sequences cost billions of dollars to obtain. Today, with the advent of new technologies, a full sequence costs about \$200, and less detailed versions are cheaper still. It is as if, to use Apollo as the analogy, regular shuttles to the Moon had become available at prices an average family in the West could afford—and the more adventurous might now be considering a trip to Mars.

Researchers with a hypothesis to test can, for instance, turn to biobanks containing details of tens or hundreds of thousands of people—their medical records, education, employment and, crucially, data about their genomes. Private companies will also sequence genomes to varying standards, for a suitable price. It is probably the case, and if not, it soon will be, that more than 1m human genomes have been sequenced by one method or another.

Genomics also helps non-medical biology. Many non-human species, including crops and domestic animals, have had their genomes sequenced. Though tinkering directly with the genes of organisms that end up on

people's plates still makes some a bit queasy, that is increasingly unnecessary. Genomic knowledge can now be used to speed up selective breeding, without the need for genetic engineering.

At the other end of the scientific spectrum, what can be done for *Homo sapiens* can be done, using DNA from fossils, for other (now extinct) species of human being: the Neanderthals and Denisovans. There is a possible practical interest even here. Sequencing shows that these species once interbred with *Homo sapiens*. It also suggests that the traces of that interbreeding which remain may help the recipient to fight off infections, by combating viruses and boosting the immune system. ■



基因组学

新时代的黎明

人类基因组计划已经改变了生物学和医学

二十年前的2000年6月26日，受公共基金资助的人类基因组计划（Human Genome Project）以及它在私营部门的平行项目赛雷拉基因组公司（Celera Genomics）的负责人都决定要宣告胜利。两者同时冲过了终点线，都发表了基因组“工作草图”。居中斡旋的比尔·克林顿在白宫招待了两方的首席科学家。人们夸张地把该计划和阿波罗登月计划相提并论。

然而与阿波罗计划不同的是，这一宣告标志着一个开始，而不是结束。基因组学现在已深深根植于生物学，以至于很难回忆起在那之前是什么情形。当年获取第一批人类基因组序列要耗资数十亿美元。而今天，有了新技术之后，获得一个完整序列需要约200美元，较粗略的版本还要更便宜。若用阿波罗计划作类比，就好像西方普通家庭现在已经能负担得起飞往月球的班机，而更有冒险精神的人现在可能都在盘算去火星旅行了。

举例来说，如果想检验某个假设，研究人员可以求助于生物资料库，其中存有几万或几十万人的详细信息，包括病历、受教育和就业情况，还有最重要的——他们的基因组信息。私营公司也会按照多样的标准，以合适的价格提供测序。很可能已经有超过100万个人类基因组通过某种方法被测序——如果还没有，那也很快就会实现。

基因组学对非医学生物学也有助益。包括农作物和家畜在内的许多非人类物种的基因组已被测序。直接对那些最终会成为盘中餐的有机体的基因动手脚仍然让一些人略感不安，不过这种情绪已经越发没有必要了。这是因为现在可以运用基因组学的知识来加速选择性育种，而不需要用到基因工程。

而在科学光谱的另一端，利用化石中的DNA，可以把对智人的基因测序也用于其他（现已灭绝的）人种：尼安德特人和丹尼索瓦人。即使是这类研

究也可能有实际用途。测序显示这些人种曾经与智人杂交，同时还显示残留的杂交痕迹可能帮助了受体对抗病毒和增强免疫系统，从而抵抗感染。





Ageing in Japan

Ready, cane, fire

Japan's army is greying. It may have to draft more robots

BRIGHT YOUNG faces gaze out from a recruitment poster on the thick grey walls of the Defence Ministry in central Tokyo. But in greying Japan, finding enough youngsters to fill the ranks has become, by the ministry's own admission, "an imminent challenge". The number of Japanese between 18 and 26 years old, long the prime recruiting pool, peaked at 17m in 1994. It has since fallen to 11m. By 2050 it will sink below 8m. "Young blood is what all militaries need, and it's exactly what we're lacking," says Yamaguchi Noboru, a retired lieutenant-general in the Self-Defence Forces (SDF), as the country calls its army, in deference to its pacifist constitution.

The SDF has missed its recruiting targets every year since 2014, reaching just 72% of its goal in 2018. It fields only 227,000 of the 247,000 troops it budgets for, a shortfall of 8%. Among the lowest ranks, the gap is over 25%. Low pay, harsh conditions and the limited prestige of soldiering in a peacenik nation with little unemployment always made recruiting hard, but demography compounds the difficulties. The inverted population pyramid ought to worry Japan as much as Chinese expansionism or North Korean missiles, argues Robert Eldridge, an American former military official and the author of a book in Japanese on demography and the armed forces: "Demographic change is not just an economic issue, it's a national-defence issue."

The army is using many of the same strategies as private companies to cope with an ageing workforce. "Just like the rest of Japan, the SDF is trying to see what AI and robotics can do for them," says Sheila Smith of the Council on Foreign Relations, an American think-tank. The government has announced plans to acquire and develop new unmanned aircraft and

submarines. While these will be for surveillance, “the next step is strike capability”, says Nagashima Akihisa, a government MP and former deputy defence minister.

But persuading politicians to fund the development and deployment of offensive weapons is hard in a country whose constitution states, “The Japanese people forever renounce war.” Nor is technology a panacea for personnel shortfalls, notes Koda Yoji, a retired vice-admiral. Drones and robots require operators and skilled engineers—the sort of people the SDF already has trouble attracting. A cyberdefence unit set up in 2014 has only 220 members.

An alternative is to expand the pool of potential personnel. Female troops used to be confined to non-combat roles such as nursing and administration, but in recent years the high command has allowed them to fly fighter jets and drive tanks, among other things; soon they will be allowed to sail on submarines. At the defence ministry, officers speak of “work-life balance” and stress family-friendly perks such as an on-site day-care centre. Yet progress has been slow: women made up just 7% of Japan’s armed forces in 2018, compared with an average of 11% among NATO countries. And the government’s goals are modest: to increase the share to 9% by 2030. The National Defence Academy caps the number of women it admits at 15%. Sexist attitudes about roles in the army still prevail, says Sato Fumika of Hitotsubashi University. In the SDF’s recruiting pamphlets, the pages that focus on women are printed on pink backgrounds.

Another way to keep up the numbers is simply to tolerate older soldiers. In 2018 the SDF raised the maximum age for new recruits from 26 to 32, the first increase since 1990. This year the retirement age for senior officers will start rising gradually. Older soldiers can focus on maintenance, logistics and training, thus freeing younger troops to concentrate on more muscular missions. Experienced soldiers may even bring advantages in “new

domains and new frontiers” of warfare, where physical prowess matters less, says Colonel Kagoshima Hiroshi, who works in recruitment. Those past retirement age are encouraged to continue working for reduced pay. As Nagaiwa Toshimichi, a retired lieutenant-general, laughs, “I’m 71 years old, but I’m ready to fight.” He is only half-joking. ■



日本老龄化

预备，撑好手杖，开火

日本军队日益老龄化。它可能不得不部署更多机器人

在位于东京市中心的日本防卫省，灰色厚墙上贴着征兵海报，上面一张张充满朝气的脸庞凝视着远方。但是在人口老龄化的日本，防卫省自己也承认，找到足够多的年轻人来补充兵员已成为“迫在眉睫的挑战”。长期以来，18至26岁的日本人一直是征兵的主要对象，但这个人群在1994年达到1700万人的峰值，之后不断下降至1100万，到2050年还将跌破800万。“所有军队都需要年轻的血液，而我们就缺这个。”日本自卫队退役中将山口升说。根据和平宪法，日本称自己的军队为“自卫队”。

自2014年以来，自卫队每年都没能完成征兵目标，2018年仅达成目标的72%。预算员额为24.7万人，实际只有22.7万人，缺口为8%。基层士兵缺口更是超过25%。工资低、工作环境严酷，加上在一个失业率很低的反战国家服役没那么受人尊敬，征兵工作一直困难重重，而如今人口结构问题更是雪上加霜。美国前军事官员罗伯特·埃尔德里奇（Robert Eldridge）曾用日语写过一本关于人口和军队的书，他认为日本应该像担心中国扩张和朝鲜的导弹那样担心本国倒金字塔形的人口结构，“人口结构变化不仅仅是一个经济问题，也是国防问题”。

自卫队正在使用很多和私营企业一样的策略来应对劳动力老龄化的困境。“就和日本其他所有领域一样，自卫队想看看人工智能和机器人技术能为他们做些什么。”美国智库外交关系委员会（Council on Foreign Relations）的希拉·史密斯（Sheila Smith）说。政府已经宣布了采购和研发新型无人机和无人潜艇的计划。这些装备会用于监视，但“下一步就是打击能力”，日本国会议员、前防卫省副大臣长岛昭久表示。

但在一个宪法规定“日本人民永远放弃战争”的国家，要说服政客资助开发和部署攻击性武器很难。退役海军中将香田洋二指出，技术也不是解决人员短缺的灵丹妙药。无人机和机器人需要操作员和熟练的工程师，而自卫

队已经很难吸引到这些人。2014年成立的网络防御部门目前只有220人。

一个替代方案是扩大潜在兵源。女兵们过去被限制在护理和行政这类非战斗职位上，但近年最高指挥部已经允许她们驾驶战斗机、开坦克，很快还会让她们登上潜艇。在防卫省，官员们谈论着“工作与生活的平衡”，强调方便照顾家庭的待遇，比如在防卫省内部设有一个日托中心。但进展很缓慢：2018年女性在日本军队中占7%，而在北约国家平均为11%。政府的目标并不高：到2030年提高到9%。日本防卫大学把招收女生的上限设定在15%。一桥大学的佐藤文香认为，有关军队岗位的性别歧视态度仍然盛行。在自卫队的征兵宣传册中，针对女性的页面都使用了粉红色的背景。

另一个维持人数的办法是直接把年龄限制放宽。2018年自卫队将征兵年龄上限从26岁提高到32岁，这是自1990年以来首次提高。今年起高级军官的退役年龄将开始逐步推迟。年长的士兵可以主要从事维护、后勤和培训，这样就可以解放年轻士兵，让他们把精力集中在更需要体力的任务上。从事征兵工作的上校鹿儿岛浩表示，经验丰富的士兵甚至可能在战争的“新领域和新前沿”上带来优势，在这些领域体能并没那么重要。那些过了退役年龄的人还被鼓励继续工作，拿低一些的工资。退役中将长井俊一笑着说：“我71岁了，但我已做好战斗的准备。”他并不全然是开玩笑。■



Universities

From rustbelt to brainbelt

How higher education can drive prosperity

TO BUILD A great city is simple, the politician Daniel Patrick Moynihan once said. First create a university, then wait 200 years. By that logic, the Midwest has decent assets. It is home to lots of excellent universities, and hordes of more modest ones. All influence the cities around them. Those that thrive often have a university at their core; educated places do well long-term. Edward Glaeser of Harvard cites examples. If fewer than 5% of adults had a college degree in a city in 1940 then, 60 years on, no more than 19% did. In cities where more than 5% were graduates in 1940, the later share was up to 29%. Gains made early are felt for generations. He divides the Midwest in two. States in the west, such as Minnesota, Wisconsin, Iowa and Illinois, are better educated than those in the east and have prospered more.

John Austin, at the Chicago Council of Global Affairs, has written a study arguing that the Midwest's institutional brainpower is exceptional. He says 15 of the world's 200 top-ranked research universities are there. (In fact, by defining the Midwest expansively, he counts 20.) The "big ten" state universities, which oddly number 14, have 600,000 students, 50,000 faculty and draw annual research funds of \$10.6bn, more than the Ivy League and Californian universities combined. The Midwest has 16 of the country's 50 top-ranked medical schools, five of the 25 best computer-science ones, and 17 of 63 leading research universities. It does not do so well in STEM subjects, claiming just six of 25 top-ranked STEM colleges. Mr Austin tots up 21% of America's patent filings, by companies and universities in the region. Almost a quarter of National Institutes of Health federal grants for developing drugs and medical technologies go to

Midwestern institutions.

They in turn spread prosperity, in three ways. One is to bring in young people, often a city-sized population. Mayors want to revive town centres, so luring youthful consumers is a big plus. As a natural experiment, ask how they suffered when covid-19 sent people home. A resident of Columbus, Ohio, laments how the absence of 30,000 students and staff sapped demand for local businesses. Another example is South Bend, Indiana, where Pete Buttigieg often presents revival as mostly about political leadership. But he concedes that nearby Notre Dame university (where his father taught) mattered. Having 8,500 students beside a city of 100,000, including active ones who volunteer in local schools, is helpful. It was a boon to deploy researchers' ideas, for example to fit wifi-enabled sensors in sewers to monitor water flow and save money. "We have a Beta City concept, we take intellectual property from the university and apply it," he says.

Second, universities pool employable talent. Not all graduates hang around their alma mater, but cities that keep them outdo rivals. Rahm Emanuel boasts that, when he stood down as Chicago's mayor last year, 39% of its adults had four-year degrees, far above the national average. No big city has more, he says, though that rests on defining big. In Minneapolis over 49% of adults have a degree; in Madison 58%. This helps explain why both cities have flourished, especially in medicine and pharmaceuticals, which need educated workers. On average, 32% of Americans (25 or older) have at least a bachelor's degree. Of 12 states in the broad Midwest only Illinois, Kansas and Minnesota surpass that. The least educated state is Indiana, where barely a quarter have a degree. That is a reminder that early education remains a challenge. In Chicago Mr Emanuel struggled to lift the high-school graduation rate from a dismal 56% in 2012 to a somewhat better 78% last year. He also got more people to take vocational training in community colleges. That matters partly because firms come for Chicago's supply of

educated workers. Every June, he says, 140,000 graduates from across the Midwest flock in to start jobs.

Third, universities can refocus a city's economy. John Cranley, Cincinnati's mayor, says "By far the best driver is the co-location of an urban, diverse population near a tier-one research and development institution." Lori Lightfoot, Chicago's mayor, calls the University of Chicago "one of our crown jewels". The university says that in two decades it helped found over 300 companies (including Grubhub, a food-delivery firm), with \$1.2bn in funding.

The University of Illinois in Urbana-Champaign (U of I) offers a study in a lost chance to commercialise research. One of its computer-science students, Marc Andreessen, created the world's first widely used web browser, Mosaic, while studying there in 1992. Sadly for Illinois, he went on to commercial success, co-founding Netscape and more, only after moving to the west coast. Laura Frerichs, head of development at U of I, says her university—with 13,000 engineering students and more mathematics PhDs than anywhere in America—learned from that experience. It has since put up 17 buildings for entrepreneurial students and recent graduates. These contain over 120 small companies, employing 2,200, often partnering with large firms such as State Farm. One student from Iran, whose firm has 35 staff, uses AI to create 3D images for construction companies around the world. Another uses a supercomputer to help cancer patients plan treatment. A third produces "ultra-compact robots" to walk through fields monitoring crops.

The plan is to scale up. The University of Chicago says it expects to become a centre for quantum information engineering, a new form of computing. This year the governor of Illinois, J.B. Pritzker, said he would direct \$500m to launch the Discovery Partners Institute (DPI), in southern Chicago, where university research can be commercialised and tech graduates

trained. Robert Jones, U of I's chancellor, likens the plan to Tech Park on Roosevelt Island in New York, saying it will lift Chicago "from being a lower-tier city for innovation to the first tier".

Another model is Pittsburgh, a once-dying steel city now nicknamed "Roboburgh" for a boom in robotics, artificial intelligence, self-driving cars and biomedical research. Zoom, a video-conferencing firm, recently said it would open a research centre there. Tom Murphy, a former mayor, says the way to understand Pittsburgh's success is to look at Carnegie Mellon University and its entrepreneurial culture. Bruce Katz and Jeremy Nowak see Pittsburgh as a case study in regeneration driven by a university. They trace much of it to a robotics institute at Carnegie Mellon's computer-science school, which got attention by working on the Three Mile Island nuclear accident. It inspired a cluster of local tech firms. Rather than choosing which company should flourish, the city and university concentrated on producing lots of graduates, and importing more, a process the authors call "talent sprouting". In turn, they encouraged entrepreneurial activity.

Can these trends go on? Not every city can bank on a university. And many smaller colleges are threatened by demographic change, lower immigration, the pandemic and, for public ones, looming cuts in funding. But federal authorities, seeking ways to recharge the economy, could adopt an idea of professors at MIT to "jumpstart America" through \$100bn of investment in 20 new centres of high-technology, innovation and commercialised research, similar to DPI in Chicago. The idea is that lots of rivals to Silicon Valley could bloom. Of the top 20 candidates in the professors' list, 13 were around universities in the Midwest. With luck it will take less than 200 years to produce results. ■



大学

从锈带到脑带

高等教育如何推动繁荣

建造一座伟大的城市很简单，政治家丹尼尔·帕特里克·莫伊尼汉（Daniel Patrick Moynihan）曾经说过。首先创办一所大学，然后等上200年。按照这种逻辑，中西部拥有不错的资产。它拥有许多优秀的大学，还有成批的较为一般的大学。它们影响着自己周围的城市。那些繁荣的城市往往围绕着一所大学铺开——教育程度良好的地方长期来看发展不错。哈佛大学的爱德华·格拉瑟（Edward Glaeser）举了一些例子。如果一座城市在1940年时只有不到5%的成年人拥有本科学位，那么60年后这一比例不到19%。而在1940年大学毕业生占5%以上的城市中，60年后的比例达到29%。早年取得的收益世代相传。他将中西部地区一分为二。西部的州，例如明尼苏达州、威斯康星州、爱荷华州和伊利诺伊州，比东部的州教育程度更高，也更繁荣。

芝加哥全球事务委员会的约翰·奥斯汀（John Austin）撰写了一项研究，称中西部院校拥有非常出色的大脑。他说，全球前200所一流研究型大学中有15所在那里。（事实上，如果扩大对中西部地区的定义，他能数出20所。）“十大”州立大学共计14所（这有点怪），拥有60万名学生，5万名教职员工，年度研究经费为106亿美元，超过常春藤联盟和加州大学系统的总和。中西部拥有全国前50名医学院中的16家、计算机专业中前25名中的5家，以及63所领先研究型大学中的17所。它在理工科（STEM）上的表现稍逊，在前25所理工学院中仅占6所。奥斯汀称该地区的公司和大学的专利申请量占全美的21%。美国国立卫生研究院（NIH）用于开发药物和医疗技术的联邦拨款中有近四分之一给了中西部机构。

而这又以三种方式传播繁荣。其一是引入年轻人，人数规模常常相当于一座城市。市长们希望复兴市中心，吸引到年轻的消费者就成了一大利好。一个自然的实验是问问当新冠肺炎把人们禁锢在家里时，这批人遭受了怎样的痛苦。俄亥俄州哥伦布市的一名居民悲叹少了三万名学生和职员降低

了对本地商业的需求。另一个例子是印第安纳州的南本德，皮特·布蒂吉格（Pete Buttigieg）经常把它的复兴说成主要是政治领导力的结果。但他也承认附近的圣母大学（他父亲在那儿教书）很重要。在一座10万人口的城市旁边加上8500名学生，还有些活跃的学生在当地学校里做志愿服务，这很有帮助。部署研究人员的创意更是一个福音，例如在下水道中安装支持无线网的传感器以监控水流并节省资金。他说：“我们有一个‘测试版城市’（Beta City）的概念，把大学的知识产权拿过来加以应用。”

第二，大学汇集了可以聘用的人才。并不是所有的毕业生都会留在母校附近，但是能够留住他们的城市就会超越竞争对手。拉姆·伊曼纽尔

（Rahm Emanuel）去年卸任芝加哥市长时夸口说，该市39%的成年人拥有四年制学位，远高于全国平均水平。他说没有哪个大城市的比例比这更高了。但这取决于大城市的定义。在明尼阿波利斯，超过49%的成年人拥有学位；在麦迪逊则是58%。这有助于解释为什么两个城市都蓬勃发展，尤其是在需要受过教育的员工的医药领域。平均而言，32%的美国人（25岁或以上）至少拥有学士学位。在中西部地区的12个州中，只有伊利诺伊州、堪萨斯州和明尼苏达州超过了这一比例。受教育程度最低的州是印第安纳州，那里只有四分之一的人有学位。这提醒人们早期教育仍然是一个挑战。在芝加哥，伊曼纽尔奋力将高中毕业率从2012年可怜的56%升至去年稍好的78%。他还让更多的人在社区大学接受职业培训。这一点之所以重要，部分原因在于企业会来芝加哥是因为这里受过教育的员工供应充沛。他说，每年6月，来自中西部各地的14万毕业生涌入芝加哥找工作。

第三，大学可以重新定位城市经济。辛辛那提市长约翰·克兰利（John Cranley）说：“最好的驱动因素是把多元化的城市人口放在一家顶级研发机构附近。”芝加哥市长洛里·莱特富特（Lori Lightfoot）称芝加哥大学为“我们的皇冠上的宝石之一”。该校表示，20年间它帮助建立了300多家公司（包括食品配送公司Grubhub），提供了12亿美元的资金。

伊利诺伊大学香槟分校（U of I）提供了一个关于研究成果错失了商业化机会的案例。计算机科学专业学生马克·安德森（Marc Andreessen）1992年在该校学习时创建了世界上第一个被广泛使用的Web

浏览器Mosaic。对伊利诺伊州来说，可悲的是，他取得商业成功、共同创立了网景（Netscape）公司等等都是搬去西海岸之后的事情了。伊利诺伊大学的开发负责人劳拉·弗雷里希斯（Laura Frerichs）说，学校从这件事中吸取了教训（该校拥有13,000名工程专业学生，数学博士比美国任何地方都要多）。它在这之后为创业的学生和新进毕业生建了17栋楼。其中容纳了120多家小公司，雇用2200名员工，这些公司通常与州立农业保险（State Farm）等大公司合作。来自伊朗的一名学生运营的公司有35名员工，使用人工智能为世界各地的建筑公司制作三维图片。另一家使用超级计算机来帮助癌症患者做治疗规划。还有一家生产“超紧凑型机器人”，在农田间穿行监测农作物。

计划是要扩大规模。芝加哥大学说它希望成为量子信息工程（一种新的计算形式）的中心。伊利诺伊州州长J.B.普利兹克（J.B. Pritzker）今年表示，他将投资5亿美元在芝加哥南部成立发现伙伴学院（Discovery Partners Institute, DPI），用于把大学研究商业化及培训技术毕业生。伊利诺伊大学校长罗伯特·琼斯（Robert Jones）将该计划比作纽约罗斯福岛上的科技园，称它将把芝加哥“从较低创新水平的城市变为一流”。

另一个典范是匹兹堡，这座曾经垂死的钢铁城市因机器人技术、人工智能、无人驾驶汽车和生物医学研究的繁荣而被昵称为“机器人堡”。视频会议公司Zoom近期表示将在那里设立一个研究中心。前市长汤姆·墨菲（Tom Murphy）表示，要了解匹兹堡的成功，就要看卡内基梅隆大学及其创业文化。布鲁斯·卡茨（Bruce Katz）和杰里米·诺瓦克（Jeremy Nowak）将匹兹堡视为被一所大学推动重生的研究案例。他们将这种重生大部分归功于卡内基梅隆大学计算机科学学院下属的一个机器人研究所，它因研究三里岛核事故而备受关注。它催生了一批本地技术公司。城市和大学并没有去选择哪些公司应该发展，而是集中精力大量培养并引进更多的毕业生。作者把这个过程称为“人才涌现”。这反过来又促进了创业活动。

这些趋势还能继续吗？并非每个城市都能依靠大学。许多较小的学院正受到人口结构变化、移民减少和疾病大流行的威胁，而公立大学则要忧心迫

在眉睫的资金削减。但是，寻求经济复苏途径的联邦政府机构可以采纳麻省理工学院的教授的想法，通过对20个新的高科技、创新和商业化研究中心（类似于芝加哥的DPI）注资1000亿美元来“启动美国”。这个想法是要让硅谷的许多竞争对手红火起来。教授们罗列的前20个城市中有13个位于中西部大学附近。幸运的话，用不了200年就能结出硕果。■



Hydrogen power

Another look in the toy box

After many false starts, hydrogen power might now be about to bear fruit

CONVENTIONAL WISDOM holds that battery-powered cars are the future of motoring. But Hyundai, a big South Korean vehicle-maker, is not so sure. Over the past few months it has been running a worldwide public-relations campaign extolling the virtues of an alternative source of electrical power—fuel cells. Instead of storing and then releasing electricity gathered from the mains in the way that a battery does, a fuel cell generates current from a chemical reaction between hydrogen and oxygen. The oxygen comes from the air. The hydrogen, suitably compressed, is stored in a tank on board the vehicle, and is replenished at a filling station, like petrol. Unlike a battery, a fuel cell does create exhaust. But that exhaust is simply the reaction product of hydrogen and oxygen, namely water.

Hyundai's campaign features members of BTS, a mop-topped South Korean boy-band, staring dreamily into the middle distance amid backdrops of natural beauty. As a reminder of fuel cells' environmental advantages, water is everywhere. It falls as snow. It roils in oceans. It floats gently through forests as mist. "For rest," writes Park Ji-min, one of BTS's members, in a misguided quest for profundity, "our rest comes from for-rests".

The marketing may be silly, but Hyundai is serious. The firm already sells battery-powered vehicles, but it is hedging its low-carbon bets by developing hydrogen ones as well. The advertising campaign is designed to sell the Nexo, the firm's second fuel-cell car, which was launched last year. And Hyundai is not the only company keeping its options open in this way. On June 5th Toyota, maker of the Prius, the world's best selling battery-hybrid vehicle, announced a joint venture with several Chinese carmakers

to develop fuel-cell technology. An updated version of Toyota's Mirai, another hydrogen-powered car, is due out later this year.

Hydrogen is enjoying a purple patch, then, and not just among carmakers. It is being touted as a means of propelling buses and lorries, and even ships and aircraft. There is talk of it replacing natural gas as a source of heat, of it being used to store the surplus output of solar and wind power stations, of it being employed as a chemical feedstock and even of it replacing coke as a means of extracting metallic iron from its ore. If all this came to pass, then hydrogen would become a dominating factor in human life in the way that hydrocarbons currently are. It would, in other words, usher in a hydrogen economy.

| *This time it's different. Honest*

Readers of a certain age are now permitted to roll their eyes. At least twice in the past 50 years—in the 1970s, after the oil crisis, and in the 1990s, when climate change started to acquire political salience—there has been excited talk of replacing hydrocarbons with hydrogen. It didn't happen.

There were several reasons for this. For a start, ripping up and replacing the world's fossil-fuel infrastructure is a huge job. And even were that an easy thing to accomplish, hydrogen itself has drawbacks. Though better than batteries, it stores less energy in a given volume than fossil fuels can manage (see chart 1). More important, it is not a primary fuel. You have to make it from something else.

This can be done by a chemical reaction called steam reforming but, besides steam, the other ingredient of that process is a hydrocarbon of some sort, which rather defeats the object of the exercise. Or it can be done by the electrolysis of water. This has appropriate green credentials as long as the electricity is either from renewable sources or a nuclear-power plant. But the laws of thermodynamics mean that the energy content of the

hydrogen which comes out of the process is less than the electricity that went in. This inbuilt inefficiency raises the question “why not simply power the end-use electrically, rather than using hydrogen as an intermediary?”

To counter these arguments those who believe that things hydrogen-related really are different this time around can point to two things in their favour. Several of the relevant technologies, notably electrolytic equipment, are now at a stage where it is possible to believe they might soon become cheap enough to do the job. And the idea that economies need to be decarbonised fully in order to curb climate change is gathering speed.

Until 2019, for instance, Britain had planned to cut carbon emissions by 80% from their levels in 1990 by 2050. It then, however, upped the ante to become the first big economic power to commit itself to a 100% cut. This has implications for hydrogen. Electrification using renewable sources such as wind and solar power would probably have got the country to 80%, observes David Joffe, a member of the Committee on Climate Change (CCC), an organisation that advises Britain’s government on how to bring the transformation about. But full decarbonisation, he says, is a much bigger task, and one for which hydrogen may prove necessary.

| *Finding a niche*

Despite Hyundai’s and Toyota’s enthusiasm, few analysts believe cars will be part of this process. The CCC calculates that a battery-powered car charged with electricity from a wind turbine converts 86% of the turbine’s output into forward motion on the road. For a fuel-cell car, it is 40-45%. Hydrogen cars also suffer from a chicken-and-egg problem. Unlike the battery-powered variety, they cannot be refuelled at home. Yet roadside refuelling stations for them are scarce, and are likely to remain so while the cars themselves remain rare.

In the meantime battery cars are building a formidable lead. The International Energy Agency (IEA), which advises national governments, reckons there were just 11,200 hydrogen-powered cars on the road in 2018, mostly in America and Japan. That compared with 5.1m battery-powered cars. And this number is growing fast. In 2019 sales of new battery-powered cars in China, the world's biggest automobile market, hit 1.2m—4.7% of the total. In Norway they accounted for more than half of new cars sold. According to the IEA, sales of hydrogen cars around the world in 2018 (the most recent year for which reliable figures are available) were just 4,000.

There is, though, more to transport than private cars. A big problem with batteries is that they have a low energy density—in other words, they have to take up a lot of space if they are to propel a vehicle for any distance. For private cars, which mostly make short journeys, that is manageable. For longer-distance travel, for example by lorries, says Mark Newman, an energy analyst at Bernstein, a bank, hydrogen's greater energy density becomes more attractive. Hydrogen compressed to 700 atmospheres contains between two and five times more usable energy per litre than a lithium-ion battery. If it is liquefied (which requires more complex technology) that increases further. And since lorries spend most of their time on busy trunk roads, fewer new fuelling stations would be needed.

Exactly where the break-even point lies is still debated. Tesla, a pioneering electric-car maker, thinks that even lorries can usefully be powered by batteries and plans a version that can travel 800km. Hyundai already makes a hydrogen-powered lorry, but its range is only 400km. Several other firms are also investigating fuel cells for lorries. In April, for example, Daimler, a German company, and Volvo, a Swedish one, invested €1.2bn (\$1.3bn) in a joint venture to pursue the idea.

Shipping, which accounts for around 2.5% of the world's industrial greenhouse-gas emissions, is also taking an interest. The International

Maritime Organisation, an appendage of the United Nations that regulates the industry, aspires to cut ships' collective greenhouse-gas emissions to half their levels in 2008 by 2050. How this might be achieved is unclear. Batteries pack far too little energy to power big, ocean-going vessels. Engineers have toyed with everything from nuclear propulsion to high-tech sails. But a study published in March by the International Council on Clean Transportation, an American not-for-profit institution, examined an existing shipping route between China and America and concluded that virtually all the craft plying it could be powered by fuel cells like those used in Hyundai's cars, albeit with some cargo space removed to make room for the hydrogen itself. Even that could be ameliorated, says Michael Liebreich, an energy consultant, by first reacting the hydrogen with nitrogen to produce ammonia, a chemical that takes up less room than elemental hydrogen, and which can also be used in fuel cells.

| *Hot stuff*

Hydrogen might replace natural gas for heating, as well. A big advantage here is that it could make use of current infrastructure in the form of pipelines now employed to transport that natural gas. Several countries, including Australia, Britain and Germany, are experimenting with this idea. "We already have a gas grid that should last for at least another 75 years," says Antony Green, an engineer at National Grid, which runs Britain's electricity and gas networks. "Why not make use of that if we can?"

National Grid reckons the gas-fired boilers which heat most British homes can cope with a mix of 20% hydrogen without modification. And, says Dr Green, boilermakers are beginning to offer "hydrogen-ready" models, which are capable of burning either natural gas or pure hydrogen. Since boilers are replaced every ten to 15 years, he reckons the gas grid could plausibly be ready to switch to hydrogen in a couple of decades' time. In May a group of German pipeline operators unveiled a plan to build a

1,200km hydrogen grid, based on converted natural-gas pipes, by 2030, at a cost of €660m.

How much environmental good this would truly do is debated. Starting from the position that the only green alternative for heating is electricity powered by renewables, Graham Cooley, the boss of ITM Power, a hydrogen-equipment maker, points out that Britain's natural-gas grid supplies, every year, around 880TWh of energy to homes, factories and offices, most of which is used for heating. That is more than twice as much energy as the country's electricity grid carries.

A switch to renewably powered electric heating would therefore require a drastic—and expensive—beefing up of the electricity network. Dr Joffe, however, counters that the need to manufacture hydrogen in the first place, with all the inefficiencies this brings, means a hydrogen gas grid would require building even more new power stations than would heating homes or factories with electricity directly.

Another suggested role for hydrogen is large-scale energy storage. As wind and solar power spread, matching supply with demand becomes harder. An obvious solution is to store surpluses in good times for use later, when times are bad. And one way to do that might be to make hydrogen and keep it in underground caverns, as currently happens with natural gas. This could increase capacity enormously—perhaps enough to manage not just day-to-day fluctuations but interseasonal ones as well.

On top of these ideas, heavy industry may provide other niches for hydrogen to fill, says Dr Liebreich. Electric heating may struggle to replace natural gas for many industrial processes involving steel, ceramics and glass because it might not be able to reach the required temperatures. And one of the biggest industrial sources of carbon dioxide is not directly energy-related at all.

This is the reduction of iron ore (usually an oxide of iron) to the metal itself by reacting the ore with carbon monoxide made from coke. That produces iron and carbon dioxide. React the ore with hydrogen instead, and the waste product is water. Several firms—including ArcelorMittal, a multinational steelmaker, and a conglomerate of SSAB, a Finnish-Swedish steelmaker, LKAB, a Swedish iron-ore producer, and Vattenfall an energy company, also Swedish—are examining this possibility.

| *Elemental economics*

All of this does, however, depend on an ability to make hydrogen at scale in a way that does not release CO₂ into the atmosphere. And that is tricky.

At the moment, virtually all of the roughly 70m tonnes of hydrogen produced each year is a result of steam reforming. This emits seven tonnes of carbon dioxide for every tonne of hydrogen yielded. For this reason steam-reformed hydrogen is known to environmentalists as grey hydrogen. Its cost varies according to local circumstances, but averages, according to the IEA, around \$1.50 a kilogram.

“Blue” hydrogen, though still the result of steam reforming, is somewhat cleaner than the grey variety. Instead of the CO₂ being dumped into the air it is captured and buried underground—so-called carbon capture and storage. This is starting to happen. On July 1st, for example, Equinor, a Norwegian energy firm, said it would build one of the world’s biggest blue-hydrogen plants at a site in northern England. More ambitiously, Japan hopes that blue hydrogen might power its future. It envisages creating the gas from lignite deposits in Australia, burying the carbon dioxide locally, and then shipping the hydrogen across the Pacific in tankers akin to those that now carry liquefied natural gas.

The extra equipment needed to capture the carbon dioxide produced by reforming necessarily pushes up the price of blue hydrogen. Bloomberg

New Energy Finance (BNEF) a firm of clean-energy analysts, reckons its current cost ranges from \$1.50 to \$3.50 a kilogram, depending on which fossil fuel is used to produce it (see chart 2). Moreover, the process of capturing CO₂ is imperfect, so some of that gas escapes. The real desideratum, therefore, is “green”, electrolytic hydrogen. At \$2.50 to \$5 or more a kilogram, however, green hydrogen is currently even pricier than the blue sort.

This could all change, though, as the technologies involved in making both blue and green hydrogen are scaled up. Prediction is a mug’s game, but BNEF has had a go anyway. Its analysts reckon green hydrogen might, by 2050, cost between 70 cents and \$1.6 a kilogram—in other words the current price of the grey variety. As Kobad Bhavnagri, the firm’s head of special projects, explains, “The cost of electrolysis equipment has fallen by around 40% in the last five years in the West.” Dr Bhavnagri reckons the kit can now be had in Western countries for around \$1,200 per kilowatt of capacity and that there may be scope for those numbers to fall much further. “The cost in the Chinese market is drastically lower—around \$200 per kW,” he says, which will presumably bring the price down everywhere soon. UBS, a bank, cites a deal recently struck by Nikola, an American firm that says it is planning to make hydrogen lorries, which implies electrolyser costs of just \$350 per kW.

Operating costs, meanwhile, can ride on one of the most striking and reliable trends in the energy industry—the relentless fall in the price of solar and wind power (see chart 3). The cost of solar in particular has fallen by 85% in the past decade. Renewables are now cheaper in some parts of the world than energy from fossil fuels, and the process shows no sign of slowing.

| *It’s a gas*

The economics, then, seem to be pointing in the right direction for

hydrogen to become, if not dominant, then at least an important part of the mix. The Hydrogen Council, a lobby group based in Brussels, thinks the gas could be satisfying 18% of the world's energy demand by 2050. The share prices of firms that make fuel cells, electrolysis equipment and the like have consequently been marching upward.

Many of the assumptions made in various forecasts rely, however, on governments providing prodigious subsidies to develop the technology. BNEF says subsidies of around \$150bn over the next ten years might be needed to make hydrogen competitive. In reality, the IEA reckons that total government spending on hydrogen in 2018 was just \$724m.

Official interest is certainly picking up, though. On June 10th Germany announced a €7bn subsidy programme aimed at making it the “world leader” in the technology. A leaked draft of the European Union's post-covid stimulus plan contains an ambition to install 40GW of green hydrogen capacity by 2030. China's government hopes to see 1m fuel-cell-powered vehicles on the roads by the same year. Japan, long a fan of hydrogen, wants its price to fall by 90% by 2050. As to retooling vast swathes of the global energy system to accommodate this change, Dr Bhavnagri calculates that replacing natural gas with hydrogen would mean tripling or quadrupling the world's gas-storage infrastructure, at a cost of perhaps \$600bn.

In the end, hydrogen's impact will be limited by the basic fact that it is, ultimately, just electricity in disguise. It remains an inescapably inefficient option. For some applications, though, its advantages—its energy density, its ability to burn and its compatibility with existing infrastructure—could make it an attractive fit despite that drawback. To paraphrase another famous advert, then, the hope is that hydrogen might prove to be the Heineken of clean energy: able to refresh the parts of an economy that electrification cannot reach. ■



氢能

再看一眼玩具盒

在多次起步失误之后，氢能或许即将结出硕果

传统观点认为，电池驱动的汽车是汽车的未来。但韩国大型汽车制造商现代并不完全相信这一点。过去几个月中，它一直在全球范围内开展一项公关活动，宣传另一种电源——燃料电池——的优点。燃料电池不是像电池那样把市电的电力储存起来然后再释放，而是通过氢和氧之间的化学反应产生电流。氧来自空气。适当压缩的氢气存在车辆的储罐中，并在加氢站那里像加油一样补充。与电池不同，燃料电池确实会产生排放。但这些排放只是氢和氧的反应产物，也就是水。

现代汽车的宣传活动请到了留着拖把头的韩国男子组合防弹少年团

（BTS）的成员，在各种自然美景中眼神迷离地凝视着不远处。为了提醒人们燃料电池具有的环保优势，水无处不在。它变为雪飘落，在海洋中翻滚，化作雾轻柔地漂浮在森林中。防弹少年团的一名成员朴智敏故作深沉地写道：“人木为休，我们的休养发展离不开绿野森林。”

营销手法或许傻气，但现代汽车很认真。该公司已经在销售电池驱动的汽车，但它的低碳赌注还通过开发氢燃料电池来对冲。此次广告活动是为了推销去年推出的公司第二款燃料电池汽车Nexo。现代并不是唯一一家以这种方式留有后手的公司。6月5日，全球最畅销的混合动力汽车普锐斯（Prius）的制造商丰田汽车宣布与几家中国汽车制造商成立合资公司来开发燃料电池技术。另一款氢动力汽车、丰田的Mirai的升级版将于今年晚些时候发布。

这么看来，氢正走红，而且不仅仅是在轿车制造商中间。它还被吹捧为驱动公交车和卡车，甚至轮船和飞机的手段。有人在谈论用它代替天然气作热源、存储太阳能和风力发电站的剩余产出、用作化学原料，甚至是代替焦炭作为冶铁的手段。如果所有这些都成为现实，那么氢将像今天的碳氢化合物那样，成为人类生活中的主导因素。换句话说，它将带来一个氢经

济时代。

| 这次不一样了，真的

上了点年纪的读者现在可以翻白眼了。在过去50年中，人们兴奋地谈论用氢代替碳氢化合物已经至少有两回了——一次是在1970年代石油危机之后，一次是在1990年代气候变化开始引起政治关注时。然而它并没有发生。

这背后有多个原因。首先，拆除和替换世界上的化石燃料基础设施是一项艰巨的工作。就算这件事情容易做，氢本身也有缺点。尽管比电池强，但它在给定体积内存储的能量比化石燃料要少（见图表1）。更重要的是，它不是一次能源。你必须用别的东西来制取它。

这可以通过一种叫做蒸汽重整的化学反应来完成，但除了蒸汽之外，该过程用到的另一种原料是某种碳氢化合物，这就失去了这种做法的意义。或者也可以通过电解水来完成：只要电力是来自可再生能源或核电厂，这种做法就有恰当的绿色证书。但是热力学定律意味着这个过程中产生的氢所含的能量少于输入的电。这种固有的低效率引发了一个问题：“为什么不简单地用电来驱动最终用途就好了，还要用氢作中介？”

要反驳这些论点，那些相信与氢有关的东西这次真的不一样了的人可以指出两件对他们有利的事。一些相关技术，特别是电解设备，目前的发展让人们可以相信它们很快就会便宜到足以胜任这项工作。而且经济需要完全脱碳来遏制气候变化的想法日益升温。

例如，英国原本计划到2050年将碳排放量减少为1990年水平的80%。但它在2019年提高目标，成为第一个致力于实现“净零排放”的经济大国。这将影响氢的命运。气候变化委员会（CCC）为英国政府提供关于如何实现这一转变的建议，其成员戴维·乔夫（David Joffe）指出，风能和太阳能等可再生能源带来的电气化或许能让英国做到80%。但他说，完全脱碳的任务要艰巨得多，氢可能会成为必要的手段。

| 寻找利基

尽管现代和丰田一腔热情，但很少有分析师认为汽车将成为这个过程的一部分。CCC计算得出，如果用风力发电机生成的电来充电，电池车可将发电机输出的86%转换为在道路上的前进运动。燃料电池汽车的这个比例是40%到45%。氢动力汽车还会遇到先有鸡还是先有蛋的问题。与电池车不同，它们不能在家中加气。然而，给它们用的路边加氢站却很稀少，而且只要氢动力汽车很少，这种情况很可能还会持续。

与此同时，电池车正在建立强大的领先优势。据为各国政府提供建议的国际能源署（以下简称IEA）估计，2018年公路上只有11,200辆氢动力汽车，主要在美国和日本。相比之下，电池车有510万辆，而且这个数字正在快速增长。2019年，在全球最大的汽车市场中国，电池车新车销量达到120万辆，占新车销售总量的4.7%。在挪威，它们占新车销量的一半以上。根据IEA的数据，2018年（可获得可靠数据的最近一年）全球氢动力汽车的销量仅为4000辆。

但是，运输不止是私家车的事。电池的一大问题是它们的能量密度低——换句话说，如果要想把车开上一段距离，电池都必须占用大量空间。私家车大多数时候只做短途驾驶，所以还能对付。伯恩斯坦银行的能源分析师马克·纽曼（Mark Newman）说，对于长途驾驶（如卡车）来说，氢的能量密度更高，因此更具吸引力。压缩到700个大气压的氢气每升体积的可用能量是锂离子电池的两倍至五倍。如果是液化氢（需要更复杂的技术），这个数字还会更大。而且由于卡车大部分时间都在繁忙的主干道上，因此需要的新加氢站将更少。

盈亏平衡点到底在哪里仍有争议。领先的电动汽车制造商特斯拉认为，即使货车也可以由电池供电，并计划推出能够行驶800公里的版本。现代汽车已经生产过氢动力卡车，但其续航里程仅为400公里。其他几家公司也在研究针对卡车的燃料电池。例如，今年4月，德国公司戴姆勒和瑞典公司沃尔沃投资12亿欧元（13亿美元）成立了一家合资公司来推进这一想法。

航运业占到了全球工业温室气体排放量的约2.5%，也开始对氢产生兴趣。国际海事组织（IMO）是规范该行业的联合国附属机构，希望到2050年将船舶的总温室气体排放量减少到2008年的一半。目前尚不清楚如何实现这一目标。电池储存的能量太少，无法为大型远洋船舶提供动力。从核动力到高科技帆，工程师们什么都试过了。但是，美国非营利机构国际清洁运输委员会3月份发表了一项研究，考察了中美之间一条现有的航运路线，得出的结论是几乎所有往来船只都可以由现代汽车使用的那种燃料电池驱动，只是要损失一些货物空间来为氢本身腾地方。能源顾问迈克尔·利伯里奇（Michael Liebreich）说，甚至这种情况也仍有改善的余地，方法是首先让氢与氮反应生成氨，这种化学品所占的空间比氢单质少，并且也可以用在燃料电池中。

| 炙手可热

氢气也可以代替天然气用于供暖。这方面的一大优势是它可以利用现有的基础设施，也就是目前用于运输天然气的管道。澳大利亚、英国和德国等国家正在测试这种方案。“我们已经有一个燃气网，至少可以再使用75年，”运营英国电力和燃气网络的英国国家电网公司（National Grid）的工程师安东尼·格林（Antony Green）说，“如果可以的话，为什么不利用它呢？”

英国国家电网认为，大多数英国家庭采暖所用的燃气锅炉无需改造即可接收20%的氢气。格林说，锅炉制造商已经开始提供“氢气兼容”的型号，能够燃烧天然气或纯氢。由于锅炉每10至15年更换一次，他认为燃气网似乎可以在二三十年内准备好转换成氢气。5月，一批德国管道运营商公布了一项计划，以改造后的天然气管道为基础，到2030年建成全长1200千米的氢气网，耗资6.6亿欧元。

这究竟将对环境产生多少好处尚有争议。有人认为供暖的唯一绿色替代方案是利用可再生能源发电，对此，氢设备制造商ITM Power的老板格雷厄姆·库利（Graham Cooley）指出，英国的天然气网络每年为家庭、工厂和办公室提供约880太瓦时的能源，是该国电网承载能量的两倍以上。其中大部分能源被用于供暖。

因此，切换到可再生能源的电采暖系统将需要对电力网络进行彻底且昂贵的改造。然而，乔夫博士反驳说，首先需要制造氢气——而这带来了所有的低效率，这意味着比起直接供电给住宅或工厂用于采暖，建立氢气网需要的新电站甚至更多。

人们提出氢的另一个作用是大规模储能。随着风能和太阳能的推广，让需求与供应相匹配变得越来越困难。一个明显的解决方案是在供应充足时把盈余储存起来，以备不时之需。而一种方式可以是制造氢气并将其保存在地下洞穴中，就像目前对天然气所做的那样。这可以极大地增加容量——也许足以应付日常乃至季节性的波动。

利伯里奇博士说，除了这些想法之外，重工业还可能为氢气创造其他利基市场。对于许多涉及钢铁、陶瓷和玻璃的工业流程而言，电加热可能难以取代天然气，因为它可能无法达到所需的温度。而且二氧化碳的最大工业来源之一与能源根本没有直接关系。

这个来源是通过让铁矿石与由焦炭制成的一氧化碳反应，将矿石（通常是铁的氧化物）还原为金属本身，产生铁和二氧化碳。如果让矿石与氢气反应，产生的废弃物则是水。包括跨国钢铁生产商安赛乐米塔尔、芬兰-瑞典钢铁生产商SSAB集团、瑞典铁矿石生产商LKAB以及瑞典大瀑布电力公司（Vattenfall）在内的多家公司正在研究这种可能性。

| 元素经济学

但是，所有这些都取决于大规模生产氢而又不将二氧化碳释放到大气中的能力。这很棘手。

目前，每年生产的大约7000万吨的氢气差不多都是蒸汽重整的产物。每产生一吨氢气，就会排放七吨二氧化碳。因此，环保主义者将蒸汽重整出的氢气称为灰色氢气。它的成本因当地情况而异，但据IEA估计，平均成本约为每千克1.50美元。

“蓝色”氢气尽管仍然是蒸汽重整的结果，但比灰色氢气清洁一些。与其将二氧化碳排放到空气中，不如将其捕获并埋在地下，即所谓的碳捕获和存

储。这种方法已经开始启用。例如，7月1日，挪威国家石油公司（Equinor）表示，它将在英格兰北部的一个地点建造世界上最大的蓝氢工厂之一。日本更加雄心勃勃，希望蓝氢能为其未来提供动力。它设想从澳大利亚的褐煤矿床中开采出天然气，将二氧化碳埋在当地，然后用类似于现在运送液化天然气的油轮把氢运过太平洋。

捕获重整产生的二氧化碳所需的额外设备必然会推高蓝氢的价格。据清洁能源分析公司彭博新能源财经（BNEF）估计，其当前成本范围为每千克1.50至3.50美元，具体取决于使用哪种化石燃料生产（见图2）。此外，捕获二氧化碳的过程并不完美，因此其中一些气体会逸出。因此，人们真正向往的是“绿色”的电解氢。但绿氢目前比蓝氢更贵，价格为每千克2.50至5美元或更高。

不过，随着制造蓝氢和绿氢的技术规模不断扩大，这一切都可能改变。预测是一个必输的游戏，但是BNEF还是要一试。它的分析师认为，到2050年，绿氢的成本可能在每千克70美分至1.6美元之间，也就是灰氢目前的价格。正如该公司特殊项目负责人科巴德·巴夫纳格里（Kobad Bhavnagri）所说：“在过去五年中，西方国家电解设备的成本下降了约40%。”巴夫纳格里博士认为，现在在西方国家可以以每千瓦容量1200美元左右的价格买到这套设备，而且这个数字还可能大幅下降。他说，“中国市场的成本要低得多，大约为每千瓦200美元”，这应该很快会把全球的价格拉低。瑞银（UBS）援引美国公司尼古拉（Nikola）最近达成的一项交易，该公司表示正计划生产氢能卡车，这意味着电解槽的成本仅为每千瓦350美元。

同时，运营成本可能会借助能源行业最引人注目的趋势之一，即太阳能和风能价格持续下跌（见图3）。特别是在过去十年中，太阳能成本下降了85%。现在，世界上某些地区的可再生能源比化石燃料能源还要便宜，而且这一过程没有放缓的迹象。

| 一种燃气

因此，经济学似乎支撑了氢的前景——即使不成为主导，它也至少会成为重要的组成部分。总部位于布鲁塞尔的游说组织氢能委员会（Hydrogen

Council) 认为，到2050年，氢气可以满足世界18%的能源需求。因此，制造燃料电池和电解设备等产品的公司的股价一直在上涨。

但是，各种预测中做出的许多假设都依赖于政府提供巨大补贴来开发这项技术。BNEF表示，未来10年可能需要约1500亿美元的补贴以提高氢的竞争力。实际上，据IEA估计，2018年政府在氢能方面的总支出仅为7.24亿美元。

不过，官方的兴趣肯定在增加。6月10日，德国宣布了一项70亿欧元的补贴计划，旨在使其成为该技术的“世界领导者”。欧盟泄露的一份新冠后刺激计划草案里有宏伟的目标：到2030年安装40吉瓦绿色氢能。中国政府希望到同一年道路上会有100万辆燃料电池驱动的车辆。长期以来一直拥护氢能的日本希望其价格到2050年下降90%。要适应这一变化将需要大规模改造全球能源系统，巴夫纳格里博士计算指出，用氢替代天然气将意味着世界氢气存储设施要增长三到四倍，耗资约6000亿美元。

到头来，氢的影响将受到一个基本事实的限制——氢说到底只是变相的电。它仍然无可避免地是一个低效的选择。但是，对于某些应用而言，尽管有此缺点，但它的优点——能量密度、燃烧能力以及与现有基础设施的兼容性——使其仍然很有吸引力。因此，套用另一句著名的广告词来说，人们希望氢会成为清洁能源中的喜力啤酒：给电气化无法触及的经济部分带来清爽的感觉。■



Industry

America's Mittelstand

Advanced manufacturing can thrive, as Grand Rapids shows

MIDWESTERNERS STILL like to make stuff. Manufacturing may have slid, but they do more of it than other Americans. In Indiana, it makes up 29% of gross state product (and employs 17% of workers). In Michigan it is 19% (and 14% of jobs). In each of the “core” eight states, it is above the national average of 12% of GDP. Companies plug into supply chains for car, aviation and retail industries, or for medical equipment, machine parts and the energy industry. Older-style work, such as furniture-making, persists.

Yet the mass employment of low-skilled workers has largely gone. That hurts those diverted to low-paid work in services. Tony Flora, a union leader in South Bend, asks “How can you provide a middle-class way of life if the jobs are serving omelettes in a restaurant?” Harvard’s Edward Glaeser observes that, as recently as 2000, manufacturing was the largest employer nationally of lower-skilled workers. Now it is one of the smallest.

Paul Krugman, an economist, suggests that rising economic nationalism, confrontation with China and pandemic-induced anxiety over supply chains could nudge some manufacturing back to the Midwest. Sherrod Brown, a senator from Ohio, sees this as a golden opportunity. Any recovery would be centred on those with skills in science, technology, engineering or maths (STEM). Bruce Katz and Jeremy Nowak from Brookings say STEM-related jobs (mostly in manufacturing) are better paid than average, employing 9% of Americans but contributing 17% of GDP.

Training does not have to mean four-year degrees. Instead what is needed are vocational skills that can be taught simultaneously by companies and colleges. Scot McLemore, of Honda, praises the community college in

Columbus, Ohio, noting that “there are no more skilled trades, we need multi-craft technicians”, such as the computer savvy. David Harrison, who leads the college, says his 60 trainees study for two days a week in class and work for three at a firm. “Five years ago there was no path for this, now 30 manufacturers are in the programme.” It is an attempt at a German-style apprenticeship scheme.

How can Midwesterners develop more advanced manufacturing? An example of what to avoid is in Mount Pleasant village, in southern Wisconsin. A 20m-square-foot factory complex, planned in the past two years, belongs to Foxconn, a Taiwanese giant. In 2018 Donald Trump, wielding a golden shovel, vowed it would be the “eighth wonder of the world”, employing 13,000 factory workers on high wages. Supposedly Wisconsin’s economy would gain \$51bn over 15 years. He talked less about promises to Foxconn of billions of dollars in subsidies.

The project always had a Potemkin air. It was a mystery what Foxconn would make, though television screens were talked of. It was rushed through as the showpiece of a manufacturing renaissance in a swing state. But Tim Bartik, at the Upjohn Institute for Employment Research in Michigan, says it was misconceived. The subsidies were ten times bigger than usual as a share of future wages, suggesting the underlying economics made no sense. Foxconn now talks of innovation and research instead.

A better example, says Mr Bartik, is Grand Rapids, Michigan, “the most successful intensive manufacturing city in America”. It once made furniture and car parts, but since 1985 has been transformed by a project called “the Right Place”. Change came from the ground up, starting with 13 businesspeople from banks and philanthropy, including the Van Andel and De Vos families, who wanted to make their home more attractive. The early idea was to get existing firms to stay, but later it became to lure newcomers. The burghers first restored the town centre. They built a 12,000-seat arena

that hosted big-name performers like Elton John. Hotels, restaurants, coffee bars and other entertainment flourished. Students flocked in. The Van Andels set up the Van Andel Institute, a bioscience cluster. Michigan State University opened a big medical school to train health-care staff. Michigan Tech University set up a branch.

Manufacturers were pressed to modernise. Birgit Klohs, a German transplant who has run the Right Place since 1987, says “We’re still a manufacturing centre, like the Mittelstand. The bulk of our success is in advanced manufacturing, in family-owned, mid-sized firms in their third or fourth generation of ownership, just like in Germany.” She seeks foreign ideas. In the 1980s a Japanese adviser showed car-suppliers Toyota’s lean techniques. She leads forays to Germany to study “Industry 4.0” (high tech in factories) or Israel to see how to work with startups.

As important, foreign investors are urged to come to Grand Rapids. Again, the German connection helps. She says there are 136 foreign companies, including 50 from her former homeland. The city “makes a point of attracting foreign, especially German” firms, she says, “as we saw something in common”. The results are exceptional. The Grand Rapids metro area has more than 1m residents today, up from 740,000 in 2000. New types of manufacturers flourish, such as makers of medical devices and equipment. Ms Klohs’s group lists 79 suppliers of personal protective gear, such as face shields, masks, hand-sanitisers, swabs and more, currently in high demand.

The city is a model for deployment of social capital. Researchers have tried to understand why some collaborative efforts succeed but not others. Part of the answer is that, as with the Mittelstand, many firms in the Midwest are owned by families with a passion for their home towns. Mr Katz says Midwesterners benefit from a “deep commitment to place”. He notes how many institutions with huge endowments there are, including MacArthur

in Chicago, Heinz in Pittsburgh, the Cleveland Foundation and the Howard G. Buffett (son of Warren) foundation in Decatur.

One research paper contrasts the fortunes of Allentown in Lehigh Valley, Pennsylvania, with the dim outcomes in Youngstown, Ohio, in the years since the 1970s. In Allentown the main concern, as in Grand Rapids, was to create conditions so firms would stay and grow. In Youngstown (as with Foxconn in Wisconsin) there was a narrower focus on helping a particular industry, in its case steel. The long slog of creating the right eco-system seems more likely to pay off than the short-term effort to pick a winner in a declining business. ■



工业

美国中小企业

大急流城向世人展示，先进制造业可以蓬勃发展

美国中西部人仍然喜欢造东西。制造业或许是衰落了，但他们仍比其他美国人造得更多。在印第安纳州，制造业占到州内生产总值的29%（雇用了17%的工人）。在密歇根州为19%（占工作岗位的14%）。在八个“核心”州中的每一个，这一比例都高于12%的全国平均水平。企业投身于汽车、航空、零售、医疗设备、机械零部件和能源等产业的供应链中。像做家具这样更老式的行当也还在。

不过，大规模雇用低技能工人的情形已经基本上看不到了。这伤害了那些改行从事服务业低薪工作的人。南本德的工会领袖托尼·弗洛拉（Tony Flora）问道：“如果大家的工作都是在餐厅里端煎蛋卷，你怎么给他们提供中产阶级的生活方式？”哈佛大学的爱德华·格莱泽（Edward Glaeser）指出，近在2000年时，制造业还是全美最大的低技能工人雇主，现在已经是最小之一。

经济学家保罗·克鲁格曼（Paul Krugman）认为，经济民族主义发酵、与中国的对抗，以及新冠疫情引发的对供应链的焦虑，可能会推动一些制造业渐渐回流到中西部。俄亥俄州参议员谢罗德·布朗（Sherrod Brown）视之为千载难逢的机会。任何制造业复苏都将集中在那些拥有理工科（STEM）相关技能的人身上。布鲁金斯学会的布鲁斯·卡茨（Bruce Katz）和杰里米·诺瓦克（Jeremy Nowak）表示，STEM相关工作（主要集中在制造业中）的薪资高于平均水平，雇用了9%的美国人，却贡献了GDP的17%。

培训不一定意味着四年制学位。相反，所需要的是可以由企业和大学同时传授的职业技能。本田汽车公司的斯科特·麦克勒莫尔（Scot McLemore）赞美俄亥俄州哥伦布市的社区大学，指出“熟练工种已经不存在了，我们需要多才多艺的技术人员”，比如精通计算机的人。该校主管

戴维·哈里森（David Harrison）说，他的60名学员每周在课堂上学习两天，在公司工作三天。“五年前这一切还不可能，现在已经有30家制造商参与进来。”这是一种类似德国学徒制的尝试。

中西部人如何发展更先进的制造业？威斯康辛州南部的快乐山（Mount Pleasant）告诉我们应该避免什么。过去两年，这个村镇规划了一个占地2000万平方英尺的工厂园区，它属于台湾巨头富士康。2018年，特朗普挥舞着一把金色铁锹，誓言这里将成为“世界第八大奇迹”，高薪雇用1.3万名工厂工人。据称威斯康辛州的经济将因此在15年内增长510亿美元。他倒不大说起承诺给富士康的几十亿美元补贴。

这个项目始终透出一股波将金村般的虚假气息。富士康要在这里制造什么是个谜，尽管有人在谈论电视屏幕。这是在一个摇摆州匆忙炮制出来的制造业复兴样板。但密歇根州的厄普约翰就业研究所的蒂姆·巴尔季克（Tim Bartik）说它规划失当。补贴规模相对于未来工资的比例要比通常水平高十倍，从这一点看背后的经济帐根本不成立。富士康现在改口谈创新和科研了。

巴尔季克说，一个更好的样本是密歇根州的大急流域（Grand Rapids）——“美国最成功的密集型制造业城市”。它曾经制造家具和汽车零部件，但自1985年起被一个名为“适宜地”（the Right Place）的项目改天换地。改造从零开始，由来自银行和慈善业的13位商人发起，包括范安德尔（Van Andel）和狄维士（De Vos）家族，他们希望自己的家园变得更具有吸引力。一开始的想法是让现有企业留下来，后来变成了吸引外来者。市民们首先重建了市中心。他们盖了一个1.2万座的体育馆，请来埃尔顿·约翰（Elton John）等著名表演者。酒店、餐厅、咖啡馆和其他娱乐场所蓬勃发展。学生们蜂拥而至。范安德尔家族创建了范安德尔研究所（Van Andel Institute）这个生物科学集群。密歇根州立大学设立一个大型医学院来培训医护人员。密歇根理工大学在这里开设了分校。

制造商被迫开展现代化改造。自1987年以来一直负责“适宜地”项目的德国移民比吉特·克洛斯（Birgit Klohs）说：“我们仍是一个制造中心，就像

德国的“中小企业”（Mittelstand）。我们的成功主要源自先进制造业，源自家族拥有的第三、第四代中型企业，就像在德国那样。”她寻求外来创意。在1980年代，一位日本顾问向汽车供应商展示了丰田的精益生产方式。她带队前往德国学习“工业4.0”（工厂高科技），去以色列观摩如何与创业公司合作。

同样重要的是，该项目也敦促外国投资者前来大急流域。与德国的联系再次带来了助益。她说这里有136家外国公司，其中50家来自她的祖国。她说，这座城市“强调吸引外国的尤其是德国的”企业，“因为我们看到了共同点”。这取得了杰出的成果。如今大急流域都市区有100多万居民，而2000年为74万。医疗设备等新型制造商蓬勃发展。克洛斯的团队罗列了79家个人防护装备供应商，它们生产防护面具、口罩、消毒搓手液和棉签等，目前需求量很大。

这座城市是社会资本部署的典范。研究人员过去一直试图弄明白为什么有些协作成功了，有些却没有。答案一部分在于，和德国的中小企业一样，中西部的许多企业都是由对故乡充满深情的家庭拥有的。卡茨说，中西部人受益于一种“对地方的全心奉献”。他指出那里有众多拥有巨额捐赠的机构，包括芝加哥的麦克阿瑟基金会（MacArthur）、匹兹堡的亨氏家族基金会（Heinz）、克利夫兰基金会（Cleveland Foundation）和位于迪凯特市、由巴菲特的儿子运营的霍华德·巴菲特基金会（Howard G. Buffett Foundation）。

有一篇研究论文对比了自1970年代以来宾夕法尼亚州利哈伊谷（Lehigh Valley）的阿伦敦（Allentown）的致富之路和俄亥俄州的扬斯敦（Youngstown）的惨淡结果。和大急流域一样，阿伦敦注重创造条件让企业留下来并得以发展。而在扬斯敦（和威斯康辛的富士康一样），关注点被更狭隘地放在了帮助某一个特定行业上——在扬斯敦是钢铁。看起来，长久而艰辛地打造出适宜的生态系统要比短期花些力气在一个衰退的行业中选出赢家更可能获得回报。■



Public finances

The debt toll

The poorest countries may owe less to China than previously thought

THE FOUR-LANE, 62-km toll road being built between Masiaka, a business hub in Sierra Leone, and Freetown, the country's capital, promises shorter journey times, fewer accidents and smoother drives. It is nonetheless controversial. Awarded to China Railway Seventh Group, the project added over \$160m to the country's foreign debt, according to the China-Africa Research Initiative (CARI) at Johns Hopkins University. The work has suffered delays, which the company blames on the pandemic and the need to compensate property owners, reports the *Concord Times*, a local newspaper. The firm has also complained that some lorries pass by the toll booths, not through them.

Projects like these have mushroomed across Africa and other developing countries in the past 15 years. "It's no secret...China is by far the largest bilateral creditor to African governments," said Mike Pompeo, America's secretary of state, earlier this month, blaming it for creating an unsustainable debt burden. Plenty else is, however, secret. China does not typically divulge how much it has lent to whom or on what terms. Nor is it a member of the Paris Club of government lenders, which tries to coordinate debt forgiveness among its members, making sure that no lender takes advantage of the magnanimity of another.

Many, therefore, have wondered how China would play its part in the debt-relief initiative agreed in April by the G20 group of big economies. That initiative will allow 73 of the world's poorest countries to delay payments on loans from G20 governments, freeing up resources to fight the pandemic. China, a prominent G20 member, signed up. But would it offer the same terms as the others? And if so, how would they know? Proving

China is doing its bit is hard if you do not know how much it has lent.

Recent weeks, however, have yielded a pleasant surprise. To help monitor the G20 initiative, the World Bank told its board it wanted to reveal more data about the government debts of the eligible countries. Though its board is dominated by its bigger shareholders, including China, the bank's plan faced little resistance. And so after cross-checking its numbers, the bank has now disclosed what eligible governments owe to bondholders, multilateral bodies, private foreign lenders and other governments. The countries covered by the data owed \$104bn between them to China at the end of 2018. The total includes soft loans from China's government, semi-soft loans from "policy banks", such as China Development Bank, and profit-seeking loans from state-owned commercial lenders. The same countries owed \$106bn to the World Bank and \$60bn to bondholders.

The data, say Deborah Brautigam and Yufan Huang of CARI, are a "gold mine". Prior to the release, they had to scour public announcements of loan pledges, cross-checked with reports from Chinese embassies or ministry documents in the borrowing country. Their work fed into a broader set of estimates by Sebastian Horn and Christoph Trebesch of the Kiel Institute for the World Economy and Carmen Reinhart of Harvard University, who in May became the World Bank's chief economist.

In addition to aiding research, the data should also help the public in developing countries, says David Malpass, the World Bank's president. Governments—and "this is not unique to developing countries"—sometimes enter into contracts that do not serve the public interest, he points out. Transparency "helps align" these contracts with "the interests of the people".

The new figures confirm Mr Pompeo's observation that China is by far the biggest bilateral creditor to Africa, and in many poor countries elsewhere

(see chart 1). It accounts for about 20% of the total foreign debt owed by the 73 governments eligible for the G20 initiative (and about 30% of their debt service this year). That is more than all of the Paris Club lenders, including America, Britain and Japan, combined. But it is also smaller than the estimate of over 25% based on figures from Mr Horn, Ms Reinhart and Mr Trebesch. Indeed their estimates for individual countries often exceed the bank's by large margins (see chart 2).

What explains the gap between Ms Reinhart's research and her new employer's data? Some of it may reflect the difference between announcements and disbursements. Just because China says it will lend money, does not mean the entire sum is paid at once (or ever). But even when Mr Horn, Ms Reinhart and Mr Trebesch look at the bank's figures on commitments, rather than incurred debt, they find some loans missing, suggesting incomplete data.

Another reason for the gap may be that the bank excludes some debt owed by state-owned enterprises and special-purpose vehicles but not guaranteed by the government. In other contexts the bank does consider scenarios in which state-owned firms fail or public-private partnerships sour, requiring the government to step in. Counting these as public debt brings the bank's estimates closer to the Horn-Reinhart-Trebesch figures.

Such thought experiments could sometimes stretch the definition of public debt, though. The financing raised for Sierra Leone's controversial toll road, for example, is supposed to be repaid from toll, not tax, revenues. It would only burden the government if those tolls fell short. The World Bank does not seem to count it as government debt—but it is included by CARI.

The bank's figures for Chinese lending are not always below outside estimates. For Burkina Faso, the Central African Republic and Liberia they are much higher. This, reckons Ms Brautigam, is because they include loans

from Taiwan. China's critics, including Mr Pompeo, may suspect that its true lending is higher than the bank suggests. But even they would not want to chalk up to the People's Republic what is properly owed to Taiwan.





公共财政

债伤总数

最贫穷国家欠中国的债务可能比之前人们以为的要少

塞拉利昂的商业中心马西亚卡（Masiaka）和首都弗里敦（Freetown）之间正在修建一条62公里长的四车道收费公路。它有望缩短两地间的旅行时间、减少交通事故，让行驶更平稳，但还是颇有争议。据约翰斯·霍普金斯大学中非研究所（China-Africa Research Initiative，以下简称CARI）称，这个由中铁七局承建的项目让塞拉利昂增加了1.6亿多美元的外债。据当地报纸《协和时报》（Concord Times）报道，该项目进度延误，中铁七局把这归咎于新冠疫情以及需要补偿房地产业主。该公司还抱怨一些卡车绕开收费站行驶。

过去15年里，类似的项目在非洲和其他发展中国家如雨后春笋般涌现。“这不是什么秘密……中国显然是非洲各国最大的双边债权国。”美国国务卿迈克·蓬佩奥在本月初表示。他指责中国造成了不可持续的债务负担。然而，除此之外，很多都是秘密。中国通常都不透露自己借给了谁多少钱，或者开出了什么条件。中国也不是巴黎俱乐部的成员。这个债权国政府的组织在成员国之间设法协调债务减免，以确保各债权国不会利用他人的慷慨占便宜。

因此，许多人想知道，在今年4月由大经济体组织G20达成的债务减免倡议中，中国将如何发挥自己的作用。该倡议将允许世界73个最贫穷国家推迟偿还G20成员政府的贷款，以留出资金来抗击新冠疫情。作为G20重要成员之一的中国也加入了倡议。但它会给出与其他国家一样的条件吗？如果是，那么它们又如何能确知呢？因为如果人们不知道中国的对外房贷数额，就很难证明它是在尽责。

然而，最近几周却有一个惊喜。为协助监督G20的此次倡议，世界银行向董事会表示，希望披露更多符合减免条件的国家的政府债务数据。尽管世行董事会由包括中国在内的一些大股东控制，但它的这一计划几乎没有遭

到什么反对。因此在交叉核对数据之后，世界银行公布了符合减免条件的国家所欠的债务，其债权人包括债券持有者、多边机构、外国私人债权人和其他国家的政府。截至2018年底，这些数据所涉及的国家总共欠中国1040亿美元，其中包括来自中国政府的软贷款、来自中国国家开发银行等“政策性银行”的软硬混合贷款，以及国有商业银行的营利性贷款。这些国家同时还欠世行1060亿美元，欠债券持有者600亿美元。

CARI的黛博拉·布罗蒂格姆（Deborah Brautigam）和黄昱帆表示，这些数据是一座“金矿”。在这些数据公布之前，他们必须四处搜罗承诺贷款的政府公告，并与中国大使馆的报告或债务国的政府部门文件反复核对。他们的成果被输入到一组涵盖面更广的估算中。做出估算的是基尔世界经济研究所（Kiel Institute for the World Economy）的塞巴斯蒂安·霍恩（Sebastian Horn）和克里斯托弗·特雷贝施（Christoph Trebesch），以及已于5月出任世行首席经济学家的哈佛大学的卡门·莱因哈特（Carmen Reinhart）。

世行行长戴维·马尔帕斯（David Malpass）表示，除了有助于研究，这些数据还应该能帮助发展中国家的民众。他指出，政府——“这并不是发展中国家所独有的（现象）”——有时签订的合同并不符合公众利益。透明度“有助于”让这些合同“符合民众的利益”。

新公布的数据证实了蓬佩奥的说法——中国绝对是非洲以及其他地区许多贫穷国家（见图表1）最大的双边债权国。在符合G20倡议条件的73国政府所欠的外债总额中，对中国的负债约占20%（约占这些国家今年应还本息总额的30%）。这比包括美国、英国和日本在内的所有巴黎俱乐部的债权国加起来的贷款还多。但还是少于基于霍恩三人的数据估算出的超过25%的比例。事实上，他们对个别国家的估计常常大大超过世行的数据（见图表2）。

如何解释莱因哈特的研究和她的新东家的数据之间的差距？一部分原因可能是公告所宣称的数字与实际贷款之间有出入。中国说自己会借钱，并不代表它马上就会支付全额或者一定会给。但即使霍恩三人查看的是世行承

诺贷款数字而非实际债务，他们还是发现有些贷款项目缺失了，表明世行的数据是不完整的。

造成两者数据差距的另一个原因是世行把一些由国有企业和特殊用途实体所借、没有政府担保的贷款排除在外。而在其他一些场合中，世行确实会考虑国有企业倒闭或者公私合作关系恶化而需要政府介入的情形。把这些贷款算作政府债务会让世行的估计更接近霍恩三人的数字。

不过，这种思想实验有时可能会歪曲政府债务的定义。例如，为塞拉利昂受争议的收费公路筹集的资金按说应当用通行费来偿还，而不是用税收。只有在收取的通行费不够的情况下才会加重政府的负担。世行似乎没有把它算作政府债务，但CARI却把它算进去了。

世行有关中国贷款的数字并不总是低于外界的估计。在中国对布基纳法索、中非共和国以及利比里亚的贷款上，世行的数字要比外界的估计高得多。布罗蒂格姆认为，这是因为世行的数字包括了台湾提供的贷款。包括蓬佩奥在内的批评中国的人可能怀疑中国真实的贷款额高于世行的数字，但即使是他们也不愿意把台湾的贷款算到中国大陆头上。■



Schumpeter

When bits bite

Why companies struggle with recalcitrant IT

IT IS SUPPOSED to be the “Tesla killer”. Volkswagen’s new ID.3 is the firm’s first mass-produced all-electric car—and the first step in the German carmaker’s attempts to reinvent itself for an electrified world. That makes it perhaps the most important model since the original Golf, launched in 1976. The ID.3 is also late. Mechanically, the car is hunky-dory. But some software widgets that are a big selling point these days—rumoured to include smartphone connectivity and augmented-reality parking assistance—may be missing at first, only to be added later. Originally set for this summer, the launch has been pushed back until at least September.

VW is not the only big company struggling to make its computers work. Last year British banks were hauled over the coals by regulators for online outages and botched IT upgrades that left millions of customers unable to make or receive payments. Some problems are much more serious. Boeing’s 737 MAX aircraft were grounded in 2019 after two fatal crashes caused partly by a software flaw. Investigators have since found lesser bugs. Airlines are, for instance, now advised to turn the plane off and on again every 51 days, to stop its computers displaying false data in mid-flight. A similar problem found in 2017 in some aeroplanes made by Airbus, Boeing’s European rival, prompted the European Union Aviation Safety Agency to require that such aircraft be rebooted at least every 149 hours.

Blame for companies’ IT woes often ends up in the boardroom. Sometimes that is fair; Dennis Muilenberg was rightly forced to resign as Boeing’s CEO after the tragic 737 max disasters. But not always. For software is hard—and hard to keep up with. And the employees expected to produce it are often the products of a discipline that is in many ways oddly premodern. When

software is “eating the world”—Silicon Valley speak for a situation where most firms are to a greater or lesser extent software companies—that matters.

Start with the computer code itself. Programming requires a mix of hyper-literalness and creativity. Tiny errors, like a misplaced punctuation mark, can completely change how a system behaves. An industry rule of thumb is that, depending on how carefully they work, programmers make between 0.5 and 50 errors in every 1,000 lines of code they write. Because cars and aircraft contain tens of millions of lines, the chances of an error-free system are in effect zero. Even when bugs do not lead to catastrophe, they put a constant drag on a firm’s productivity. A survey commissioned by Stripe, a digital-payments processor, suggested the average developer spends 21 hours a week fixing old or bad code.

The inherent difficulty of programming is made worse by the shortcomings of software engineering as a profession. These are laid out in a book, “The Problem With Software: Why Smart Engineers Write Bad Code”. The author, Adam Barr, spent 20 years as a developer for Microsoft, a software giant. Many coders, he notes, are at least partly self-taught. That leads to bad habits, which software-engineering courses fail to correct. There is too little communication between academia and industry, and no real agreement on what to teach or what habits to instil. The result, argues Mr Barr, is a field in which folklore and fads too often take the place of professional standards.

To illustrate the field’s shaky foundations, Mr Barr points to the practice, popular with technology firms like Google or Apple, of giving job candidates a programming problem to solve on a whiteboard. Few other fields behave that way, because they assume that, by dint of having graduated, applicants have already achieved a basic level of competence. Doctors do not expect anatomy quizzes before being hired. Mechanical

engineers are not required to jot down Newton's laws of motion to prove their bona fides.

All those problems are compounded by software engineering's breathless rate of change. Even when a system works, it rapidly becomes obsolete. The woes of British banks are largely the result of trying to maintain such "legacy" systems, written by long-departed programmers (often outsourced) in half-forgotten computer languages to satisfy criteria no one can quite remember. Coders under pressure to add nifty new features often cut corners, storing up problems for the (ever less distant) future.

The result, says one expert with decades of experience, is that shiny new IT systems can rapidly devolve into rickety, half-understood contraptions held together with gaffer tape and a prayer. Eventually the costs become too great to ignore, and companies must upgrade their systems. But that is the moment of maximum danger, for the new software must do everything that the half-understood old one does, and more. It is, to repeat a common but apposite analogy, like rebuilding an aircraft in flight.

| *A bug's life*

VW is doing its best to iron out the kinks with the ID.3's snazzy features. The firm wants to bring most software development back in-house, and has spent €7bn (\$8bn) on a shiny new "digital unit". That is probably a good idea. However, as Mr Barr argues, the structural problems with writing software mean that spending money on it does not, by itself, guarantee success. One great advantage possessed by startups like Tesla or Monzo, a newish online bank in Britain, is that their programmers are handed a blank sheet of paper. With no legacy systems to maintain, and fewer old bugs to root out, their software is more robust and developers can spend more time on features that customers want.

If that is cold comfort for older companies that have no easy way of starting

afresh, computing greybeards offer reassurance—after a fashion. The startups' advantages will, they predict, prove temporary. Bugs will creep in. Bodge jobs will go unfixed. Developers will leave, taking knowledge with them. Today's feisty usurpers will become tomorrow's clumsy incumbents, held back by their antiquated, unreliable IT—and ripe for disruption in turn. ■



熊彼特

食人小比特

企业为何难以应付难搞的IT

人们预期它是“特斯拉杀手”。全新ID.3是大众首款量产纯电动汽车，也是这家德国汽车制造商试图在电气化世界中重塑自我的第一步。因此，它或许是继1976年首次推出高尔夫之后大众最重要的车型。ID.3同样推迟了上市。在机械层面，这款车无可挑剔。但一些现如今算是大卖点的软件功能——据传包括智能手机连接和增强现实停车辅助——可能一开始并不会，日后才会添加进去。ID.3原定于今年夏天发布，现在已至少推迟到9月份。

大众并不是唯一一家难以让自己的电脑顺畅运转起来的大公司。去年，英国的银行因网络中断和IT升级一团糟导致数百万客户无法支付或接收款项，受到监管机构的严厉指责。有些问题的后果要严重得多。波音737 MAX飞机此前因两起致命事故于2019年停飞，事故的部分原因是软件缺陷。自那以后，调查人员发现漏洞减少了。例如，航空公司现在被建议每隔50天重启一次飞机，以防止计算机在飞行中途显示错误的信息。2017年，波音的欧洲竞争对手空客制造的部分飞机上也发现了类似的问题，这促使欧盟航空安全局要求此类飞机至少每149个小时重启一次。

对企业IT弊病的指责最终往往会落到董事会头上。有时这很公道：

737 MAX的惨痛灾难发生后，丹尼斯·米伦伯格（Dennis Muilenberg）理所应当地被迫辞去了波音CEO一职。但有时这也有失公允，因为软件很难做，要跟上软件发展的步伐也很难。而培养软件开发人员的学科在许多方面往往又莫名地很“前现代”。在软件正在“蚕食世界”的当下——正如硅谷所示，大多数公司或多或少都是软件公司——这是个紧要的问题。

先来看计算机代码本身。编程需要将极度严谨和创造性相结合。细微的错误（比如一个放错位置的标点符号）也可能会完全改变一个系统的行为。业内有一个经验法则：根据程序员工作仔细程度的不同，他们每写1000行

代码会犯0.5到50个错误。由于汽车和飞机包含上千万行代码，一个无错误系统存在的可能性实际为零。即便错误不会导致灾难，也会持续拖累企业的生产率。处理数字支付的公司Stripe委托开展的一项调查显示，开发人员平均每周要花21个小时修补过时或蹩脚的代码。

软件工程这个职业的弊病更是让编程固有的麻烦雪上加霜。这些都在《软件困局：为什么聪明的程序员会写出糟糕的代码》（The Problem With Software: Why Smart Engineers Write Bad Code）一书中得到了阐释。作者亚当·巴尔（Adam Barr）在软件巨头微软做了20年的开发员。他指出，许多程序员至少在一定程度上是自学的。这导致他们养成了各种坏习惯，而软件工程课程又未能纠正他们。学术界和业界交流太少，在应该教什么或培养什么习惯上也没达成真正的共识。巴尔认为，结果就是在这个领域里专业标准总是被坊间习俗和一时的风潮取代。

巴尔以一种做法为例来说明这个领域根基不稳。这种操作在谷歌或苹果这样的科技公司中很流行，就是抛出一个编程方面的问题，让应聘者在白板上解决。其他领域极少如此行事，因为它们认为，求职者既然能毕业，说明已经达到了基本的能力水平。医生在受聘前不用接受解剖学测验，机械工程师也无需用写下牛顿运动定律来证明自己货真价实。

所有这些问题又因为软件工程惊人的变化速度而更加棘手。即使一个系统奏效，也会迅速过时。英国银行的灾祸在很大程度上就是试图维持这种“遗留”系统的运转所致。这些系统是早已离开的程序员（通常是外包的）用几乎被遗忘的计算机语言编写的，满足的也是已经没人记得清的标准。迫于压力要添加实用新功能的程序员常常会图省事而走捷径，这就为未来埋下了一颗又一颗雷，危险日益逼近。

一位有着几十年经验的专家说，其结果就是簇新的IT系统可能会飞速退化为摇摇欲坠、让人半懂不懂的奇怪装置，只能修修补补，祈祷它别垮掉。最终成本会高到不容忽视的地步，企业因而必须升级自己的系统。但这就到了最危险的时刻，因为新软件必须具备那些让人似懂非懂的旧软件的一切功能，还要做更多。借用一个常见但恰当的类比，这就像一架飞机正在

飞行，却得重新装配它。

| “虫虫”危机

大众正在竭尽全力理顺ID.3各种新潮功能的技术问题。该公司希望把大部分软件开发工作都转回公司内部，并已投入70亿欧元（80亿美元）成立了一个崭新的“数字部门”。这很可能是个好主意。然而正如巴尔所言，由于软件编写方面的结构性问题，在软件上砸钱这件事本身并不能保证成功。像特斯拉或英国新兴网络银行Monzo这样的创业公司具备一个巨大的优势，就是它们交给程序员的是一张白纸。没有遗留系统要维护，需根除的旧缺陷也更少，它们的软件因而更强健，开发人员也就能花更多时间琢磨客户想要的功能。

如果这让那些无法轻易重头来过的老企业感到心灰意冷，那么它们倒是能从计算领域的老手那里勉强得到些宽慰。这些人预测，创业公司的优势将被证明是暂时的。漏洞会慢慢冒头。粗制滥造的活计将修无可修。开发者会离职，把知识也带走。今天争强好胜的篡位者将成为明天笨手笨脚的在位者，受制于过时而又不可靠的IT——到那时，便又是颠覆的好时机。■



Astrobiology

Life on Mars: the search continues

A new generation of biology-hunting spacecraft is on its way

AROUND 3.5BN years ago conditions on Earth and Mars were similar. Both had thick atmospheres and liquid water on their surfaces. Both, in other words, had the conditions required to sustain life. And on one of those planets life was, indeed, sustained. Precisely when biology began on Earth remains obscure. But by 3.5bn years ago, a billion years after the solar system formed, it was well established there and has since evolved into the lush abundance of complex forms seen today. Mars, meanwhile, became a freezing desert.

The question nevertheless remains: given that the conditions needed for life to emerge on Earth also seem to have pertained for a time on Mars, might life have evolved there, too? And, if it did, might it still survive in some form, even if only in vanishingly rare amounts?

To answer that question means visiting the place—if not with people then at least with robots. And now is a good time to do so, for Earth and Mars are aligned in a way that means the journey takes less than seven months. On July 20th, therefore, the first of a caravan of craft planning to take advantage of this alignment set off. That was when *Al Amal*, meaning “hope”, rose from Japan’s spaceport on Tanegashima, off the southern tip of Kyushu. *Al Amal* is an orbiter intended to study Mars’s weather, and also look at how the Martian atmosphere is leaking into space. Its lift-off adds the United Arab Emirates (UAE) to the list of countries that have dispatched probes towards extraterrestrial bodies.

Al Amal was followed, on July 23rd, by *Tianwen-1* (“heavenly questions”), a Chinese mission consisting of an orbiter, a lander and a rover that took off

from Wenchang Space Launch Centre, on Hainan. The lander's provisional target is Utopia Planitia, a large impact basin where an American craft, *Viking 2*, touched down in 1976. Chinese officials have so far declined to release much detail about *Tianwen-1*'s scientific aims, but what is known of them suggests that it will study the distribution of ice on Mars and examine how the planet's habitability has changed over time.

Lack of publicity has not been an issue for the third member of the flotilla. On July 30th NASA, America's space agency, launched *Perseverance*, a one-tonne, six-wheeled rover, from the country's principal spaceport at Cape Canaveral, in Florida. It cost \$2.4bn to build and dispatch, and will absorb another \$300m in operating costs during its mission. It is the most sophisticated vehicle sent by America to the Martian surface.

| *Once upon a time...*

Perseverance is aimed at a 45km-wide crater called Jezero that was, 3.5bn years ago, home to a lake. The rover's main goal is to look for signs of ancient life. But it is also the opening gambit in a decade-long plan to bring Martian rocks to Earth. Jezero itself sits on the inner rim of Isidis Planitia, another large impact basin, which was excavated 3.9bn years ago. One source of the water which formed the lake that once lay within it seems to have been a river leading to a well-preserved delta. The layers of sediment in this feature (colour-coded in the picture above according to their mineral composition) are prime targets in the search for Martian biology.

On Earth, some of the oldest evidence for life comes in the form of stromatolites. These stratified structures form in shallow water when colonies of microbes grow layer upon layer, trapping sediment as they do so. The most ancient examples are thought to be those found in Greenland in 2016, which have been dated to 3.7bn years before the present day. If there was sufficient time for stromatolite-forming organisms to evolve on Earth by this date then there is no obvious reason why they might not also

have evolved on Mars.

Spotting stromatolite-like layers in rocks will not, though, be enough on its own. Researchers will also need to consider the textures of the rocks concerned and the distribution within them of potentially telltale minerals and organic molecules. Confusingly, in chemistry-speak, an organic molecule is not necessarily of biological origin. The term just means that it is built around carbon atoms, so organic molecules can also originate inorganically, as it were. The biological nature of an organic molecule has thus to be justified by other evidence. As Kathryn Stack Morgan, a geologist who is the *Perseverance* mission's deputy project scientist, observes, "This is exactly the type of thing that we do here on Earth to make a case for biosignatures in our own rock record, and for the very first time using our instruments we can do that on the surface of Mars."

| *Rocks and hard places*

Perseverance carries two instruments in particular that are intended to examine the surfaces of rocks which the rover encounters. Both will look for pertinent minerals and organic molecules. SHERLOC, situated at the end of the rover's robotic arm, will shine a laser onto tiny grains in rocks it comes across. By analysing the spectrum of the light that is scattered back, this instrument will be able to identify molecules in the grains under scrutiny. WATSON, a camera, will then take close-ups of rocks that SHERLOC deems worthy of further study.

Mapping SHERLOC's chemical analyses onto WATSON's high-resolution images will show how different mineral layers are arranged and textured. That will be a big improvement over the instruments on board NASA's current operational Mars rover, *Curiosity*, which arrived in 2012. These are capable only of grinding up rocks to work out whether or not organic molecules are present in the bulk material. If there are stromatolites (or even fossils of more complex creatures) *Perseverance* will be able to see

them, both chemically and optically.

As did *Curiosity*, *Perseverance* will rely on an autopilot to guide it through the atmosphere to the planet's surface, after arriving at a velocity, relative to its target, of 19,500km per hour. "We refer to it as the seven minutes of terror," says Matt Wallace, an engineer who is the mission's deputy project manager. The rover's autonomy will then carry over to its everyday operations. Because of the time it takes radio waves to travel from Earth to Mars, *Perseverance* will receive instructions only once a day. On the ground on Mars it will need to find and avoid awkwardly placed rocks, and also more serious hazards, such as cliffs, by processing, in real time, pictures coming from its 23 cameras. This autonomy, NASA is confident, will permit the new rover to cross the Martian surface routinely and safely at a speed of around 150 metres per hour, double that at which *Curiosity* is usually allowed to travel.

As well as eyes, *Perseverance* has ears. A pair of microphones on board will permit people to hear the winds of Mars for the first time. They will also be able listen to the whirr of the rover's gears, the crunch of its wheels as it moves across the regolith (the crushed rock that passes for soil on Mars) and the percussive sounds of the drill at the end of its arm as it chips out samples of rocks to study.

Not all of those samples will be discarded after investigation. Some will be packed for eventual dispatch to Earth by a project called the Mars Sample Return mission. This is a collaboration between NASA and the European Space Agency, ESA, that involves launching five separate spacecraft over the course of a decade. *Perseverance* is the first, and its collaboration-related job is to seal samples of Martian rock that its operators think worthy of further investigation into one of around 30 titanium tubes which it carries. As the illustration overleaf presages, it will leave these on the surface to be picked up by an ESA-designed "fetch rover" that could arrive as early as

2028. Once collected, the tubes will be brought back to Earth by a system of relay craft, and their contents analysed.

Perhaps most intriguingly of all, *Perseverance* also carries a 1.8kg helicopter, called *Ingenuity*. If this manages to fly in Mars's thin atmosphere (which has about 1% of the density of Earth's at the surface), it will represent the first controlled flight, beyond the landing and lift-off of a spacecraft, to take place on another heavenly body. And if that happens, it will pave the way for more sophisticated drones on future missions to act as scouts.

| *Every contact leaves a trace*

The life-seeking instruments on *Perseverance* are more advanced than anything that has come before them, but this was not the original plan for the next phase, after *Curiosity*, of NASA's attempt to find life on Mars. In February 2012, while *Curiosity* was still making its way there, Barack Obama's administration slashed NASA's planet-exploration budget by a fifth. At the time, American scientists had been developing a programme called ExoMars, in collaboration with ESA. This was to involve an orbiter and several rovers being launched from 2016 onwards, with a combination of tools intended to look for signs of life.

Mr Obama's cuts killed American involvement in ExoMars and, by the time *Curiosity* reached Mars in August 2012, NASA had no plans to send any future rovers. The overwhelmingly positive public reaction to *Curiosity*'s nail-biting landing, however, helped persuade the agency's chiefs to reconsider their priorities and put together a scaled-back version of previous plans that required no increase in the budget. The result, the mission now known as *Perseverance*, was announced a few months later.

Meanwhile, ESA had kept its part of the ExoMars programme alive, turning to Russia for help with launching and hardware. In 2016 the agency

delivered the first part of the programme, the *Trace Gas Orbiter*. Its goal is to measure the precise concentrations in Mars's atmosphere of substances, including methane, water vapour, nitrogen oxides and acetylene, that each form less than 1% of the atmosphere's total volume but which might be signs of biology.

Methane is of particular interest since its presence varies with both time and location on the planet's surface. Methane does not live long in the Martian atmosphere, suggesting there is an active source of the gas. On Earth, living things emit methane as they digest nutrients. But purely geological processes can also liberate the stuff.

The next step in ESA's ExoMars programme is a rover, called *Rosalind Franklin*. This was also scheduled for launch in the current window. However, a combination of technical delays and the effect of covid-19, which has meant the team of engineers involved could not easily travel to complete the manufacture and testing of the rover, has pushed the lift-off date back to the next favourable alignment, in 2022.

When *Rosalind Franklin* eventually does arrive on Mars (2023, if this timetable is adhered to), the craft will crawl over an area called Oxia Planum. This has clays that date back around 4bn years, which will make it the oldest site yet explored on Mars. Since clay minerals require water to form, there are high hopes that Oxia Planum may once have been a life-friendly region.

Rosalind Franklin's scientific payload will be capable of much more sophisticated analyses than *Perseverance's*. In particular, the Mars Organic Molecule Analyser (MOMA) will be able to extract organic molecules from rocks and regolith more effectively than before.

Previous attempts to study organic molecules on Mars have been plagued

by the presence of chemicals called perchlorates. These were first seen in 2008, by NASA's *Phoenix* lander, and were confirmed by *Curiosity* half a decade later. Those missions baked their Martian samples in ovens, to release the organics. That also released chlorine and oxygen from the perchlorates, and these oxidised most of the organic molecules present. MOMA will circumvent this problem by using an ultraviolet laser that will knock organic molecules off rock samples so fast that any perchlorates present will not have time to decompose.

Rosalind Franklin's most important tool, however, will be a drill that can collect samples from two metres below the surface. This is crucial for recovering material in which organic molecules can be found in a good state of preservation. The thin Martian atmosphere is easily penetrated by ionising radiation from space. This slams into the surface and even travels a little way beneath it. As Jorge Vago, ExoMars's lead scientist, observes, "Over many millions of years, this ionising radiation acts like gazillion little knives slowly cutting away the functional groups of the organic molecules you would like to hopefully discover." Use a drill to go deep enough, though, and material it collects will have been protected from radiation by several metres of rock. ESA's modelling suggests that samples from 1.5 metres down would be scientifically interesting. The deepest any mission has so far sampled under the surface of Mars is a few centimetres.

The jackpot of this treasure hunt would be to find things like sugars, phospholipids (constituents of the membranes of cells), nucleotides (the "letters" of genetic material) or amino acids (the building blocks of proteins) that are characteristic of life on Earth. But consolation prizes might be available in the form of less direct signals of biology within the chemistry—traces of the actions of enzymes, for example. As Dr Vago observes, the way fatty acids are synthesised biologically on Earth means that they usually have an even number of carbon atoms, although there is nothing in their underlying chemistry which favours that in abiotic

syntheses. Finding a pattern like this, or something equally chemically striking, in Martian organic molecules would be encouraging to those who hope that Mars has or once had life.

| *Many hands*

The UAE's launch of *Al Amal* shows how even a small country can join the space race if it is determined enough. No one, however, expects it to become a serious space power. China, though, with half a dozen visits to the Moon under its belt, already is one. Nor is *Tianwen-1* the first Chinese attempt to join the Mars club. In 2011 a craft called *Yinghuo-1* ("firefly") attempted to hitch a ride with *Phobos-Grunt*, a Russian probe. Unfortunately, the rocket intended to propel the combined mission on its way malfunctioned, and it never left Earth orbit. This time, China is going it alone.

One thing which is known is that the mission will host around a dozen scientific instruments, including cameras, chemistry sets, magnetometers and radars. Officials from the China National Space Administration say the plan is to make detailed surveys of the surface. A ground-penetrating radar, for example, will measure the thickness and composition of layers within the regolith and identify any ice within 100 metres of the surface.

It will be a sophisticated spacecraft, if details revealed about the landing system are accurate. Zhang Rongqiao, the chief designer, told Chinese television-viewers in 2019 that the lander would separate from the craft's main body at an altitude of 70 metres and hover until it found a safe landing spot. Cameras and laser scanners will help this lander avoid obstacles as it makes its way to the surface.

Tianwen-1's lander does not look capable, from its instrument list, of quite the sorts of sophisticated biology-detecting activity planned for *Perseverance* and, after it, *Rosalind Franklin*. But even if that is the case,

those other two vehicles, combined with the forthcoming ESA and NASA Mars sample-return mission, do now offer a realistic possibility of answering the question of whether there is, or was, life anywhere other than on Earth. A failure to find it would be a disappointment, although the search would no doubt go on, both on Mars and elsewhere. But an answer in the affirmative, even were that life only bacterial and extinct, would surely transform humanity's view of itself as profoundly as did the discoveries of Nicolaus Copernicus and Charles Darwin. ■



天体生物学

火星生命：继续探寻

探寻地外生物的新一代航天器启程

大约35亿年前，地球和火星的状况相似，都有着厚厚的大气层，表面有液态水。换言之，两者都曾具备维持生命所需的条件。而在其中一个星球上，生命确实得以继续下来。生物确切是从何时开始在地球上出现的仍不清楚。但在35亿年前，也就是太阳系形成十亿年后，生命已在地球扎根繁衍，此后不断演化，发展成如今丰富多彩的复杂形态。与此同时，火星却变成了一片冰冷荒漠。

一个问题挥之不去：既然火星似乎也有一段时间具备地球上那种维系生命的条件，那里说不定也有生命进化发展？如果是这样，这些生命体会不会仍以某种形式存活，即便可能数量稀少到难以察觉？

要回答这个问题，就要访问这颗星球——如果不是人类亲自来，至少得是机器人。而现在正是一个好时机，因为眼下地球和火星的相对位置使得行程只需要不到七个月。一批航天器计划利用这一个“窗口期”探索火星。其中，阿联酋的“希望号”（Al-Amal）火星探测器率先在7月20日启航，从位于日本九州南端的种子岛航天中心发射升空。“希望号”是一枚轨道探测器，计划研究火星的天气以及火星大气层如何逸散至太空。它的发射令阿联酋跻身向地外天体发射过探测器的国家之列。

继“希望号”之后，中国的火星探测器“天问一号”（包含轨道器、着陆器、火星车）于7月23日在海南文昌航天发射中心升空。其拟定着陆点是火星上的乌托邦平原（Utopia Planitia），1976年美国的“海盗2号”探测器也是在这片大型撞击盆地上着陆。目前为止，中国官员还不肯就“天问一号”的科研目标透露太多细节，但据悉它将研究火星上冰的分布以及火星宜居性的演变过程。

这批星际舰队的第三位成员则一点也不低调。美国国家航空航天局（以下

简称NASA) 7月30日在佛罗里达州的卡纳维拉尔角 (Cape Canaveral, 美国主要的航天中心) 发射了一吨重的“毅力号”(Perseverance) 六轮火星车。其建造和发射成本达24亿美元, 在执行任务期间还要另外耗费三亿美元的运营成本。这是美国迄今送往火星表面的最先进的探测器。

| 很久以前.....

“毅力号”的目标着陆点是一个名为杰泽罗 (Jezero) 的45公里宽的陨石坑, 35亿年前那里曾有一个湖泊。这台火星车的主要使命是寻找远古生命的痕迹。但它同时也是一个把火星岩石带回地球的十年计划的先头部队。杰泽罗位于另一个大型撞击盆地伊希地平原 (Isidis Planitia, 形成于39亿年前) 的内缘。它里面曾存在过的湖泊似乎有一部分水源来自一条河流, 而这条河流形成了一片保存完好的三角洲。该地的沉积层 (上图中按所含矿物成分以不同颜色标记) 正是探寻火星生物的主要目标。

在地球上, 一些最古老的生命证据蕴含在叠层石中。微生物群落在层层叠生时将海水中的成分粘结成沉积物, 在浅水中就逐渐形成了这些分层结构。2016年在格陵兰发现的叠层石被认为是最古老的样本, 有37亿年的历史。既然形成叠层石的生物在此前有足够的时间在地球上进化, 那么没有明显的理由认为它们不曾在火星上进化过。

但是, 在岩石中发现叠层石之类的结构本身并不够。研究人员还要考虑岩石的质地和可能显示生命痕迹的矿物和有机分子在其中的分布。这里会造成混淆的是, 化学上所说的有机分子不一定来自生命体。这个名词只意味着分子是围绕碳原子构成, 因此“有机分子”在某种程度上也可能是无机形成的。所以有机分子的生物属性必须有其他证据来辅助推定。正如“毅力号”项目的副项目科学家、地质学家凯瑟琳·斯塔克·摩根 (Kathryn Stack Morgan) 所说: “在地球上我们也在做同样的事情, 验证岩石记录中的生物印记。而现在我们可以破天荒地运用仪器在火星表面做这种研究了。”

| 艰险之地

“毅力号”专门搭载了两台仪器, 用于检测火星车走过的岩石表面, 寻找包

含生物印记的矿物质和有机分子。在火星车机械臂的末端装配了拉曼光谱仪“SHERLOC”，它能发射激光到途经的细小岩石颗粒上。通过分析散射回来的光线光谱，该仪器能识别所探测岩石颗粒内的分子。而名为“WATSON”的照相机将对SHERLOC认为值得进一步研究的岩石拍摄特写照片。

把SHERLOC的化学分析与WATSON拍摄的高分辨率图像对应起来，将显示出不同矿物层的铺排和结构。相比NASA目前运行的火星探测器“好奇号”（于2012年抵达火星）上的仪器，这是一项重大的改进。“好奇号”的仪器只能磨碎石块，从整体上分析其中是否存在有机分子。如果遇到叠层石（甚至更复杂生物的化石），“毅力号”将能通过化学分析和光学观测两种途径看到它们。

与“好奇号”一样，“毅力号”在抵达后将由自动驾驶仪引导穿越火星大气层，着陆火星表面。它抵达火星大气层顶部时相对于火星的速度将达到每小时19,500公里。该任务的副项目经理、工程师马特·华莱士（Matt Wallace）表示：“我们称之为‘恐怖七分钟’。”然后，火星车将自主执行日常任务。由于无线电波从地球传到火星需要一定时间，“毅力号”每天只会接收一次指令。在火星表面，它需要通过实时处理自身配备的23个摄像头拍摄的图像，发现并避开杂乱的岩石以及悬崖等更大的危险。NASA相信，这种自主性将让这台新火星车以每小时约150米的速度在火星表面来回安全行驶，是“好奇号”正常安全行驶速度的两倍。

“毅力号”不但有“眼睛”，还有“耳朵”。它携带的两个麦克风能让地球人第一次听到火星上的风声。人们还将听到火星车齿轮转动的嗡嗡声、车轮碾压风化层（可以算是火星土壤的碎石）的嘎吱声，以及机械臂末端的钻头钻凿岩石样本时的敲击声。

这些样品在探测后不会被全部丢弃。其中一些会被打包，通过名为“火星样本返回”（Mars Sample Return）的任务最终发回地球。这是NASA与欧洲航天局（ESA）的合作项目，计划在十年内分别发射五枚航天器到火星。“毅力号”是第一个，它与这个项目有关的任务是把它的工作人员认为

值得进一步研究的火星岩石样本分别封装至它携带的约30根钛管中。如下图所示，这些金属管将被留在火星表面，而由欧洲航天局设计的“取样火星车”最快可在2028年抵达火星拾取它们，再通过航天器接力带回地球，以分析其中的样本。

也许最有趣的是，“毅力号”还搭载了一台重1.8公斤、名为“机智号”（Ingenuity）的无人机。假如它能在火星稀薄的大气层（表面大气密度约为地球的1%）中飞行，那将是另一天体上除了航天器着陆和升空以外的首次受控飞行。如果真能实现，那将为在以后的火星任务中运用更先进的无人机展开探测开辟道路。

| 触物留痕

“毅力号”上的生命探测仪器比之前的探测设备都更先进，但这并非NASA的火星生命探测行动原本计划在“好奇号”之后展开的下一阶段。2012年2月，“好奇号”仍在飞往火星的途中，奥巴马政府把NASA的行星探索预算削减了五分之一。当时，美国科学家一直在跟欧洲航天局合作开发一个名为ExoMars的项目，计划从2016年起发射一枚轨道飞行器及多台火星车，搭载一系列工具寻找地外生命的痕迹。

预算被削减导致美国退出了ExoMars项目，到“好奇号”于2012年8月抵达火星时，NASA已经没有计划再发射任何火星车。但民众对“好奇号”扣人心弦的着陆反应极为热烈，促使NASA的主管们重新思考各项工作的轻重缓急，在之前的基础上整理出了一个缩减版的、无需增拨预算的火星探测计划。结果就是，NASA在数月后宣布了如今大家所知的“毅力号”计划。

与此同时，欧洲航天局继续推进自己在ExoMars项目中的那部分，同时转向俄罗斯寻求发射和硬件方面的协助。2016年，欧洲航天局交付了该项目的第一个组件——微量气体轨道器（Trace Gas Orbiter）。其目标是测量火星大气层中的甲烷、水蒸气、氮氧化物和乙炔等物质的精确浓度，虽然这些物质各占火星大气层总量的不到1%，但可能是生物存在的信号。

甲烷尤其受关注，因为它在火星表面的浓度随时间和位置而变化。甲烷不

能在火星大气层中长期存在，这表明火星上有活跃的甲烷来源。在地球上，生物在消化营养物时会释放甲烷。但纯粹的地质过程也会释放这种物质。

欧洲航天局ExoMars项目的下一步是发射名为“罗莎琳德·富兰克林号”（Rosalind Franklin）的火星车。原计划在当前这个窗口期发射。但由于技术延误，再加上新冠疫情妨碍了工程师团队出差完成它的制造和测试工作，发射日期推迟至将于2022年出现的下一个火星探测窗口期。

到“罗莎琳德·富兰克林号”最终抵达火星时（一切如期推进的话将是在2023年），它将在一处名为奥克夏平原（Oxia Planum）的区域行驶。这里的粘土有40亿年的历史，将是人类探索的最古老的火星区域。由于粘土矿物要有水才能形成，奥克夏平原很可能曾经具备生命存在的条件。

“罗莎琳德·富兰克林号”搭载的科学仪器所能开展的分析要比“毅力号”复杂得多。尤其是其中的“火星有机分子分析仪”（以下简称MOMA）能比以往更有效地从岩石和风化层中提取有机分子。

过去，对火星上有机分子的研究一直备受高氯酸盐这种化学物质的干扰。NASA的“凤凰号”着陆器在2008年首次发现了这些物质，五年后“好奇号”也印证了其存在。两次航天任务都用烤箱烘烤火星样品来释放有机物，但这也让其中的高氯酸盐释出了氯和氧，令样品所含的有机分子大部分都被氧化。而MOMA将利用紫外线激光让岩石样品释放有机分子，速度之快将令样品中所含有的任何高氯酸盐都来不及分解，从而避免了这个问题。

不过“罗莎琳德·富兰克林号”最重要的工具是可以从地下两米深处钻取样品的钻头。这对获取含有保存良好的有机分子的样本至关重要。来自太空的电离辐射很容易穿透火星稀薄的大气层，冲击火星表面，甚至再往地下穿透一点。正如ExoMars的首席科学家豪尔赫·巴戈（Jorge Vago）所言，“经过千百万年，这种电离辐射就像是无数把小刀慢慢凿掉了人们希望找到的有机分子的官能团。”但如果用钻头探入足够深的地方，收集到的样本就有几米厚的岩层保护，不受辐射的影响。欧洲航天局的模型运算表

明，从1.5米以下收集样本在科研上会很有意义。迄今为止，火星探测任务的采样最深也不过是到表面以下几厘米。

火星寻宝之旅的“头奖”会是发现糖类、磷脂（细胞膜的成分）、核苷酸（遗传物质的“字母”）或氨基酸（蛋白质的基本单位）等标志着地球生命的物质。而“安慰奖”则可能是从化学反应中找到一些间接的生物信号，例如酶作用的痕迹。正如巴戈所观察到的，在地球上，脂肪酸的生物合成方式意味着它们通常含有偶数个碳原子，但在非生物合成脂肪酸的基本化学过程中并没有这种倾向。如果能在火星有机分子中找到类似的模式或同样瞩目的化学发现，将令希望火星存在或存在过生命的人们振奋鼓舞。

| 众人拾柴

阿联酋发射“希望号”表明，只要下定决心，小国也能加入太空竞赛。不过也没人预期它会成为真正的太空强国。而已六次探月的中国原本就已经是太空强国了。“天问一号”也不是中国加入火星探测俱乐部的首次尝试。

2011年中国的“萤火一号”探测器曾计划跟随俄罗斯的“福布斯-土壤”（*Phobos-Grunt*）探测器探测火星。不幸的是，这一联合项目的火箭在发射中出现故障，“萤火一号”根本没能离开地球轨道。这一次，中国自己来了。

目前已知的一点是“天问一号”搭载有摄像头、化学仪器、磁力计、雷达等大概12台科学仪器。中国国家航天局的官员表示，其目标是详尽勘测火星表面。例如，探地雷达将测量火星风化层的各层厚度和构成，查找火星表面以下100米内的冰层。

如果已披露的有关着陆系统的细节信息正确无误，那“天问一号”会是一台先进的航天器。总设计师张荣桥在2019年对中国的电视观众表示，着陆器将在70米的高度与航天器的主体分离并悬停，直至找到安全着陆点。摄像头和激光扫描仪将辅助着陆器在降落过程中避开障碍物。

从所搭载的仪器来看，“天问一号”的着陆器似乎不能开展“毅力号”和之后的“罗莎琳德·富兰克林号”计划开展的那种复杂的生物探测活动。但即便

如此，就凭这后两者再加上欧洲航天局和NASA即将启动的火星样本返回任务，对于火星上是否存在或曾经存在生命的问题，答案已不再遥不可及。如果最终没能找到生命迹象，人们会感到失望。但毫无疑问，无论是在火星还是其他地方，探索还会继续。但如果找到了，哪怕只是已经灭绝的细菌类生物，也势必会像哥白尼和达尔文当年的发现那样，深刻改变人类对自身的看法。■



TikTok

Sixty seconds of fame

As America threatens to ban or seize TikTok, its Chinese parent is scrambling for a way to hang on to its hit app

IN MAY BYTEDANCE, the world's most valuable startup, leapt further ahead of other technology "unicorns". It was valued at \$140bn on the secondary market, up by nearly half from a funding round in the spring. The reason? TikTok, a short-video app that has been downloaded 2bn times. The "last sunny corner" of the internet, as it is known thanks to jolly user-generated content, is China's first worldwide internet sensation. For ByteDance's 37-year-old founder, Zhang Yiming, it is part of an ambition to build a global software giant.

Now that ambition is in jeopardy. On June 29th India banned TikTok and 58 other Chinese apps, after deadly clashes between Indian and Chinese soldiers in the Himalayas. The same month ByteDance's American lawyers told it that President Donald Trump's administration has concerns over TikTok's Chinese ownership. America is now threatening to ban the app altogether.

Official unease about TikTok has risen with its popularity. It has an estimated 70m American users, in the same league as Snapchat. In the first quarter it was downloaded 315m times globally, more than any app ever in three months, according to Sensor Tower, a research firm (see chart 1). In America and Britain it rivals YouTube for user attention—and not just among teenagers, who first took to it. "TikTok is a place for everyone now," says Vanessa Pappas, the app's general manager for America.

ByteDance keeps its numbers close to its chest but its investors say it is on track to bring in \$30bn of revenue in 2020, up from \$15bn-20bn in 2019.

Net profit could more than double, to \$7bn. Most of that comes from its Chinese businesses, Douyin, a version of TikTok, and Toutiao, a news app. TikTok is not yet making money, but ByteDance reckons it may in time eclipse all its Chinese properties put together, by tapping into America's vast ad market. It has been rolling out tools to advertisers. ByteDance's mainly American venture-capital backers believe this, plus growth in China, could lift its valuation to \$500bn.

To TikTok's users the idea of Uncle Sam cracking down on videos of baby hedgehogs is as silly as grandpas learning to shuffle. Officials have two concerns. The first is over censorship and propaganda. TikTok has in the past muted discussion of subjects sensitive in China, like Tibet, Tiananmen Square or repression in Xinjiang province. The second worry is that as a Chinese firm, ByteDance is subject to laws that require it to work with China's authorities.

TikTok says that it has never received any formal requests for data from China, and would refuse to hand over information on non-Chinese users. But Alex Stamos, former chief security officer at Facebook who now advises Zoom, a videoconferencing service with operations in China, says that even if TikTok could resist government requests, "the question is what extralegal means exist to get data out". If Beijing-based engineers have access to TikTok's servers anywhere in the world, he says, their government could force them to hand over data stored there. TikTok says it collects less data than many social networks, but automatically records users' GPS location, internet address, and browsing and search history on the app. Users can also opt in to share their contacts.

ByteDance has tried to head off these concerns. As TikTok's user base exploded in the West, it took steps to Americanise its operations and management. After a covid-related delay its "transparency centre" in Los Angeles, where experts can examine its code, should open this summer.

TikTok has hired a high-profile new chief executive, Kevin Mayer, from Disney.

In March ByteDance also came up with a more radical plan. It could take all its non-Chinese businesses, including TikTok, and give them a global headquarters in London, plus a back-office in Ireland (where Europe's strict data-protection rules are in force). Operationally, the firm would bifurcate into "ByteDance China" and "ByteDance Global". It talked to the British government about the idea in February.

These discussions stopped once the White House raised the prospect of banning TikTok. Some people involved now reckon the likelihood of such a ban is pretty high. ByteDance's priority is to avoid this outcome, while hanging on to a meaningful chunk of TikTok's economic value.

The company's preferred option is the "ByteDance Global" plan. It is ready to change its capital structure and spin off the global arm, keeping a stake of between 35% and 49%. Mr Zhang would appoint a minority of board members. ByteDance Global could in turn spin out TikTok's American arm to distance it further from China. Another option on the table is reportedly for ByteDance's existing investors to buy a majority stake in TikTok, maybe letting ByteDance keep a small shareholding. Whether this would placate the Trump administration is unclear.

What ByteDance fears most is a forced sale of 90-100% of global TikTok to American investors or a tech giant. Larry Kudlow, Mr Trump's economic adviser, has said he thinks TikTok will become an American firm separate from the Chinese parent. Beijing would probably accept a new European global headquarters for ByteDance, the firm reckons. But handing global TikTok over to Americans would smack of expropriation. "America would get another global tech platform," notes one person in China involved in the matter.

Letting go of some or all of TikTok would be a financial blow to ByteDance. Without TikTok America its potential value would fall from \$500bn to perhaps \$300bn, reckons a big investor. Losing TikTok globally would be more painful still. A split could also stunt the future development of the app, whose popularity has been fuelled by ByteDance's algorithms, honed in developing Douyin and Toutiao.

TikTok's woes offer others an opening. In India, where Zoom users lost access to it overnight, a local rival, Roposo, got 22m sign-ups in 48 hours. In America Facebook is about to launch Instagram "Reels", a TikTok clone, and YouTube will soon roll out "Shorts". The White House may yet think twice about banning an app so many Americans are hooked on. Its corporate structure may change. But Ms Pappas is resolute: "TikTok is not going away." ■



抖音国际版 风光60秒

美国有可能封禁或夺取TikTok，其中国母公司着急找到办法来保住自己的热门应用

五月，全球最具价值的创业公司字节跳动相对其他科技独角兽的领先优势又拉大了。它在二级市场的估值为1400亿美元，比春季一轮融资后增长了近五成。是什么原因呢？那就是下载量达到20亿次的短视频应用抖音国际版TikTok。由于用户分享的内容欢快有趣，TikTok被称为互联网上“最后一个阳光明媚的角落”，是中国首个在全球范围内大火的互联网产品。字节跳动37岁的创始人张一鸣立志要打造一家全球软件巨头，TikTok是这一宏图的一部分。

现在，这番抱负可能折翼。在中印两国士兵在喜马拉雅山脉地区发生致命冲突之后，印度于6月29日禁用了TikTok和其他58个中国应用。同月，字节跳动的美国律师告诉公司，特朗普政府对TikTok的中国背景感到担忧。目前美国威胁要完全禁用这款应用。

随着TikTok越来越受欢迎，美国政府愈发感到不安。TikTok估计有7000万美国用户，与Snapchat旗鼓相当。根据研究公司Sensor Tower的数据，今年第一季度，它在全球的下载量达3.15亿次，创下全球任一应用单季下载量的历史记录（见图表1）。在美国和英国，TikTok在用户关注度方面可与YouTube相提并论——而且这还不仅仅是在它最初吸引到的青少年当中。TikTok的美国总经理凡妮莎·帕帕斯（Vanessa Pappas）说：“现在是全民刷TikTok。”

字节跳动对营收数字秘而不宣，但其投资者称，按目前的趋势它有望在2020年实现300亿美元的收入，2019年的收入为150亿至200亿美元。净利润可能翻一番以上，达到70亿美元。大部分利润来自它的国内版抖音和新闻应用今日头条。TikTok尚未盈利，但字节跳动认为，通过挖掘美国庞大的广告市场，假以时日TikTok的利润可能会超过字节跳动所有中国业务的总和。它一直在向广告主推出工具。字节跳动的主要美国风险投资者相

信，这一块再加上中国业务的增长，可能会将公司估值推高至5000亿美元。

在TikTok的用户看来，山姆大叔出手打击一款分享刺猬宝宝视频的应用就像老爷爷学鬼步舞一样犯傻。官员们有两方面的担忧。第一个涉及审查制度和宣传。TikTok过去一直屏蔽对中国敏感话题的讨论，比如西藏问题、天安门事件或新疆的镇压行动。第二个担忧是，作为一家中国公司，字节跳动受制于要求其与中国当局合作的法律。

TikTok表示，它从未收到中国政府任何索要数据的正式要求，如果有，它也会拒绝交出非中国用户的信息。但是，Facebook前首席安全官、现任视频会议服务Zoom（有中国业务）顾问的亚历克斯·斯塔莫斯（Alex Stamos）说，即使TikTok真挡得住政府的要求，“问题在于存在着哪些可获取数据的法外手段”。他说，如果身在北京的工程师可以访问TikTok在各地的服务器，那么他们的政府就可以强迫他们交出任何一个服务器上存储的数据。TikTok表示，它收集的数据比许多社交网络都少，但会自动记录用户的GPS位置、互联网地址，以及在应用中的浏览和搜索历史。用户还可以选择是否共享联系人。

字节跳动试图化解这些顾虑。随着TikTok的用户基数在西方呈爆炸式扩张，它逐步采取步骤使其运营和管理美国化。其位于洛杉矶的“透明中心”（专家可在此查看其程序代码）的启动因疫情而延误，应该能在今夏启用。TikTok已从迪士尼挖来了凯文·梅耶（Kevin Mayer）这位知名人物担任首席执行官。

字节跳动还在3月提出了一个更激进的计划。它可以为包括TikTok在内的所有非中国业务在伦敦建立一个全球总部，后台设在爱尔兰（那里实行欧洲严格的数据保护规定）。在运营上，公司将分为“字节跳动中国”和“字节跳动全球”。它在2月曾与英国政府就这一设想洽谈。

在白宫提出可能禁用TikTok之后，这些磋商中断了。现在，一些相关人士认为禁用的可能性很高。字节跳动的首要任务是避免这种结果，同时保住

TikTok经济价值的主要部分。

该公司的首选方案是成立“字节跳动全球”的计划。它已准备好改变资本结构并把全球业务分拆出去，持有其中35%至49%的股份。张一鸣将任命少数董事会成员。字节跳动全球可以进而再剥离TikTok的美国业务，使其更远离中国的控制。据称另一种在考虑的方案是让字节跳动现有的投资者购买TikTok的多数股权，可能会让字节跳动保持少数股份。尚不清楚这能否安抚特朗普政府。

字节跳动最担心的是被迫将TikTok全球业务的90%至100%出售给美国的投资者或某个科技巨头。特朗普的经济顾问拉里·库德洛（Larry Kudlow）表示，他认为TikTok将变成一家独立于其中国母公司的美国公司。字节跳动估计，北京可能会接受公司在欧洲设立新的全球总部。但若要把TikTok全球业务拱手交给美国人则会有种被强征的味道。“美国将获得又一个全球科技平台。”中国的一位相关人士指出。

部分或全部放弃TikTok将对字节跳动造成财务上的打击。一个大投资方估计，如果失去TikTok美国市场，字节跳动的潜在价值将从5000亿美元降至约3000亿美元。失去TikTok全球业务还要更痛苦。拆分还可能阻碍该应用未来的发展，因为推动它如此大受欢迎的是字节跳动在开发抖音和今日头条的过程中不断改善的算法。

TikTok的麻烦为其他公司提供了可乘之机。在印度，一夜之间有两亿用户无法再登录TikTok，本地竞争对手Roposo在48小时内获得了2200万新注册用户。在美国，Facebook即将推出TikTok克隆版Instagram“Reels”，YouTube不久也将推出“Shorts”。对于禁用一个让这么多美国人着迷的应用，白宫可能还是会再想一想。TikTok的公司结构可能会改变。但帕帕斯很坚定：“TikTok是不会离开的。”■



Banks and the economy

A window on America

In a topsy-turvy economy Wall Street banks book giant trading profits and giant bad-debt charges

IF YOU WANT a sense of what is happening to America's economy during one of the most unusual periods in its modern history, a decent place to start is its banks. Several of the very largest firms, including JPMorgan Chase, Citigroup, Wells Fargo and Goldman Sachs, have just updated investors. Together they have trillions of dollars of assets and dealings with many of the households and firms hit by the pandemic. The message is that Wall Street is booming even as Main Street is suffering.

When the pandemic struck, markets collapsed but the Federal Reserve started buying up government debt and promised to purchase all sorts of private assets, including corporate debt. Shares and bond prices soared and many companies, facing a shortfall in revenue because of the lockdowns, rushed to raise capital, mainly by issuing new bonds to investors but also by selling shares. In total some \$5.4trn has been raised worldwide so far this year.

This has created a windfall on Wall Street. In the second quarter markets revenues at Citibank, Goldman Sachs and JPMorgan were higher than at any time since the global financial crisis, almost doubling over the same period in 2019. Goldman Sachs, one of the two remaining big stand-alone investment banks, saw revenues jump by 41%. True to form, it wasted no time in handing over more to its staff. Their 35% pay increase meant that its indulgent and long-suffering shareholders saw profits rise by only 2%.

The real world is less reassuring. Under accounting and supervisory rules, bankers have to prepare for expected losses on loans that go sour, by

making provisions now. The sums involved are staggering. The four big banks that have reported set aside \$30bn, on top of the \$20bn they earmarked in the first quarter. In total the bad-debt reserves they hold are equivalent to 2-4% of their consumer and corporate loan books. Provisions for bad loans now exceed those set aside at the height of the financial crisis. This dragged overall profits down by 50-70% year on year at the big banking conglomerates. Wells Fargo, which does not have a large Wall Street operation to offset charges for dud loans, recorded its first loss since 2008.

What about the outlook? Few investment-bank bosses expect Wall Street to see such stellar results in the second half of the year. Trading volumes have already fallen back and, now that big businesses have their war chest, they will not need to raise so much new money. But the most striking signal from the banks is just how much depends on whether the virus can be controlled—and what the government does. Asset prices have been lifted because of the extraordinary, and necessary, interventions made by the Fed to restart activity. Main Street is staying afloat thanks to generous government handouts. It is unprecedented that unemployment has jumped to post-war highs while income and savings are rising. Half of the consumers who requested deferrals for credit-card and mortgage payments from JPMorgan have kept paying their bills. Whether they will still do so when the government stimulus tapers is another matter. Ominously, Michael Corbat, the boss of Citigroup, admitted that “We are in a completely unpredictable environment.”

That the banks are not sharing the pain in a time of hardship may stick in the craw. But it is better than weak lenders dragging down the rest of the economy, as in the financial crisis. The idea of letting lenders run investment banks no longer looks as risky as it did, given that Wall Street revenues generate profits which can offset Main Street losses. And America’s banking system sits on a vast capital buffer worth a total of \$1.2trn. The message from banks is not reassuring. The state of banks is

more so. ■



【首文】银行与经济

美国之窗

经济混乱不堪之时，华尔街银行录得巨额交易利润和巨额坏账拨备

要想了解美国在其现代史上最不寻常的时期之一经济状况如何，银行是个不错的起点。包括摩根大通、花旗集团、富国银行和高盛在内的最大的几家银行刚刚向投资者公布了最新数据。它们的资产合计达数万亿美元，与大量受疫情打击的家庭和企业有业务往来。这传达出的信息就是在“民生街”（Main Street）遭受苦难之时，华尔街欣欣向荣。

疫情爆发时市场崩溃，但美联储开始购买政府债务，并承诺购买包括公司债在内的各种私有资产。股票和债券价格飞涨，因封城而面临收入不足的许多公司连忙筹集资金，主要方式是向投资者发行新债券，但也出售股份。今年到目前为止，全球融资总额约为5.4万亿美元。

这让华尔街大赚意外之财。第二季度，花旗、高盛和摩根大通在资本市场的收入创下全球金融危机以来的最高水平，比2019年同期将近翻了一番。仅存的两个大型独立投资银行之一的高盛收入大增41%。一如往常，它马上就把更多的钱发给了员工。35%的薪资增长意味着它们那些宽容但长期饱受煎熬的股东只看到了2%的利润增长。

现实世界就没那么让人安心了。根据会计和监管规则，银行人员必须现在就做准备，以应对预期的坏账损失。准备金的数额很惊人。据报道，已公布业绩的四大银行在第一季度拨备了200亿美元的基础上又拨备了300亿美元。它们持有的坏账准备金总计相当于其个人和企业贷款总额的2%至4%。现在的不良贷款准备金规模已经超过了金融危机最严重的时段。这让大型银行集团的整体利润同比下降了50%至70%。富国银行没有大型投行业务来抵消不良贷款拨备，自2008年以来首次录得亏损。

那前景又如何呢？没几个投行老板指望华尔街在下半年也能有如此出色的业绩。交易量已经回落，而且大企业既然已经有了资金储备，也就不需要

再度筹集大笔资金。但是，银行发出的最引人注目的信号是事情在很大程度上取决于新冠病毒能否被控制住以及政府如何行动。由于美联储采取了非常且必要的干预措施以重启经济，资产价格上涨。多亏政府慷慨的救济，“民生街”得以维持。失业率已跃升至战后最高水平，与此同时收入和储蓄又在上升，这是前所未有的。向摩根大通申请推迟信用卡和抵押贷款还款的消费者中有一半人一直在支付账单。政府的刺激措施逐渐减少后他们是否还会继续支付就是另一回事了。不祥的是，花旗银行的老板迈克尔·科巴特（Michael Corbat）承认：“我们处于一个完全不可预测的环境中。”

银行在困难时期竟没有分担痛苦，这可能会让人不爽。但这总比让疲弱的贷款机构拖累整个经济要好——金融危机期间就是如此。鉴于华尔街的收入所产生的利润或许能抵消“民生街”的损失，任由贷款机构经营投资银行的想法看起来不再像从前那样有风险了。而且美国的银行系统拥有总值1.2万亿美元的庞大资本缓冲。银行发出的信号不能让人安心。银行的状况更是如此。■



The Big Mac index

Patty power

How big is China's economy? Let the Big Mac decide

AMERICA'S ECONOMY did not exceed China's in size until the 1880s, according to the Maddison Project at the University of Groningen. The two now rival each other again. Because China's workers are 4.7 times as numerous as America's, they need be only a fraction as productive to surpass America's output. No fewer than 53 countries would already have a bigger GDP than America if they were as populous as China.

In 2019 China's workers produced over 99trn yuan-worth of goods and services. America's produced \$21.4trn-worth. Since it took about 6.9 yuan to buy a dollar last year, China's GDP was worth only \$14trn when converted into dollars at market rates. That was still well short of America's.

But 6.9 yuan stretches further in China than a dollar goes in America. One example is the McDonald's Big Mac. It costs about 21.70 yuan in China and \$5.71 in America, according to prices collected by *The Economist*. By that measure, it takes only 3.8 yuan to buy as much as a dollar. But if that is the case, then 99trn yuan can buy as much as \$26trn, and China's economy is already considerably bigger than America's.

Motivated by this logic, *The Economist* has compared the price of Big Macs around the world since 1986. The result is a rough gauge of the purchasing power of currencies. It suggests that many currencies are undervalued, relative to the dollar, on the foreign-exchange markets (see chart). The Swiss franc and the Lebanese pound are overvalued. Lebanon's currency was undervalued until inflation took off late last year, raising local prices even as the pound remained pegged to the dollar. The Big Mac alone jumped 38% in price.

Every few years the World Bank embarks on a vastly more systematic effort to gauge purchasing power by comparing thousands of prices across the world. The results can be startling. Its survey of prices in 2011, released six years ago, showed that China was cheaper than previously thought and its economy was therefore much larger. Based on these estimates, the IMF calculated that its GDP overtook America's in 2014 and was 27% bigger in 2019.

Many observers, however, greeted these estimates with scepticism. In 2010 an informal survey by a reporter at *Caixin*, a financial magazine, noted that a number of items were dearer in Hangzhou than in its sister city Boston. (It compared apples to apples, and found that the Golden Delicious variety was 37% pricier in the Chinese city.)

The sceptics won some vindication in May when the World Bank released its latest price-comparison exercise. It discovered that things were about 17% more expensive in China, relative to America, than previously thought. At a stroke, China's GDP fell by over \$3.2trn. The estimates suggest China did not overtake America's economy until 2016.

But are these new estimates any more robust than earlier efforts?

Comparing prices across the world is fraught with difficulties. An item may be a staple in one place and a delicacy in another. The World Bank must also decide how much weight to give each item. That depends on shopping habits, which differ—partly because prices differ. It is easy to go around in circles.

So it might help to check the World Bank's results against a cruder yardstick—like the price of a Big Mac. Our index suggests that the bank now, if anything, underestimates the buying power of China's currency, and therefore its economic size. McDonald's was once a symbol of America's economic might. Now the Big Mac shows how its might is being

surpassed. ■



巨无霸指数 肉饼劲道

中国的经济体量有多大？让巨无霸来丈量

美国的经济规模直到19世纪80年代才超过中国——格罗宁根大学的麦迪森项目（Maddison Project）显示。现在两国又开始一较高下了。由于中国的劳动力数量是美国的4.7倍，人均生产力只需要达到美国的几分之一便可在整体产出上超过美国。如果其他国家也有中国如此庞大的人口，那么至少会有53个国家的GDP高于美国。

在2019年，中国劳动者生产出超过99万亿元的商品和服务。美国的产出为21.4万亿美元。由于去年大概6.9元人民币可兑换1美元，中国的GDP总值若按市场汇率换算成美元只有14万亿美元，仍然远低于美国。

但是，在中国的6.9元人民币比在美国的1美元更耐花。麦当劳的巨无霸汉堡就是一例。根据本刊收集的价格，一个巨无霸在中国的售价约为21.70元，在美国约为5.71美元。照此计算，只要3.8元人民币就能达到1美元的购买力。但如此一来，99万亿元人民币的购买力便相当于26万亿美元，那么中国的经济规模已经明显超过了美国。

在这一逻辑的启发下，本刊从1986年开始比较全球各地的巨无霸价格，以此粗略地衡量各国货币的购买力。结果表明，许多货币在外汇市场上相对美元而言被低估（见图表）。瑞士法郎和黎巴嫩镑的汇率则被高估。黎巴嫩的货币此前一直被低估，直到去年年底通胀开始飙升，在黎巴嫩镑保持与美元挂钩的情况下抬高了当地价格。巨无霸的价格上涨了38%。

每隔几年，世界银行都会展开一项系统化得多的调查，对比全球数千种商品的价格来衡量购买力。其结果可能令人吃惊。六年前发布的2011年价格调查显示，中国的物价比之前想象的更便宜，其经济体量因而也要大得多。根据这些估算，国际货币基金组织（IMF）推测中国的GDP在2014年便已超过美国，到2019年更是超出了27%。

然而，许多观察人士对这些估算持怀疑态度。2010年，财经杂志《财新》的记者进行的一项非正式调查发现，杭州的一些商品比它的姐妹城市波士顿更贵。（调查比较了苹果的价格，发现杭州的金冠苹果要贵37%。）

今年5月，世界银行发布了最新的价格比较报告，让这些怀疑论者赢得了一些佐证。报告发现，中国相对于美国的物价比之前想象的要贵17%左右。中国的GDP一下子便减少了超过3.2万亿美元。据此估算，中国的经济规模到2016年才超过美国。

但这些新的估算是否比之前的更可靠呢？比较世界各地的物价可谓困难重重。一个地方的平常主食换在另一个地方可能就是珍馐佳肴。世界银行还必须设定每样商品的权重。这取决于购物习惯，而各地的购物习惯千差万别——这在一定程度上又是因为价格不同。这很容易就绕起了圈子。

因此，用巨无霸价格这样一个更粗略的标准来检验世界银行的计算结果，或许能有所帮助。我们的指数显示，如果说有什么不同的话，世界银行现在的计算低估了人民币的购买力，因此也低估了中国的经济规模。麦当劳曾是美国强大经济实力的象征，而今巨无霸又显示出它的这种实力正在被超越。 ■



Satellite navigation

BeiDou begins

A home-grown satellite-navigation system will soon be fully functional

THIRTY-FIVE THOUSAND kilometres above the island of Borneo, the final piece of a Chinese infrastructure project is floating into place. The satellite is the last to join the BeiDou navigation system, which has taken nearly 30 years to develop and build. The state-owned firm that launched it from Sichuan province on June 23rd says the network of BeiDou satellites will function fully around the end of July. China sees this as a moment of triumph. It marks the end of the country's dependence on America for provision of a vital service: location data.

Satellite-navigation systems work on a simple principle. Each spacecraft uses radio waves to beam the time and its position to Earth. Devices that receive simultaneous transmissions from three or more satellites can use tiny differences in these signals to work out where the user is. All location satellites broadcast timing data on the same frequencies, so that a location device could, in theory, lock on to whichever satellites provide the best signal, regardless of whether they belong to America's Global Positioning System (GPS), Russia's GLONASS, Europe's Galileo or China's BeiDou.

But depending on foreigners for a technology so critical to national security has long worried the Communist Party. Having to rely on America has caused particular anxiety. GPS was the earliest network to provide global coverage, so GPS-enabled devices became the norm for use by Chinese companies, citizens and soldiers. The system is owned by America's government and operated by its air force, which means American officials could decide—say, in a conflict with China—to switch off or degrade the signals coming from GPS satellites. The main purpose of building BeiDou, which is operated by China's space administration, is to give China full

control over a navigation system it can rely on.

The placement of the final satellite (55 have been deployed, though some are no longer in use) is symbolic of a widening rift between China and the West in many technological domains. This trend was highlighted on July 14th by Britain's decision to ban the use of products made by Huawei, a Chinese tech firm, in the country's 5G telecommunications networks.

Work on BeiDou began in 1993 and has involved three phases. The first two provided coverage in China and then across the rest of the Asia-Pacific region. As was the case with GPS, building it has focused on military applications. When the second phase was being tested in 2013, the Chinese navy relied on BeiDou data during exercises in the South China Sea, according to state media. The third phase provides global coverage. It also affords more accuracy, and allows users to send short text messages and distress signals.

China prefers to publicise BeiDou's commercial applications. On the day of the final satellite's launch, state television trumpeted an array of uses, from precision crop-planting and freight tracking to the guiding of autonomous taxis (when they eventually come into service). Since 2013 the government has required heavy goods vehicles and fishing ships to be equipped with BeiDou devices. Most smartphones sold in China, except Apple's, can receive signals from BeiDou's satellites.

The completion of BeiDou not only eliminates dependency on America. It also puts China ahead technologically. BeiDou's satellites are more advanced than those of GPS. In the Asia-Pacific, BeiDou claims accuracy to 10cm, compared with 30cm offered by GPS. America began upgrading its system in 1997 with the deployment of a new generation of satellites known as GPS-3. It may take another 15 years to complete this roll-out. China took just five years to finish installing its latest batch of 30 BeiDou

satellites, which use technology as advanced as GPS-3.

China hopes to cash in on BeiDou globally. In December officials said China had exported BeiDou-enabled products to 120 countries and regions worldwide. Pakistan's armed forces have started using the system. BeiDou receivers may eventually be installed in all phones, in addition to GPS. It would add little cost and give devices access to more satellites when pinpointing a location. Or perhaps Sino-American rivalry will make American and other Western manufacturers eschew the use of a system so closely linked with the military power of a potential enemy. BeiDou may yet struggle to find its place in the world. ■



卫星导航

北斗当空

一个中国国产卫星导航系统将很快全面投入使用

在婆罗洲岛上空3.5万公里处，中国一个基础设施项目的最后一个部分正缓缓就位。这是加入北斗导航系统的最后一颗卫星，这个系统的开发和建设耗时近30年。6月23日在四川发射这颗卫星的国有企业称，北斗卫星网络将在7月底前后全面投入使用。中国视之为一个胜利的时刻。它标志着中国将不再依赖美国提供一项重要的服务：位置数据。

卫星导航系统的工作原理很简单。每颗卫星都使用无线电波向地球发送时间和位置信息。从三颗或更多的卫星同时接收信号的设备可以利用这些信号间的微小差异来确定用户的位置。所有定位卫星都以相同的频率广播计时数据，因此理论上定位设备可以锁定任何提供最佳信号的卫星，不管它们是属于美国的全球定位系统（GPS）、俄罗斯的格洛纳斯（GLONASS）、欧洲的伽利略，还是中国的北斗。

但是，在一项对国家安全至关重要的技术上依赖外国人一直就让共产党担忧。不得不依赖美国尤其让他们焦虑。GPS是最早覆盖全球的网络，因此搭载GPS的设备被中国企业、民众和军队广泛使用。这一系统归美国政府所有，由美国空军运营，这意味着美国官员可以决定关闭或降级来自GPS卫星的信号，比如在中美发生冲突时。建设由中国国家航天局运营的北斗系统主要是为了让中国可以完全控制一个自己可以依赖的导航系统。

最后一颗卫星到位（已部署55颗，虽然其中一些已不再使用）标志着中西方在许多技术领域中的裂痕正在扩大。7月14日，英国决定禁止在本国的5G电信网络中使用中国科技公司华为的产品，更是凸显了这一趋势。

北斗系统的研发工作始于1993年，分为三个阶段。前两个阶段先是覆盖了中国，然后是整个亚太地区。和GPS一样，建设北斗主要是为了军事应用。据中国官媒报道，2013年开展第二阶段测试时，中国海军在南海的演

习中使用了北斗的数据。第三阶段则覆盖全球。北斗的精度提升，并能让用户发送短报文和求救信号。

中国更喜欢宣传北斗的商业应用。在最后一颗卫星发射当天，国家电视台大力宣传它的一系列用途，从农作物精确种植、货运跟踪，到无人驾驶出租车导航（要等到这类车最终投用之时）。自2013年起，政府已要求重型货车和渔船配备北斗设备。除苹果手机外，中国销售的智能手机大多都能接收到北斗卫星的信号。

北斗系统的建成不仅让中国不再需要依赖美国，还让它在技术上取得了领先。北斗卫星比GPS卫星更先进。在亚太地区，北斗称其精度达10厘米，而GPS为30厘米。美国从1997年开始升级系统，部署名为GPS-3的新一代卫星。这可能还需要15年才能全部完成。而中国仅用五年时间就完成了最新一批30颗北斗卫星的组网，使用的技术与GPS-3一样先进。

中国希望用北斗在全世界获利。去年12月，有官员表示中国已经向全球120个国家和地区出口了搭载北斗系统的产品。巴基斯坦军队已经开始使用该系统。北斗接收器最终可能会和GPS一道被安装在所有手机内。这不会增加多少成本，还能让设备在定位时访问更多的卫星。又或者，中美之间的对抗可能会让美国和其他西方世界的制造商避开一个与潜在敌国的军方密切关联的系统。北斗可能还难以在世界上找到自己的位置。■



GDP and life satisfaction

Blessed are the rich in spirit

Money really can buy happiness—and recessions can take it away

GROSS DOMESTIC PRODUCT (GDP), the most common gauge of national prosperity, has taken a lot of flak in recent years. Critics say that counting a country's spending on goods, services and investment misses the full value that citizens get from products such as Google and Facebook. They also note that GDP ignores other aspects of development, including personal health, leisure time and happiness.

These criticisms probably exaggerate GDP's failure to capture the wealth of nations. Gallup, a pollster, has asked people in 145 countries about various aspects of well-being. Many of these correlate strongly with GDP per person. To take an obvious example, nearly all residents in the top 10% of countries by spending say they have enough money for food, compared with just two-fifths of those in the bottom 10%.

Strikingly, many non-financial indicators also track GDP per person closely. Residents in the top 10% of countries score their life situation as seven out of ten, compared with just four for those in the bottom 10%. They are also more likely to feel supported by their families, safe in their neighbourhoods and be trusting of their politicians—though they complain nearly as much as people in poor countries do about a lack of rest and affordable housing.

Scholars disagree over the extent to which national wealth itself causes contentment. Some countries' citizens have remained glum even as GDP per person has risen, a paradox noted by Richard Easterlin, an American economist. But one way of testing if money buys happiness is to analyse what happens when it goes away.

Studies of the previous global recession in 2009 suggest that economic hardship does indeed lead to emotional woe. Academics found dips in life satisfaction and other measures of well-being in the United States and several European countries, though the effects were mainly limited to people who lost their jobs. Adam Mayer of Colorado State University found that among Europeans of similar wealth and education, those who had recently become unemployed and struggled to buy staple foods had the worst outlook on life.

Covid-19 will allow economists to probe this pattern further. The IMF's latest forecast points to a fall in global GDP, weighted by purchasing-power parity, of 4.9% this year. If past recessions are any guide, the severe shock will have long-lasting effects. Economies will eventually grow larger than they were before the pandemic, but will be less rich than they would have been otherwise. The virus's human toll is therefore vast in terms of deaths and dollars. But given the correlation between GDP per person and Gallup's measures of well-being, it may have an enduring impact on the world's quality of life too. ■



GDP和生活满意度

富裕的人有福了

金钱的确能买到幸福感——而经济衰退也能把它夺走

国内生产总值（GDP）是衡量国家繁荣程度最常用的指标，近年来却饱受抨击。批评人士认为，它只计算了一个国家在商品、服务和投资上的支出，而忽视了公民从谷歌和Facebook等产品中获得的全部价值。他们还指出，GDP忽略了社会发展的其他方面，包括个人健康、休闲时间和幸福感。

这些批评可能夸大了GDP在衡量国家财富方面的不足。民意调查机构盖洛普（Gallup）就福祉的不同方面调查了145个国家的民众。其中许多方面都与人均GDP密切相关。举个明显的例子，在消费水平居前10%的国家中，几乎所有居民都说自己有足够的钱买食物，而在消费水平最低的10%的国家中只有五分之一的人这么说。

出人意料的是，许多非财务性指标也显示出与人均GDP的密切关联。排名前10%国家的居民自己的生活状况打了7分（满分为10分），而排名后10%国家的居民只打了4分。排名前10%国家的居民也更可能感受到家人的支持和在社区中的安全感，对政客也更信任，尽管他们几乎和贫穷国家的人一样抱怨休息时间不够、房子太贵。

对于国家财富本身能在多大程度上带来满足感，学者们意见不一。美国经济学家理查德·伊斯特林（Richard Easterlin）指出了一个矛盾现象：在一些国家的人均GDP增长的同时，民众却仍然闷闷不乐。不过，测试金钱是否能买到幸福感的方法之一就是分析失去金钱后的情况。

对上一次发生在2009年的全球经济衰退的研究表明，经济困窘确实会让人感到痛苦。研究人员发现美国和一些欧洲国家的生活满意度和其他福祉指标下降了，尽管这种影响主要限于失业者。科罗拉多州立大学的亚当·梅尔（Adam Mayer）发现，在财富状况和教育水平相似的欧洲人中，那些

最近失业、买不起主食的人对生活的展望最为悲观。

新冠疫情让经济学家得以进一步探索这种模式。国际货币基金组织（IMF）最新预测指出，按购买力平价计算，今年全球GDP将下降4.9%。如果说过去的经济衰退有什么借鉴意义，那就是这次的严重冲击将产生持久的影响。各经济体最终将增长到比疫情前更大的规模，但富裕程度比不上如果不爆发疫情的情况。因此新冠病毒造成的生命和经济损失是巨大的。而考虑到人均GDP与盖洛普福祉指标之间的相关性，它可能也会对全球的生活质量产生持久的影响。 ■



Bartleby

Keep it practical

The rights and wrongs of management books on social issues

MODERN EXECUTIVES are often told they should worry about a lot more than their balance-sheets. They should be aware of their company's environmental impact, of how well they treat their employees and suppliers, and whether their workforce is sufficiently diverse in terms of gender and ethnicity.

Sometimes, this pressure comes from customers unhappy with the company's stance on an issue. Sometimes employees demand that their firms take action, as when Google dropped a contract with the Pentagon after workers complained. But many businesspeople don't need a push: they are strong believers in what are known as ESG (environmental, social and governance) issues.

During the lockdown your columnist has worked his way through four weighty tomes by managers who argue that companies have a broader purpose than simply making a profit. The books were "Trailblazer" by Marc Benioff, "Green Swans" by John Elkington, "Restoring the Soul of Business" by Rishad Tobaccowala and "Share" by Chris Yates and Linda Jingfang Cai.

The danger is that managers use their books to opine on every social issue of the moment. Mr Elkington is a social entrepreneur who has co-founded groups such as SustainAbility, an environmental consultancy. The idea behind "Green Swans" is to focus on changes in the economy that will lead to environmental breakthroughs but his message is lost in a miasma of mixed metaphors. In the space of two pages he writes about "10x thinking", "an exponential mindset" and the "Chrysalis economy", while warning that the world is both heading into "some sort of historic U-bend" and backed

into “the mother of all corners”. Quite how a corner can have a mother, the author fails to explain.

In “Share” Mr Yates, general manager of learning and development at Microsoft, and Ms Cai, an “organisation design specialist”, fall into a different trap. The dust jacket promises a book about “new business models based on sharing, reciprocity and co-operation”. Instead readers get a rambling mix of personal biography and economic history.

Readers will find more useful lessons from Mr Benioff, the founder of Salesforce. His book is a personal history of how he built his software giant, while donating 1% of its services, profit and employees’ time to help non-profit organisations and charities. He argues that “companies and their leaders simply can no longer turn a blind eye to the issues that matter to their employees, their customers and the communities on which they do business”. To cite one notable example, Salesforce opposed a bill in Indiana that would have allowed business owners to discriminate against LGBTQ customers (after Mr Benioff’s intervention, Indiana’s then governor, Mike Pence, revised the bill to prevent such discrimination).

The book provides some useful lessons for chief executives who might assume their company is free from bias. Mr Benioff admits that for a long time he assumed his company paid sexes and races equally. But a review showed that it did not and three rounds of pay adjustments were needed before equalisation occurred. This focus on social issues has not stopped Salesforce from making money for shareholders. It also regularly ranks as one of the best places to work.

Perhaps the best of the books is Mr Tobaccowala’s. That is because the author, a senior adviser at Publicis Groupe, an advertising and communications firm, has a clear focus: how to ensure you can hire, then inspire, the right workers in the knowledge economy. “Employees who find

work meaningful are highly productive, agile and committed,” he writes, adding that talented workers are in a more powerful bargaining position in the current economy. He also argues that companies can be too obsessed with data, and not enough with employee motivation: “The best businesses find ways to marry the math and the magic.”

The book is clearly written and full of sensible and practical suggestions. They include assessing all meetings to eliminate those that waste time and suggesting that all employees spend 20% of each month trying to enhance their skills.

Both Mr Tobaccowala and Mr Benioff reflect on how companies can pursue both broader social goals and the desire to grow. Indeed, they argue that the aims are complementary, rather than contradictory. They also demonstrate the benefits of practical advice over grand philosophising about every social issue of the day. Those lessons even apply to managers who aren't writing books. ■



巴托比

别来玄的

管理学书籍探讨社会问题的是与非

现代高管经常被告知要多多关注资产负债表之外的东西。他们要了解公司对环境的影响有多大、员工和供应商的待遇如何，以及员工队伍在性别和种族方面是否足够多元。

有时，这种压力来自对公司在某个问题上的立场不满意的客户。有时是员工要求公司采取行动，例如谷歌在员工抗议之后放弃了与五角大楼的一份合同。但是许多企业领导并不需要别人施压，他们本身就对ESG（环境、社会和治理）议题抱持强烈的信念。

在封城期间，本专栏作者啃完了四本由管理者撰写的大部头著作，他们都认为公司的目标不止于获利。它们是马克·贝尼奥夫（Marc Benioff）的《开拓者》（Trailblazer）、约翰·埃尔金顿（John Elkington）的《绿天鹅》（Green Swans）、里沙德·托巴科瓦拉（Rishad Tobaccowala）的《重塑商业的灵魂》（Restoring the Soul of Business），以及克里斯·叶兹（Chris Yates）和蔡婧芳的《共享》（Share）。

管理者们一旦要通过自己的书来发表对当下各种社会问题的看法，问题就来了。社会企业家埃尔金顿是环境咨询公司“持续能力”（SustainAbility）等企业的联合创始人。《绿天鹅》的初衷是着重讲述经济中的某些变化将能带来环境方面的突破，但他的中心思想却淹没在形形色色的隐喻构成的迷阵里。在仅仅两页纸的篇幅里，他一边讲着“10倍思维”、“指数（增长）心态”和“蝶蛹经济”，一边警告说世界正在走向“某种历史性的U形大转折”，同时又退回到“困境之母中”。困境如何还能有母亲，作者并没有解释。

在《共享》一书中，微软学习与发展总经理叶兹与“组织设计专家”蔡婧芳陷入了另一个陷阱。书的护封上介绍说这本书讲的是“基于共享、互惠与

合作的新商业模式”。但读者实际看到的却是个人传记和经济史的大杂烩。

读者能从Salesforce的创始人贝尼奥夫那里获得更多有用的经验。他在书中讲述了自己打造这家软件巨头的经历，以及一直将1%的服务、利润和员工时间捐赠给非营利组织和慈善机构的做法。他认为，“公司及它们的领导者就是不能再无视员工、客户以及自己业务所系的社区所重视的问题。”举一个著名的例子，Salesforce反对印第安纳州一项允许企业主歧视LGBTQ（男女同性恋、双性恋者和跨性别者等性少数群体）客户的法案（贝尼奥夫干预之后，印第安纳州时任州长迈克·彭斯修改了法案以防止这种歧视）。

这本书为那些可能以为自己的公司不存在偏见的首席执行官提供了一些有用的经验。贝尼奥夫承认，很长一段时间以来，他一直以为自己的公司不论性别和种族一律同工同酬。但一次内部审查表明实际情况并非如此，并需要三轮调薪才能实现待遇平等。对社会问题的关注并没有妨碍Salesforce为股东们赚钱。它也经常被评为最佳工作场所之一。

托巴科瓦拉的书可能是这几本书中最好的一本。这是因为这位广告和传播公司阳狮集团（Publicis Groupe）的高级顾问论述的重点很明确，即如何确保在知识经济中雇到合适的人才并激励他们。“觉得工作有意义的员工生产力、敏捷度和敬业度都高。”他写道。他还补充说，在当前的经济环境下，有才华的员工议价能力更强。他同时认为，公司有时会过于痴迷数据，对激励员工却关注不足：“最好的企业能把数学和魔法结合起来。”

这本书表达清晰，也提供了大量合理可行的建议，包括通过评估取消那些浪费时间的会议，并建议所有员工每月花20%的时间提升自己的技能。

托巴科瓦拉和贝尼奥夫都在书中思考公司如何能实现更广泛的社会目标和自身发展目标。实际上，他们都论证了这两个目标是互补而不是互斥的。他们也展现了实用的建议比把当今所有社会问题都提到哲学的高度更有帮助。这些经验甚至适用于那些不写书的管理者。■



Schumpeter

The battle for low-Earth orbit

Elon, Masa and Boris. What could possibly go wrong?

SCHUMPETER IS ONLY an amateur stargazer. His equipment is no fancier than a pair of eyes and a place in the countryside, away from London's light pollution. That is enough to make out Venus, Mars, Jupiter and Saturn—and, occasionally, the International Space Station crossing the firmament. In the past few years a new spectacle has appeared, in the form of the Starlink satellites. Launched in batches by SpaceX, an American rocketry firm founded by Elon Musk, the tech billionaire behind Tesla's electric cars, they resemble nothing else in the heavens, floating like a train of white dots in tight formation. Bad weather delayed the launch of the latest batch on July 8th. When they do go up, they will total nearly 600, making SpaceX the world's biggest satellite operator.

SpaceX is a remarkable firm. It was founded in 2002, to further Mr Musk's dream of colonising Mars. It is a case study in disruption—a startup with no track record has humbled incumbents like Boeing and Lockheed Martin. Its rockets cost half as much as its rivals' do, thanks in part to their ability to land their first stages for reuse rather than dumping them in the sea in line with standard industry practice. The firm was last valued at \$36bn, more than better-known tech darlings such as Airbnb, DoorDash or Palantir.

SpaceX's rocket business alone does not justify this rich valuation. The market for launches is small and stagnant. Mr Musk himself has said that the most his firm could hope to earn from them is around \$3bn in revenue a year. If he is to make it to Mars—and if his investors are to see big returns—he needs another plan. This is where Starlink comes in. Those satellites visible from Schumpeter's garden are the vanguard of a planned

constellation of over 1,000, designed to beam the internet to every corner of the globe.

Satellite broadband is not a new idea. But existing options are expensive and slow. Starlink's cheap, mass-produced, low-flying satellites would, SpaceX claims, offer a service comparable to earthly broadband at competitive prices. It could serve poorly connected villages in rural Africa (or rural America for that matter), as well as oil rigs or cargo ships at sea. Mr Musk has noted that the global telecoms market is worth roughly \$1trn. If SpaceX captured even a fraction of that, Morgan Stanley, a bank, recently opined, it could be worth anywhere from \$5obn to \$12obn or more, making its present valuation look like a bargain.

The world has been here before. Iridium announced similar plans in the late 1990s with gales of hype: the first call on its network was between Al Gore, then America's vice-president, and a distant descendant of Alexander Graham Bell. Nine months later the firm went bust, swamped by the upfront capital costs of launching satellites. LeoSat, a firm based in Luxembourg, was founded in 2013. It shut down last year for lack of investor interest.

Starlink's chief competitor is OneWeb, with 74 satellites in orbit and hundreds more planned. It, too, went bust in March, after failing to persuade even Son Masayoshi (also known as Masa), a Japanese tech billionaire with a stake and a well-documented affection for risky startups, to pony up more cash. But it has new backers. On July 3rd Boris Johnson, Britain's shaggy-dog prime minister, announced that his government had stumped up \$500m for a 45% stake in OneWeb, and a golden share giving it control over its future. Bharti Global, an Indian telecoms firm, also put in \$500m.

Mr Johnson's decision drew general bafflement—and an instant flurry of

speculation about its rationale. Could he be trying to safeguard a domestic high-tech gem? Britain has long tried to nurture its small but sophisticated space sector and OneWeb is notionally a British firm; its parent company is based in Jersey, an island in the English Channel. But many of its operations, including satellite manufacturing, are in America. Perhaps the reasons were strategic? China was circling, claims one person close to the deal, and Britain pounced to frustrate its ambitions. Except that the American court administering the bankruptcy may be reluctant to hand OneWeb over to a Chinese firm. Politics almost certainly played a part. Britain's exit from the European Union has limited its access to Galileo, the EU's alternative to America's GPS satellites. A bombastic promise to build an all-British replacement, at a cost of £5bn (\$6.3bn) or more, looks dubious. Bolting a less capable navigation service onto OneWeb's satellites may offer Mr Johnson a face-saving way to back down, while pushing back against the perception that Brexit has made the country parochial.

Yet there are also hopes, according to insiders, that the bizarre acquisition may work on purely commercial grounds. OneWeb has priority over SpaceX for the bits of the electromagnetic spectrum needed to beam the internet from the heavens. Those satellite companies that survived bankruptcy—such as Iridium—have come out on the other side as viable, if somewhat dull businesses. Like railways in the 19th century and subsequent infrastructure projects, globe-spanning satellite broadband may become a viable proposition once the initial investors, who often overpay exuberantly, have been wiped out.

And Mr Musk could use a rival in low-Earth orbit. Jeff Bezos, the biggest tech tycoon of all, is working on a similar project, but has yet to put any satellites into space. In the meantime, competition from OneWeb would spur innovation and prevent SpaceX from settling into a celestial monopoly.

| *A giant leap of faith*

Can the British government be a source of competitive pressure? The politest description of its entrepreneurial record is “spotty”—just ask owners of clunkers such as an Austin Allegro or Morris Marina, produced after the partial nationalisation in 1968 of British Leyland. OneWeb may need a further injection of cash if it is to complete its constellation. British taxpayers may never see a financial return on their investment. But if OneWeb keeps Mr Musk on his toes even for a little while, their loss may turn out to be global consumers’ gain. Stranger things have happened in space. ■



熊彼特

近地轨道争夺战

马斯克、孙正义和约翰逊。能出什么错？

本专栏记者只是个业余观星爱好者，手头的设备不过是一双肉眼和一处远离伦敦光污染的乡间居所。这也足以分辨金星、火星、木星和土星，偶尔还能发现穿越天穹的国际空间站。过去几年，天空中出现了另一个新奇观——星链卫星（Starlink）。这些卫星由拥有特斯拉的科技亿万富翁伊隆·马斯克创立的火箭公司SpaceX分批发射，看起来像一排紧挨着的白色亮点，不同于天空中其他一切星体。最新一批星链卫星原定于7月8日发射，但因恶劣天气推迟。等到这批卫星升空，轨道内的星链卫星总数将接近600颗，令SpaceX成为全球最大的卫星运营商。

SpaceX是一家非凡的企业。它成立于2002年，目的是推进马斯克的火星殖民梦。这家毫无资历的创业公司让波音和洛克希德·马丁等老牌公司自愧不如，堪称“颠覆”的典型案列。SpaceX的火箭价格是对手的一半，这在一定程度上要归功于它把第一级火箭降落回收，而不是像行业一贯所做的那样让它们坠入大海报废。该公司的最新估值为360亿美元，超过了爱彼迎、外卖公司DoorDash或大数据公司Palantir等更知名的科技宠儿。

单凭火箭业务，SpaceX是难以获得如此高估值的。发射市场很小，且停滞不前。马斯克本人曾表示公司每年能从火箭发射业务获得的收入最多也就30亿美元左右。如果他要进军火星，而且如果投资者还要获得丰厚回报，就需要另作谋划。这正是星链的意义所在。星链计划发射1000多颗卫星，把互联网信号传播到全球每一个角落，现在从记者的花园里看到的这些卫星便是其中的“先头部队”。

卫星宽带并不是什么新点子。但现有的选择又贵又慢。SpaceX声称这些批量生产的廉价近地星链卫星将以有竞争力的价格提供堪比地面宽带的网络服务，可为联网不便的非洲偏远农村（或者就网络服务而言同样偏远的美国农村）、海上石油钻井平台或海上航行的货船提供联网服务。马斯克指

出，全球电信市场的价值约为一万亿美元。摩根士丹利近期表示，即便SpaceX只获取其中一小部分，价值也可能达到500亿至1200亿美元或者更高，令该公司目前的估值显得很便宜。

世界上不乏这类先例。铱星公司（Iridium）在上世纪90年代后期大肆宣传过类似的计划：首次通过其网络连线通话的是时任美国副总统戈尔和电话之父贝尔的一个曾孙。九个月后，该公司因无法负担发射卫星所需的庞大前期资本成本而破产。还有在2013年成立的总部位于卢森堡的LeoSat公司，因乏投资者问津而在去年倒闭。

星链的主要竞争对手是OneWeb，后者拥有74颗在轨卫星，计划再发射数百颗。但在未能说服日本高科技富豪孙正义（持有OneWeb股份而且一贯爱好投资高风险创业公司）加大注资后，该公司也在今年3月申请破产。但如今它迎来了新的投资者。7月3日，英国那位头发乱蓬蓬的首相约翰逊宣布政府已斥资五亿美元购入OneWeb 45%的股份，并持有黄金股而得以控制该公司的未来发展。印度电信公司Bharti Global也投资了五亿美元。

约翰逊的决定令很多人感到困惑，随即引起了对其背后动机的连串猜测。这是为了保护英国本土高科技公司吗？英国一直都想培育自己规模小但高精尖的太空产业，而OneWeb理论上算是英国公司——其母公司位于英吉利海峡中的泽西岛。但它的许多业务运作都在美国，包括卫星制造。或者这一决策是出于战略考虑？一位知情人士表示，中国正试探性地接触OneWeb，而英国的迅速出手挫败了其野心。不过负责处理这一破产申请的美国法院应该不会愿意把OneWeb交给一家中国公司。其中有政治上的考虑几乎是确定无疑的。英国脱欧限制了它使用欧盟的伽利略卫星定位系统（可替代美国的GPS系统）。英国政府曾夸口说要花费50亿英镑（63亿美元）或更多资金建立一套自己的卫星定位系统，这看起来并不靠谱。依靠OneWeb的卫星建立一套稍差一些的导航服务或许可以帮助约翰逊体面地从空头承诺中抽身，同时也可以反驳脱欧令英国变得孤立的说法。

但据一些内部人士称，这宗离奇的收购也有可能完全是出于商业目的。在获得从太空发射互联网信号所需的部分无线频谱上，OneWeb比SpaceX有

优先权。另一边，铱星公司等破产后重建的卫星公司也显现出可行性，尽管生意平平。就像19世纪的铁路和随后的基础设施项目一样，在往往大笔烧钱的第一批投资者被淘汰后，覆盖全球的卫星宽带也许能成为切实可行的计划。

而马斯克在近地轨道上也需要竞争对手。排名科技大亨之首的杰夫·贝佐斯正在研究类似的项目，但尚未发射任何卫星。同时，来自OneWeb的竞争将刺激创新并防止SpaceX安于太空垄断的地位。

| 靠信仰飞天

英国政府会成为竞争压力的一个源头吗？说起英国政府以往插手企业的业绩，“参差不齐”算是最客气的说法了，问问1968年英国利兰汽车公司

（British Leyland）部分国有化后生产的奥斯汀·快板（Austin Allegro）或莫里斯·玛丽娜（Morris Marina）这类破车的车主便可知一二。

OneWeb要建成卫星网络可能需要投资者进一步注资。英国纳税人可能永远不能看到他们的投资带来财务回报。但哪怕OneWeb能让马斯克多忌惮那么一会儿，英国纳税人的损失就可能会成为全球消费者的收益。太空中已经有过很多奇事了。 ■



Schumpeter

The legacy of Chesapeake

In times like these, business needs a bit of hubris

DRILLING FOR oil and gas is a contest of man and machine against nature. In America's shale formations, nature takes the form of rocks, rich in hydrocarbons, buried about a mile (1.6 kilometres) below ground. It is a geologist's job to find those rocks. It is an engineer's job to develop the right mix of water, chemicals and drilling technology to "hydraulically fracture" them. One of the core beliefs of America's shale-fracking revolution, which took off in the late 2000s, is that if you blast enough pressure at the rocks for long enough, they will eventually yield a big bounty.

The two "Okies" who founded Chesapeake Energy, a pioneer of this hydrocarbon upheaval, were neither geologists nor engineers. Tom Ward and the late Aubrey McClendon were "landmen". Their skill was in leasing mineral rights and persuading investors they would produce a bonanza, particularly of natural gas, if enough wells were drilled. Their success was extraordinary. At times in the 2000s Chesapeake was considered the Google of energy. It had leases with 1m Americans. It became America's biggest producer of unconventional natural gas.

That was then. On June 28th this once-mighty firm filed for bankruptcy protection, unable to support nearly \$9bn of debt. Robert Clarke of Wood Mackenzie, a consultancy, says that ultimately the poor quality of its assets, despite their size, made it unfit for a world of low energy prices.

Chesapeake's tale is a common one of hubris in America Inc, evident in the dotcom bubble, the decline of General Electric and Detroit's carmakers, or, most recently, the humbling of the tech unicorns. But is hubris really so bad?

In its early years Chesapeake's self-belief was (literally) ground-breaking. It was a young company, armed with a new technology, offering a compelling growth story at a time when a big market opportunity was opening. That was natural gas, a fuel in such short supply in America in the early 2000s that the country was building liquefied natural-gas (LNG) terminals to import it. Chesapeake was quick to notice rising demand from utilities switching from coal to natural gas. Its land grab put it in a good position to take advantage as the fuel's price increased. Sure enough, it quintupled to more than \$12 per million British thermal units (BTUs) between 2000 and mid-2008, pushing Chesapeake's market value to \$37.5bn.

Its descent into bankruptcy 12 years later, too, displays familiar features. It became hooked on cheap credit. Its net debt grew thirteen-fold to \$12.5bn in the decade to 2010. To finance this it needed natural-gas prices of at least \$6 per million BTUs—a level seldom reached since the end of 2008. Then there was the evangelistic boss. With his rock-solid faith in shale, McClendon, who was ousted as chief executive in 2013 and indicted on bid-rigging charges the day before his death in 2016, doubled down on new basins even as America's production tripled between 2008 and 2012.

Finally, Chesapeake was slow to adapt when market forces turned against it. Some of its biggest rivals, such as EOG Resources, switched their focus from shale gas to shale oil as early as 2009, earning bumper profits when prices of crude soared. By the time Chesapeake did so, the best oil assets had already gone. Its Chapter 11 deal, in which creditors have agreed to eliminate \$7bn of debt, will do nothing to lower the break-even costs of its oil and gas production. Unless prices soar, which is unlikely given the pandemic-induced slump in demand, these costs remain too high to assume the firm can thrive after emerging from bankruptcy.

Like Chesapeake, the shale industry has become a shadow of its former self. The more investors poured money into shale oil after the financial crisis of

2007-09, the worse life got for gas producers. Oil drillers in basins like the Permian in Texas also extract “associated gas” as a by-product. Although some of it is flared (at great environmental cost), most is dumped on the natural-gas market, exacerbating the glut. The shale-oil euphoria turned against the oilmen, too. Their prodigious output has depressed crude prices since the mid-2010s but, like Chesapeake before them, they have struggled to cut costs fast enough; they were slow to do so even before prices collapsed as a result of covid-19. The pain spreads beyond the wildcatters. On June 30th Royal Dutch Shell became the latest supermajor to slash the value of its global energy holdings because of falling prices. ExxonMobil, its bigger rival, remains one of the few holdouts. But, in a sign of the times, it is now worth less than Tesla, a maker of electric cars.

Nonetheless, Chesapeake’s legacy leaves plenty to marvel at. It played a role in changing America’s energy narrative from concern about overdependence on foreign suppliers for its energy, to one of exuberance about domestic energy abundance and industrial competitiveness. This boosted American business confidence after the financial crisis. It left a diplomatic and geopolitical windfall, too—though one that has faded in recent years. The switch from coal to gas lowered America’s carbon emissions, enabling Barack Obama to broker the Paris agreement on climate change in 2015 while he was president. It unlocked the possibility of LNG exports to weaken Russia’s natural-gas stranglehold on Europe and to improve trade with China.

| *Twilight of the revolution*

Ironically, the recent collapse in American oil production will curb associated-gas supply, potentially supporting natural-gas prices. Moreover, the coronavirus crisis may well lead to further bankruptcies and more consolidation in the shale industry, which could put assets into the hands of big firms with stronger balance-sheets, boosting profitability.

The romance of the early wildcatters and landmen will be gone. The revolutionaries will be replaced by bureaucrats. The over-exuberant and undercapitalised industry's financial discipline will improve. But especially in these troubled times, spare a thought for Chesapeake. Until it got the better of the company, its hubris helped change the world. ■



熊彼特

切萨皮克的遗产

在这样的时代，企业需要一点点狂妄

石油和天然气钻探是一场人与机器对抗自然的竞赛。在美国的页岩地层中，自然这一方是富含碳氢化合物的岩石，埋藏在地下约1英里（1.6公里）的深处。地质学家的工作是找到这些岩石。工程师的任务是合理运用水、化学品和钻探技术对这些岩石做“水力压裂”。始于十几年前的美国页岩革命的核心信念之一，就是只要对岩石施加足够大的压力并持续足够长的时间，终将获得丰厚的回报。

这场页岩革命的先锋是切萨皮克能源公司（Chesapeake Energy），它的两个“俄州佬”创始人既非地质学家也非工程师。汤姆·沃德（Tom Ward）和已故的奥布里·麦克伦登（Aubrey McClendon）是“租地人”。他们的本事是租下矿权，然后说服投资者只要打下足够多的钻井，就能挖到金矿，尤其是天然气。他们的成功非比寻常。在本世纪头十年的某些时候，切萨皮克被誉为能源业的谷歌。这家公司与一百万美国人签有租约，成为了美国最大的非常规天然气生产商。

俱往矣。6月28日，这家曾经不可一世的公司因无力偿还近90亿美元的债务而申请破产保护。咨询公司伍德麦肯兹（Wood Mackenzie）的罗伯特·克拉克（Robert Clarke）表示，尽管该公司资产的规模庞大，但质量不佳，终究无法在能源价格低迷的世界里生存下去。切萨皮克是美国企业界屡见不鲜的败于狂妄自大的例子之一——想想互联网泡沫、通用电气和底特律汽车公司的衰落，以及近来科技独角兽的挫败。但狂妄真的那么糟糕吗？

在早期，切萨皮克的自我信念就如同钻头一般，确实是开天辟地的。这家年轻的公司凭借一项新技术，在一个巨大的市场机遇成形之际，讲述了一个让人难以抗拒的成长故事。这个市场就是天然气，这种燃料在21世纪初的美国极为短缺，该国不得不兴建液化天然气（LNG）接收站来进口。切

萨皮克敏锐地注意到公用事业由煤转气的需求与日俱增。随着天然气价格上涨，公司大举圈地的策略使其处于极为有利的位置。果不其然，从2000年到2008年中气价上涨了四倍，超过每百万英热单位（BTU）12美元，切萨皮克的市值也攀升至375亿美元。

十二年后这家公司陷入破产边缘，过程同样大起大落。它沉迷于低息贷款。本世纪头十年它的净债务增长了13倍，达到125亿美元。天然气价格至少要达到每百万英热单位6美元，公司才有能力偿还债务——而自2008年底以来气价极少触及这个价位。此外它还有个如布道般热情推动这项事业的老板。麦克伦登对页岩气的信念坚如磐石，就在2008至2012年间美国天然气产量增加了两倍之时，还在不断加大对新天然气盆地的押注。（麦克伦登在2013年被迫辞去首席执行官一职，在2016年去世前一天被起诉操纵投标。）

最后，当市场风向逆转时，切萨皮克却反应迟缓。它最大的一些竞争对手，例如EOG能源（EOG Resources），早在2009年就将业务重心从页岩气转向了页岩油，在原油价格飙升时大赚特赚。等到切萨皮克开始效仿的时候，最好的石油资产早已被抢光。在它的破产保护协议中，债权人同意免除70亿美元的债务，但这丝毫无助于该公司降低达到油气生产盈亏平衡所需的成本水平。除非价格暴涨（鉴于目前疫情下需求不振，这也不太可能实现），否则生产成本仍然过高，即使公司能摆脱破产也未必能够东山再起。

与切萨皮克一样，页岩行业也大不如前。2007至2009年金融危机后，投资者对页岩油的投资增多，天然气生产商的日子变得更不好过。得克萨斯州二叠纪盆地等地的石油钻探商也会产出“伴生气”这样的副产品。尽管一部分被烧掉（付出了极大的环境代价），但大部分都被倾销到天然气市场，使供应进一步过剩。页岩油热潮也令石油生产商陷入了逆境。自2015年前后以来，巨大的页岩油产量让原油价格陷入低迷，但正如之前的切萨皮克一样，它们也未能迅速削减成本；即使在新冠疫情导致油价暴跌之前，它们在这方面也行动迟缓。遭受打击的不仅仅是投机性的油井开采商。6月30日，荷兰皇家壳牌成了最新一个因油价下跌而大幅减记全球能

源资产价值的石油巨头。其更大的竞争对手埃克森美孚是少数几个仍未减记资产的公司之一。然而，鲜明地反映出这个时代特征的是，它的市值现在还不及电动汽车制造商特斯拉。

尽管如此，切萨皮克仍然留下了大量令人赞叹的遗产。它改变了美国的能源业现状，让美国从担心对外国能源供给过度依赖，转变为国内供给充裕和行业竞争力强劲的繁荣局面。这在金融危机后提振了美国企业的信心，也带来了外交和地缘政治上的意外收获——尽管这些收获近年来已逐渐消失。从煤炭到天然气的转变降低了美国的碳排放，使时任总统奥巴马在2015年得以促成应对气候变化的《巴黎协议》。通过解锁出口液化天然气的可能性，美国削弱了俄罗斯通过天然气对欧洲的钳制，也提升了与中国的贸易。

| 革命的黄昏

讽刺的是，最近美国石油产量暴跌将抑制伴生气的供应，而这又可能支撑天然气的价格。此外，新冠病毒危机很可能导致页岩气行业出现更多破产与整合，实力雄厚的大公司可能会借机吸纳资产，提高盈利能力。

早期的投机勘探者和租地人的浪漫将随风而逝。革命派将被官僚所取代。在这个过度繁荣而资本不足的行业，财务纪律也将得到加强。但是，尤其在当前艰难的年代，请充满同情地记得切萨皮克吧。在这家公司被自己的狂妄击倒之前，它的狂妄确实改变了世界。■



Huawei and the world economy

Trade without trust

The West doesn't trust China at all any more. It still has to find a way to do business with Chinese firms

NINETEEN YEARS ago an unknown Chinese company set up its first European sales offices, in a suburb of Frankfurt and an English commuter town, and started bidding to build telecoms networks. Today Huawei symbolises the daunting rise of China Inc—and a global trading system in which trust has collapsed. With sales of \$123bn, it is known for its razor-sharp prices and dedication to the industrial goals of China's rulers. Since 2018 America has subjected it to a legal assault, making it a flashpoint in the trade war. Now Britain has said that it will block Huawei from its 5G networks. Other European countries may follow. But far from showing the West's resolve, the saga reveals its lack of a coherent strategy. If open societies and authoritarian China are to keep their economic links and avoid a descent into anarchy, a new trade architecture is needed.

America's security chiefs have always worried that Huawei's equipment was designed to aid spying and would make its customers dependent on subsidised Chinese technology. But over 170 other countries decided the risks were manageable. Britain, which works closely with America on intelligence, created a "cell" of cyber-experts to monitor Huawei's gear in 2010 and, later, confined it to less sensitive parts of the network. Other countries mirrored this approach. It offered a middle way between a naive embrace of Chinese state capitalism and a cold war.

Such a finely balanced judgment has proved untenable. The Trump administration has urged the world to ditch Huawei and enforced a unilateral embargo on its suppliers, preventing sales of some components as well as chips made abroad using American tools. Forced to choose

between an ally and a supplier, Britain was inevitably drawn to last week's decision. It has become riskier for anyone to do business with a firm Uncle Sam wants to cripple. Huawei, for its part, has failed to reassure Britain's cyber-experts, who have complained that its buggy software is getting harder to monitor, or to reform its opaque governance and ownership. Any remaining illusions that China's leaders respect the rule of law when it really matters have been shattered by events in Hong Kong.

The direct cost of ripping Huawei out of European networks is tolerable—adding less than 1% to Europeans' phone bills if amortised over 20 years. Ericsson and Nokia, two Western suppliers, can ramp up production and new competition may emerge as networks come to depend more on software and open standards.

The true burden has nothing to do with antennae but stems from the decay of the world's trading system. Perhaps a dozen countries might end up banning Huawei—Germany is sitting on the fence. But it will still be used in much of the emerging world, hastening the splintering of the tech industry. Trade relies on common rules but Britain's decision has been made amid a swirl of lobbying and threats. It is hard to elicit a principle behind it that can be usefully applied more broadly. If the problem is gear made in China, then Ericsson and Nokia do that, too. If it is Chinese firms building systems which connect devices (in the case of 5G, robots and machines), then a similar logic could be applied across a digitising world economy. German cars and Apple phones sold in China are packed with software, data and sensors. Is China entitled to ban them, too?

This feeds a spiralling sense of lawlessness. The average tariff on Sino-American trade is 20%. Direct investment flows from China to Europe have dropped by 69% from the peak in 2016, according to Rhodium, a research firm. Other firms are caught in the crossfire. TikTok faces a ban in India and, perhaps, America. China plans to impose sanctions on Lockheed

Martin for selling arms to Taiwan. Now that President Donald Trump has ended Hong Kong's special status, HSBC, a bank with huge interests there, could be subject to punishment by both China and America. Some Chinese lenders may be banned from dealing in dollars.

The logic of the Huawei ban is one of disengagement and containment. But this will not work if it is applied across the entire economic relationship. The West's last great authoritarian rival, the Soviet Union, was a trade minnow. China accounts for 13% of world exports and 18% of world market capitalisation, and is the dominant economic force in Asia.

Instead a new trade regime is needed that acknowledges China's nature. That is not easy. The World Trade Organisation (WTO), which aims to set universal rules, has failed to evolve with the digital economy. Nor was it prepared for President Xi Jinping's drive to increase state and Communist Party influence over private Chinese firms and those, like Huawei, which say they are mutually owned by workers. Disillusioned with the WTO, the Trump administration's negotiators unilaterally tried to wrestle China into liberalising its economy and cutting subsidies, using the threat of tariffs and embargoes. That has been a fiasco.

So how should the trade architecture work in an age of mistrust? The goal should be to maximise trade consistent with both sides' strategic security. That means fencing off flashpoints, such as tech, that generate lots of tension but a minority of trade: perhaps a third of Western firms' sales to China based on our analysis of Morgan Stanley's data, for example. These sectors will require scrutiny and international security certification of the kind Britain tried with Huawei. It may not work. But at least commerce in other areas can flourish.

Chinese firms should also be required to accept open governance of their big subsidiaries in the West, including local shareholders, foreign directors

and managers with real autonomy, and disclosures that all help create a degree of independence from the state. This is not hard: multinationals such as Unilever have been doing it for decades. TikTok could be a pioneer.

| *The ultimate network effect*

Open societies are stronger when they act in unison. Europe may be tempted to go it alone, ending decades of transatlantic co-operation. Yet at some point, soon if Mr Trump fails to win a second term, America will reinvigorate its alliances because it has been less effective without them. The West cannot fundamentally change China or ignore it. But by acting together, it can find a way to do business with an authoritarian state it mistrusts. Huawei marked a failure to do this. Time to start again. ■



【首文】华为与世界经济

没有信任的贸易

西方不再信任中国，但仍必须找到与中国公司做生意的途径

十九年前，一家不知名的中国公司在法兰克福一处郊区和英国一个通勤小镇设立了首批欧洲销售办事处，开始竞标建设电信网络。今天，华为标志着中国企业令人生畏的崛起，却也成了全球贸易体系信任瓦解的象征。销售额高达1230亿美元的华为以非常低廉的价格和致力于中国政府的工业发展目标著称。美国自2018年开始对华为发起法律攻击，使之成为中美贸易战的导火索。现在英国也表示将禁止华为参与其5G网络建设。其他欧洲国家可能也会随之采取行动。但这一连串事件远未显示出西方国家的决心，反而暴露出它们缺乏统一的战略。如果开放社会和威权中国要保持经济联系并避免陷入混乱，就必须建立一个全新的贸易架构。

美国的国家安全官员一直担心华为的设备被用于协助间谍活动，并可能导致其客户依赖受补贴的中国技术。但其他170多个国家认为这种风险是可控的。与美国在情报工作上合作密切的英国于2010年成立了一个网络专家“密室”（the Cell）来监控华为的设备，之后决定仅允许华为参与建设其网络中较不敏感的部分。其他国家效仿了这种做法。在不设防地拥抱中国国家资本主义和开打冷战之间，这提供了一条中间道路。

但事实证明这个左右逢源的想法行不通。特朗普政府敦促世界各国放弃华为，并对华为供应商实施单方面禁运，禁止向华为销售部分元件以及海外企业使用美国设备制造的芯片。英国被迫在盟友和一个电信供应商之间做选择，必然地做出了最近的决定。对任何国家来说，与一家“山姆大叔”要打击的公司开展业务都变得风险重重。而华为既未能打消英国网络专家的疑虑——他们抱怨华为的软件漏洞很多，越来越难以监控——也没有改革自己不透明的公司治理和所有权结构。对于中国领导人在关键时刻能尊重法治的任何残留幻想都已被香港近日的风波击碎。

将华为从欧洲网络中剔除的直接成本是可以忍受的，如果分摊到20年里，

欧洲人的通讯费用只会上升不到1%。爱立信和诺基亚这两家西方供应商可以加大生产，而且随着网络愈加依赖软件和开放标准，也可能会有新的竞争出现。

真正的难题无关通讯行业，而是缘于世界贸易体系的衰落。最终可能有十几个国家会封杀华为，德国正犹豫不决。但大部分新兴国家还是会继续使用华为的设备，加剧科技行业的分裂。贸易有赖于通用规则，但英国的决定是在一片游说和威胁中做出的，从中难以找到可广泛应用的原则。如果说问题在于设备是在中国制造的，那爱立信和诺基亚也在中国生产设备。如果说问题是中国公司打造了连接设备的系统（在5G网络中是机器人和其他机器），那么类似的逻辑可以用于整个正在数字化的世界经济。在中国销售的德国汽车和苹果手机上装载着各种软件、数据和传感器，那中国是不是也可以理所当然地禁用这些设备？

这推动了一种无法无序的情绪不断加剧。目前中美贸易的平均关税为20%。研究公司荣鼎咨询（Rhodium）的数据显示，从中国流向欧洲的直接投资比2016年时的峰值下降了69%。其他公司也受到牵连。TikTok在印度被禁，在美国也可能面临禁令。中国大陆因洛克希德·马丁公司向台湾出售武器而计划对其实施制裁。在特朗普终止美国对香港的特殊待遇后，在香港利益庞大的汇丰银行可能同时受到中美两方的惩罚。部分中国贷款机构可能被禁止进行美元交易。

华为禁令背后的逻辑是脱离和遏制。但若将它应用于整个经济关系，便不会奏效。西方上一个威权劲敌苏联在贸易上无足轻重。而中国占世界出口额的13%，占全球市值的18%，是亚洲的主导经济力量。

所以需要建立一套正视中国的性质的新贸易体制。这并非易事。力争设立通用规则的世界贸易组织未能跟上数字经济的发展。中国国家主席习近平推动加大政府和共产党对私营企业和像华为这类声称“员工所有”的企业的影响，这也是世贸组织没有准备好应对的。特朗普政府谈判代表对世贸组织大失所望，试图以关税和禁运相威胁，单方面迫使中国实施经济自由化并削减补贴。结果闹得不可收拾。

那么在互不信任的时代，贸易架构应如何运作？目标应该是让符合双方战略安全的贸易最大化。这意味着隔离出那些造成大量纷争但在贸易中占比不大的“导火索”，如技术。比如本刊对摩根士丹利数据的分析显示，这一部分大概占到西方公司对华总销售额的三分之一。这些领域将需要实施像英国对华为那样的审查和国际安全认证。这可能行不通，但至少其他领域的贸易往来可以继续繁荣。

还应该要求中国公司在其西方大型子公司实行开放的治理，包括本地股东、拥有真正自治权的外国董事和管理人员，以及信息披露，这都有助于企业在一定程度上脱离政府操控。这并不难办，像联合利华这样的跨国公司这么做已经有几十年了。TikTok可以成为示范先锋。

| 终极网络效应

开放社会在步调一致时会变得更强大。欧洲可能会想单独行动，结束大西洋两岸数十年来的合作。然而到了某个时候（假如特朗普没能连任，这个节点将很快到来），美国将会重振其同盟，毕竟没有盟友它的行动效果也打了折扣。西方不能从根本上改变中国或者无视其存在。但通过联合行动，西方可以找到和一个自己不信任的威权国家做生意的方法。华为事件显示西方没能做到这一点。是时候重来了。■



Online business

E-shopping frenzy

Investors are besotted with digital China. Two booming internet firms show why

CHINA'S BUSTLING digital economy has spawned thousands of startups. Yet in the eyes of many it remains "BAT or bust", to cite a saying among jobseekers from the country's elite universities. The BAT in question refers to the original trio of Chinese internet stars: Baidu, a search engine; Alibaba, an online emporium; and Tencent, a mobile-payments and video-game titan. The acronym is overdue an update.

Alibaba and Tencent continue to lord it over digital China. With market capitalisations of nearly \$700bn apiece, they are the world's seventh- and eighth-biggest listed companies, respectively. Having struggled to adapt as consumers moved from desktops to smartphones, Baidu languishes in 319th place; its erstwhile equals can gain or lose the equivalent of its entire market value of \$45bn in a day or two.

The BAT label also belies another development. Newer arrivals have been busily remodelling the upper reaches of China's cyberscape. They include firms like JD.com, a \$100bn e-merchant listed in New York, Didi Chuxing, a privately held ride-hailing giant valued at \$60bn or so, and the \$100bn-plus ByteDance, the world's biggest unlisted startup (which owns, among other things, TikTok, a short-video app popular with Western teenagers).

None has set investors' pulses racing of late more than Meituan Dianping and Pinduoduo. The duo have much in common. Both began by matching shoppers with discounts (on spa and cinema tickets in Meituan's case and products from apples to Apple iPads in Pinduoduo's). Both went public in 2018—Meituan in Hong Kong and Pinduoduo in New York. And both have seen their share prices soar since the start of the year (see chart 1). They are

now worth more than \$100bn each. But their routes to these highs look quite different.

Start with the bigger of the two, Meituan. It was founded in 2010 by Wang Xing, an engineering graduate from Beijing's Tsinghua University, selling those discount vouchers. Like Tencent and Alibaba, it has expanded into other areas. In 2013 it launched a meal-delivery business and a travel arm that lets users book hotels and flights. Two years later it merged with Dianping, a restaurant-review and booking platform similar to Yelp. In 2018 it paid \$2.7bn for Mobike, a bike-sharing service, and entered ride-hailing, which it expanded last year to dozens of Chinese cities. Today Meituan can be thought of as "a search engine for services", says Elinor Leung of CLSA, a broker.

Some of these, like food delivery or bike-sharing, are low-margin, high-volume businesses. In 2019 the firm earned a profit of less than three cents per delivery (chiefly from commissions it charges restaurants). But it makes an awful lot of them. The platform has 700,000-800,000 drivers at its disposal. Two in every three yuan that the Chinese spend on having grub dropped off at their doorstep goes through Meituan.

Like Mobike (which is capital-intensive and still unprofitable), the food business lures users who can then be directed to more lucrative offerings such as travel. Meituan's operating margins on hotel reservations hover between 20% and 35%. The pandemic briefly halted domestic bookings but by late May they had recovered to 70% of pre-coronavirus levels.

Pinduoduo has taken the opposite tack to Meituan. Rather than spread its bets, it has doubled down on e-commerce. Online retail is growing fast enough in China to justify not being "a jack of all trades", says David Liu, in charge of strategy at the firm.

He has a point. Chinese e-commerce sales could expand by 16% this year, to 14.4trn yuan (\$2trn), according to eMarketer, a research firm, even as total retail sales may dip by 4% to 35trn yuan as a consequence of lockdowns' toll on bricks-and-mortar shops. Alibaba will capture perhaps half of this growth. Pinduoduo will slug it out with JD.com for the rest. Shoppers hit by the coronavirus slowdown may lean towards Pinduoduo's bargains.

Central to the firm's ascent is the concept of social shopping, which it describes as a fusion of Costco and Disneyland. Products are cheaper if you buy in bulk with fellow bargain-hunters. Users can join existing groups or invite pals using WeChat, a social-messaging app owned by Tencent (which holds a 16% stake in Pinduoduo). Merchants sacrifice margins in exchange for higher volumes.

Colin Huang, Pinduoduo's founder, who once worked as an engineer at Google in America, did not invent group shopping; Groupon has been doing a version of it since 2008. But he did develop the idea, for instance introducing games which reward players with credits on future purchases.

Chinese shoppers love it. At the end of March 628m of them had made at least one purchase on the app in the preceding 12 months, 42% more than the year before and 60% more than shopped on JD.com; only Alibaba has more active users (726m). Their average annual spending also rose, from 1,250 yuan to over 1,800 yuan. So has Pinduoduo's share of Chinese e-commerce—from 2% in 2017 to 10% last year. Bernstein, a research firm, expects it to be 18% by 2024, in line with JD.com.

The shopping frenzy has boosted Pinduoduo's revenues by 44% year on year in the first quarter, to 6.5bn yuan. The money comes from transaction fees and adverts bought by merchants to have their offers promoted in the app. Similarly to eBay but not many e-commerce giants, Pinduoduo does not hold inventory or operate its own logistics network, relying on

merchants to ferry products to buyers. Instead, it burns a spectacular, and growing, amount of cash on sales and marketing: 112% of revenues in the first quarter.

Mr Liu insists these costs can easily be dialled back. Experience of other marketplaces suggests otherwise. Uber, which also matches sellers (drivers) with buyers (riders), has been perpetually loss-making. Like Uber, Pinduoduo enjoys some “network effects”—the more buyers use its app, the more sellers it draws, who in turn attract new buyers, and so on. But, again as in ride-hailing, buyers and sellers face few costs in switching to another app that offers a better deal. JD.com and Alibaba have already launched Pinduoduo clones to their vast user base.

The market is giving Pinduoduo the benefit of the doubt. The pandemic appears to have done it no harm; cooped-up Chinese consumers have turned to the firm for necessities and, sometimes, a dose of retail therapy. With negligible business outside China, it is, like Meituan, shielded from the Sino-American tech war making life difficult for TikTok, with its mostly non-Chinese users, or Huawei, China’s telecoms champion. White House threats to expel Chinese firms from American exchanges have not dampened investors’ enthusiasm. Nor has the sudden departure of Mr Huang, who stepped down as its chief executive on July 1st and cut his stake in the company from 43% to 29% (he remains chairman and holds 81% of voting rights).

Meituan’s path to riches is clearer. It ended last year in the black for the first time. Its profitable food and travel arms have been gaining market share from rivals (such as Ele.me, Alibaba’s food-delivery app, and Ctrip, China’s biggest travel agency). That gives its loss-making divisions financial breathing room.

Ultimately, both firms embody the excitement over digital China’s bright

prospects. But TAMP will only become the new BAT if both firms can match Tencent's and Alibaba's consistently fat profits. ■



线上商务

情迷网购

投资者对数字中国心醉神迷。两家崛起的互联网公司说明了原由

中国的数字经济蓬勃发展，催生出成千上万家创业公司。然而在许多人的眼中，借用国内顶尖大学的求职毕业生的说法，仍是“除了BAT，别的靠边站”。这里的BAT指的是中国最早的三家互联网明星企业：搜索引擎百度、在线商城阿里巴巴，以及移动支付和电子游戏巨头腾讯。这个缩略词早就该更新换代了。

阿里巴巴和腾讯依旧称霸中国的数字领域。这两家的市值均接近7000亿美元，在全球上市公司中分别位居第七和第八位。百度没能跟上消费者从台式机向智能手机的转移，排名下滑到了第319位；曾经和它平起平坐的另外两家公司现在一两天的股票涨跌幅度就与它450亿美元的总市值相当。

BAT这个称谓还掩盖了另一个发展动向。新入局者一直在积极重塑中国数字产业的上游格局。这些新贵包括在纽约上市的市值1000亿美元的电商京东、由私人控股的估值约600亿美元的网约车巨头滴滴出行，以及估值超过1000亿美元、全球最大的未上市创业公司字节跳动（深受西方青少年喜爱的短视频应用TikTok是其产品之一）。

但近期没有哪家公司比美团点评和拼多多更让投资者热血沸腾。这两家公司有许多共同点。它们都是通过匹配购物者和折扣券起家（美团销售SPA和电影票，拼多多销售从苹果到苹果iPad等各类商品）。两家公司都在2018年上市——美团在香港，拼多多在纽约。自今年初，两家的股价均大幅飙升（见图表1），目前市值都超过1000亿美元。但它们抵达如此高峰的路径看起来大不相同。

先来看两者之中规模更大的美团。2010年，毕业于清华大学工程专业的王兴创立了这家公司，销售折扣券。和腾讯及阿里巴巴一样，美团也已扩展到其他业务领域。2013年它推出了外卖业务，并成立了让用户预订酒店和

机票的旅行部门。两年后，美团与餐厅点评和预订平台大众点评（类似 Yelp）合并。2018年，美团以27亿美元收购了共享单车公司摩拜，并进入网约车领域，去年其网约车服务已扩展到中国几十个城市。券商里昂证券（CLSA）的梁向奕表示，如今美团可以被看作“服务的搜索引擎”。

其中一些服务——例如外卖或共享单车——均属于低利润、高成交量的业务。2019年，美团每单外卖的利润还不到三美分（主要来自向餐馆收取的佣金）。但是成交量极大。该平台有70到80万名骑手可供调度。中国人点外卖的花费里每三块钱中有两块经过美团之手。

与摩拜（投入大量资本而仍未盈利）一样，外卖业务也可以先吸引用户，然后将他们引导到旅游等更有利可图的服务上。美团酒店预订的营业利润率在20%至35%之间浮动。新冠疫情导致中国国内酒店预订短暂停摆，但到5月下旬，预订量已恢复到疫情前水平的七成。

拼多多采取了与美团相反的策略。它没有分散赌注，而是在电子商务上加倍下注。该公司负责战略的九鼎表示，中国线上零售的增长速度足够快，大可不必遍地开花。

他说得有道理。研究公司eMarketer的数据显示，今年中国电子商务销售额可能增长16%，达到14.4万亿元，尽管与此同时，由于封锁措施对实体店店铺的打击，零售总额可能下降4%，至35万亿元。阿里巴巴大概会占据新增销售额的半壁江山，而拼多多和京东将争夺其余的一半。在疫情导致经济放缓的情况下，受影响的购物者可能会更加青睐拼多多上的便宜货。

拼多多异军突起的核心是社交购物的理念，它称之为开市客（Costco）和迪士尼乐园的混合物。只要你和其他砍价者一起团购，东西就能更便宜。用户可以加入已有的团购，也可以使用微信（腾讯持有拼多多16%的股份）邀请好友参团。而商家则牺牲利润以换取更高的销量。

拼多多的创始人黄峥曾在美国谷歌担任工程师，团购并非他的发明——美国网站Groupon自2008年起就在做某种类型的团购了。但黄峥确实进一步拓展了这个模式，例如引入游戏，给予玩家积分奖励，可以在日后购物时

使用。

中国购物者乐此不疲。在截至3月底的12个月内至少在拼多多上购物过一次的人数达到6.28亿，同比增长42%，比京东的购物人数高出60%；活跃用户数仅次于阿里巴巴（7.26亿）。用户平均年支出也从1250元增至1800多元。拼多多在中国电子商务中所占份额也同样上升，从2017年的2%升至去年的10%。研究公司盛博预计到2024年它将占18%，与京东相当。

在购物热潮的推动下，拼多多今年一季度收入同比增长44%，达到65亿元。这些收入主要来自交易费，以及商家为了在拼多多应用中推广自家产品而购买的广告。不同于许多电商巨头的是，拼多多和eBay一样既不持有库存也不自营物流网络，而是依靠商家将产品运送给买家。但它在销售和营销上大笔烧钱，而且还在加码：今年第一季度这部分投入相当于其营收的112%。

九鼎坚称这些成本会很容易缩减。但其他平台的经验表明情况并非如此。同样是匹配卖家（司机）和买家（乘客）的优步始终在亏损。和优步一样，拼多多也受益于一定的“网络效应”——使用平台的买家越多，吸引来的卖家就越多，进而又引来新的买家，如此循环。但是，同样和网约车类似的是，如果另一个应用更划算，买家和卖家切换过去并不用付出什么代价。京东和阿里巴巴已经面向各自庞大的用户群推出了拼多多的克隆版。

市场暂时还是认同拼多多的说法。这次疫情似乎并没有对它造成伤害：闭门不出的中国消费者已经开始在拼多多上购买必需品，有时还买点别的慰劳自己。由于其海外业务微不足道，它和美团一样并未受到中美科技战的冲击；相比之下，用户主要在中国以外的TikTok或者中国电信龙头华为的日子很难过。白宫威胁要将中国公司逐出美国交易所，但这并没有扑灭投资者的热情。黄峥的突然离职也没有影响投资者——他于7月1日辞去了首席执行官一职，并将持股比例从43%减至29%（他仍担任董事长，并拥有81%的投票权）。

美团的致富之路更加清晰。去年该公司首次实现了年度盈利。其盈利的外

卖和旅游业务不断抢夺竞争对手的市场份额（例如阿里巴巴的外卖应用饿了么和中国最大的旅行社携程）。公司亏损的部门因而在财务上得到了喘息的机会。

归根结底，这两家公司都体现了人们对数字中国光明前景的兴奋之情。但只有当它们能够像腾讯和阿里巴巴那样持续创造丰厚利润时，BAT才会变为TAMP。 ■



Chaguan

American soft power, trashed

Millions of Chinese have studied in America over decades. That bond is in peril

THE FIRST Chinese graduate from an American university, Yung Wing, deemed his college years the great adventure of his life. Alas, his graduation from Yale in 1854, sponsored by missionaries who spotted his talents as a boy in rural Guangdong, was a high point. Soon political mistrust and prejudice, both in America and China, filled his life with setbacks. These included the ending of his scheme that involved bringing 30 Chinese youths to America each year. Back in Beijing, imperial mandarins saw value in the science that the youngsters studied in New England. These officials were especially eager to take up a promise that the military academies of West Point and Annapolis would admit Chinese cadets. Then, in a mark of disdain for the ailing Qing empire, America broke that promise. Mandarins were further appalled by the irreverent, sports-loving, churchgoing Yankee ways picked up by Yung's charges. In 1881 they summoned the boys home in disgrace. Yung lost his American citizenship to a xenophobic law passed a year later, the Chinese Exclusion Act.

Yung would recognise the pressures his Chinese heirs face today. In the coming weeks many will have to decide how and whether to pursue studies in America. They are living through a moment when campuses, borders and minds on both sides of the Pacific are being closed by mutual suspicion (including overly sweeping American fears about on-campus espionage) and a pandemic.

There are currently 370,000 Chinese students and fresh graduates in America without an easy route home, after China slashed international flights as a covid precaution. Many who plan to stay face months of online study while campuses remain shut. On July 6th American immigration

officials caused panic (and a lawsuit from Harvard University, among others) by declaring that unless foreign students in America attend some in-person classes next term they risk deportation. Another 50,000 Chinese would normally take up new places at American universities this autumn, but visa offices at America's missions in China are closed, with no word on when they will open. Parents will soon receive tuition bills for the next semester, often for tens of thousands of dollars, even if their child can only watch virtual lectures at home in China.

This is a crisis with large effects, unevenly distributed. Some American schools are offering classes on Chinese satellite campuses, such as New York University Shanghai. Cornell has announced a "Study Away" scheme, allowing students in China to take a mix of American and local classes at prestigious universities in Beijing and other cities. Many wealthy, well-connected Chinese with places at top colleges are not ready to give up their American dreams. Talk to such students and their families, and what they are really describing is a larger plan to become world citizens, of which a degree is one part. Elite Chinese call America a place to learn critical thinking, build social networks, and secure credentials that will help land them jobs and perhaps green cards.

Elle, 18, attends the international section of a top-ranked high school in Beijing, where fees run to 160,000 yuan (\$22,800) a year. She has an offer from New York University and wants to accept it. Rival countries do not appeal. Australia is for "those with bad exam results," she says over coffee in a smart Beijing suburb. In Canada, she adds: "There are so many Chinese students that you don't even have a chance to speak English." As for Britain, she attended summer school there, but sensed coldness towards foreigners. "I like America more than the UK, I think I am accepted there."

Elle's older brother is studying in New York and wanted to stay, even after rioters smashed windows in his building. "It's one thing after the other,"

sighs Elle's mother. She remembers holidays in America when the country seemed great "in every way". But officials there have "failed quite badly on fighting covid", she laments. She is shocked by ordinary Americans refusing to wear masks. Still, she thinks America offers chances that a Chinese education cannot, starting with the different, thought-provoking ideas that her children may encounter. "It's more of a globalised experience."

Families are hedging bets. Half of this year's 150 clients of Elite Scholars of China, an education counselling service focused on the Ivy League and its ilk, also applied to non-American universities. In the end, though, only four took up places outside America, says Tomer Rothschild, the firm's co-founder.

Another perspective comes from a larger group: middle-class students from provincial cities, heading to mid-ranked American colleges. To generalise, this group is less likely to enthuse about Western freedoms, from raucous debates to an uncensored internet. Their focus is on which degree will boost their earning power when they return to China to compete with local graduates.

| *Yes, Chinese teens know Donald Trump calls covid "kung flu"*

Just now America is doing a remarkable job of making foreign students feel unwelcome. Chinese state media happily reinforce the message, with lavish reporting of American riots, anti-Chinese racism, gun violence and covid infections. Any decoupling may take time to be visible. Francis Miller, a college counsellor based in Xi'an, a western city, notes that the Chinese students he helps have to enroll in special international streams that prepare them for the SAT or other foreign exams from the age of 15 or so. That amounts to a commitment to study abroad, because they are abandoning the fearsome, three-year *gaokao* curriculum that governs entry to Chinese universities. Future trends are ominous. In the eastern city of

Nanjing, a college-entry coach says her employer's new-client numbers are down by two-thirds in a year.

Yung Wing wanted more Chinese to enjoy an American education to make his country "enlightened and powerful". His dream involved risks for both sides. America was being asked to help China rise. Chinese rulers had to let youngsters taste new freedoms. Soon afterwards, leaders in both countries rejected that bargain. Over a century later, a folly repeated is still a mistake.





茶馆

美国软实力，弃之如敝履

几十年来有数百万中国学生赴美留学。这种纽带如今岌岌可危

第一位从美国大学毕业的中国留学生容闳认为他的大学生涯是人生中的伟大历险。当年他只是广东的一个农村孩子，传教士发现他天资聪颖，赞助他赴美留学，后于1854年毕业于耶鲁大学，可惜这已是他历险的最高潮。很快，他在美国和中国都遭遇了政治偏见，不受信任，让他的人生备受挫折，其中一桩就是他每年送30名中国青少年赴美留学的计划被中止。容闳从美国返回北京后，清朝官员看到了年轻人在新英格兰所学科学知识的价值。这些官员尤其乐于接受西点军校和安纳波利斯海军学院（Annapolis）招收中国子弟的承诺。后来，美国背弃了这一诺言，显示了对积弱清帝国的鄙视。清朝官员又因容闳选派的留学生沾染了美国佬大逆不道、热衷体育、信奉基督教的生活方式而大为惊骇。1881年，这些学子被黯然召回。一年后美国通过了排外法律《排华法案》，容闳因此失去了美国国籍。

容闳会很理解如今这一代中国年轻人面临的压力。未来几周内，许多人将不得不决定该如何以及是否继续在美国学习。他们正在经历这样一刻：在太平洋两岸，校园、边境和思想都因双方相互猜忌（包括美国对校园间谍活动极度广泛的忧虑）和新冠疫情而不再开放。

目前在美国有37万名在读和刚毕业的中国留学生，中国为防范疫情而大幅削减国际航班后，他们遇到了回国难题。由于校园仍未开放，许多打算留下来的人面临几个月的在线学习。7月6日，美国移民局官员宣布，如果在美留学生下学期不参加任何线下授课，将可能被驱逐出境。这引发了恐慌（以及哈佛大学等高校的诉讼）。正常情况下，今年秋季将有五万名中国新生进入美国大学学习，但美国驻华使领馆暂停了签证服务，并且没有公布何时重启。即使这些学生只能在中国的家中上网课，他们的父母还是将很快收到下学期的学费账单，通常需要数万美元。

这场危机影响巨大，但对不同的群体冲击不同。一些美国大学在中国的卫星校园开设课程，如上海纽约大学。康奈尔大学宣布了“远程学习”（Study Away）计划，允许中国学生在北京和其他城市的名校参加美国线上课程和本地高校的线下课程。许多家境富裕、人脉广泛并考取了美国顶尖大学的中国学生还不准备放弃他们的美国梦。与这些学生及其家人交谈会发现，他们真正的计划更为长远，是要成为世界公民，拿学位只是计划的一部分。中国精英称美国是学习批判性思维、建立人脉及获得资历的地方，这些将有助于他们未来找工作，还可能拿到绿卡。

18岁的艾丽（音译）就读于北京一所顶尖高中的国际部，学费每年16万元。她收到了纽约大学的录取通知书并打算接受。其他国家她都看不上。澳大利亚是“考试成绩差的人”才去的地方，她在北京近郊一个高档社区边喝咖啡边说。在加拿大，她补充说，“中国学生太多，都没机会说英语”。至于英国，她去那里上过暑期学校，但觉得英国人对外国人态度冷淡。“比起英国我更喜欢美国，在那里我更有融入感。”

艾丽的哥哥正在纽约留学，即使骚乱分子砸碎了他居住的那栋楼的窗户，他还是想留下。“麻烦事一个接一个。”艾丽的母亲叹着气说。她记得在美国度假时这个国家看起来“方方面面”都很好。但美国官员“抗疫工作太糟糕了”，她叹道。普通美国人拒绝戴口罩，这让她很震惊。不过她仍然认为美国提供了中国教育所不能给予的机会，比如她的孩子们可能会遇到发人深省的不同看法。“这更是一种全球化的体验。”

许多家庭正在做两手准备。教育咨询机构ESC（Elite Scholars of China）主打常春藤名校及同等级大学，今年它的150名顾客中有一半同时也申请了非美国大学。不过最终只有四个人去了非美国学校，公司的联合创始人卢正树（Tomer Rothschild）说。

一个更大的群体对现状有不同的看法。他们是来自地级市的中产阶级家庭、准备前往美国中游学校的学生。总的来说，这个群体可能不太热衷从喧嚣的辩论到不受审查的互联网的西方自由。他们关注的是拿什么学位会让自己回国后赚得比本地毕业生多。

| 没错，中国的年轻人知道特朗普把新冠肺炎叫做“功夫流感”

近来美国正在十分卖力地让外国学生感到自己不受欢迎。中国官方媒体也乐得强化这个讯息，大量报道美国的骚乱、反华种族主义、枪支暴力和新冠疫情。任何脱钩可能都需要一些时间才能显现出来。在西安工作的留学顾问弗朗西斯·米勒（Francis Miller）指出，他指导的中国学生必须从15岁左右开始学习专门的国际课程，为SAT或其他外国考试做准备。这意味着走定了出国留学这条路，因为他们放弃了令人生畏的三年高中课程这条进入中国大学的必经之路。未来的趋势很不妙。在南京，一位留学顾问说她任职的公司一年内新客户数量减少了三分之二。

容闳希望更多中国人接受美国教育，让中国变得“文明、强大”。要实现他的梦想，两个国家都要冒险。美国当时被请求帮助中国崛起，中国的统治者则不得不放手让年轻人品尝新鲜的自由。此后不久，两国领导人都反悔了。一个多世纪后，历史荒唐重演，错误依然如故。 ■



The Economist film

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经济学人视频

海洋守护者

用10亿美元拯救海洋，该怎么花？听听全球海洋养护领域的专家怎么说。



Urban history

A night at the Cathay

A pair of displaced dynasties, the Sassoons and the Kadoories, helped shape two extraordinary cities

THE STORIES of Shanghai and Hong Kong, the most remarkable cities in East Asia, begin with the pogroms under Dawud Pasha, the last Mamluk ruler of Iraq. Until his ascendancy, the Sassoons were leaders of a Jewish community in Baghdad that dated back to the Babylonian captivity; for centuries the head of the family acted as the pashas' chief treasurer. Yet one dark night in 1829 here was David Sassoon, the city's richest man, fleeing for his life towards the river with a money belt around his waist and pearls sewn into his cloak.

In 1832 the 40-year-old set up anew in cosmopolitan Bombay, no hardscrabble refugee but an heir determined to win back his birthright. The Sassoons never liked being called the Rothschilds of Asia: in their view, the Rothschilds were arrivistes.

David's timing was lucky. The British empire, under which he sought protection, was at its height. He bought docks and warehouses. He imported new gins to make his raw cotton fit for the powered looms in British factories.

Above all, he ran drugs. The East India Company's monopoly on opium had been abolished. David backed Britain's unconscionable war in 1839 to force China to continue to take Indian opium. The British colony of Hong Kong was among the results, as was the "treaty" port of Shanghai.

The arrival there of Elias, the second of David's eight sons, marked the beginning of a truly global enterprise that would stretch from Yokohama to

London. Elias dealt in Indian opium, spices and cotton and Chinese silk and tea; he brokered other merchants' goods up and down the coast; and he invested in property to house the Chinese and foreign migrants flooding into the boomtown. In Hong Kong, the Sassoons helped set up the Hongkong and Shanghai Bank to get easy loans for their business. As HSBC, it remains one of Asia's most powerful banks.

The Sassoons held things together through constant correspondence—more than 7,000 letters in all. Clerks and young men of promise from poor Baghdadi Jewish families were dispatched to Sassoon schools in Bombay. One such family was the Kadoories. Recently widowed, Rima Kadoorie sent four sons to the Sassoons in 1876. Elly, the youngest, worked his way up the coast of China. When plague broke out at Weihaiwei he offered disinfectant to Chinese employees. Managers scolded him for giving away goods. “If that’s the value you place on life,” Elly said, “I resign.”

After the patriarch's death in 1864, Sassoon energies dissipated. A chief distraction was seeking status in Britain. In time Elly, joined later by his two sons, Lawrence and Horace, rivalled the Sassoons in both wealth and influence. The Kadoories brought electricity (or “power”, as they always called it) to Hong Kong. Later, in Shanghai, it was at the Kadoories' Majestic Hotel that China's Nationalist leader, Chiang Kai-shek, and his famous bride, Soong Mei-ling, held their wedding party. Still, the Sassoon clan was to produce one last rival, Victor, a crippled playboy of charm and wit whose art-deco Cathay Hotel, which opened on the Bund in 1929, immediately eclipsed the Majestic. Its masked balls became the stuff of legend.

Victor jettisoned the business's past reliance on Baghdadi families in favour of a global management team. As Jonathan Kaufman, formerly of the *Wall Street Journal*, puts it in “The Last Kings of Shanghai”, his illuminating book on the Sassoons and the Kadoories, the road to China's modernisation “ran along the Bund”. That was why Chiang's Nationalists could not shake down

the Sassoons, the Kadoories or other foreign businesses as they did Chinese merchants. They needed Western loans and approval to consolidate power in a fractured land.

To foreign residents, known as “Shanghaianders”, the forces tearing at China were at most a backdrop; few were aware of the part they were themselves playing in history. Shanghai was now the city of glamour—of Charlie Chaplin staying at the Cathay, Noël Coward writing “Private Lives” in the bath there, and Wallis Simpson acquiring sexual techniques that enticed a king from his throne.

The city partied like there was no tomorrow. Mr Kaufman recreates the era well, as does James Carter of Saint Joseph’s University in Philadelphia. With the eye of an unusually perceptive flâneur, in “Champions Day” he tells the story of Shanghai through its former racecourse (now part of the People’s Park). Mr Carter is a wonderful guide for visitors in search of a long-gone city. The ideal Shanghaiander was a Briton abroad, he writes, “but the category could be flexible.” Both books are cautionary tales about what happens, in Mr Carter’s words, when the powerful exploit their environment, inviting war and revolution.

| *Tomorrow doesn’t always come*

For it soon turned out that there was no tomorrow. Shanghaianders blanked from their vision the Chinese corpses on the streets. It took a visitor like Emily Hahn, an American writer and Victor’s lover, to note that the city’s wealth sat on “a heap of underfed coolies”. That China’s Communist Party was founded in Shanghai was no coincidence; Chiang’s brutal suppression of it met with Shanghaianders’ approval.

By then other threats were circling. In 1937 Japanese forces occupied the Chinese parts of the city (see picture); one bomb from a fleeing Chinese plane spattered flesh up the Cathay’s walls. After the attack on Pearl

Harbour in December 1941 the Japanese took the self-governing International Settlement, too. Horse-racing was suspended the next year. A naval commander moved into Victor's suite; in Hong Kong the Kadoories' fabled Peninsula hotel became a military headquarters.

During these hard years, as Mr Kaufman recounts, both clans redeemed themselves, whatever original sins their fortunes were founded on. Victor and Horace came together to give sanctuary to fleeing European Jews. They set up schools, workshops and canteens and raised funds (Chaplin donated proceeds from "The Great Dictator"), an effort that involved perilous negotiations with the rapacious Japanese occupiers. Even as Shanghai became a squalid hell, not one of its 18,000 Jewish refugees was persecuted.

Four years after that war, Mao Zedong's Communists seized power in China. They turned out the lights in Shanghai, that nest of foreign vices. His properties expropriated, Victor Sassoon cursed China and retired to the Bahamas. By contrast, Lawrence and Horace Kadoorie started afresh in Hong Kong. Lawrence's "power" fired the textile mills that fleeing Shanghai industrialists set up near Kowloon, kickstarting Hong Kong's post-war boom. The brothers had learned a valuable lesson: don't neglect those at the bottom of the pile. The gentle Horace devoted his life to helping Chinese refugees in Hong Kong set up small farms with grants, loans, seeds and better pig breeds. The Kadoorie name is revered in the rural New Territories.

The family never criticised the Communists or the seizure of their assets. When China began to open up in the late 1970s somebody quietly replaced Elly's tombstone, which Red Guards in Shanghai had ripped out. In Beijing Lawrence pleased leaders by praising China's economic policies and cautioning against democracy in Hong Kong. Today Shanghai is once again international and cosmopolitan—and the Kadoories are back on the Bund. Now, though, modern skyscrapers across the river in Pudong dwarf the

famous old skyline: no question who is boss.

Yet is another cautionary tale about to play out in Hong Kong? China imposed a draconian security law late last month, undermining what sets Hong Kong apart from the dictatorship on the mainland. The Kadoorie heirs—they are still the biggest generators of power—voiced their approval. Stability is all. But an approach that ignored fundamental injustices did not work out in Shanghai, and may not in Hong Kong either. The new law is intended to shunt popular discontents from view; meanwhile, many elderly Hong Kongers collect cardboard at night for a pittance. The tycoons and officials have stopped noticing. It is surely not the end of the story. ■



城市历史

华懋一夜

沙逊和嘉道理这两个背井离乡的王朝帮助塑造了两个不同寻常的城市【《最后的上海王》、《冠军赛马日》书评】

要讲述上海和香港这两个东亚最引人注目的城市的故事，就得从伊拉克马穆鲁克王朝最后一任统治者达乌德帕夏（Dawud Pasha）统治下的大屠杀说起。在他掌权之前，沙逊家族一直是巴格达一个犹太社区的领袖，这个社区的历史可追溯到巴比伦囚虏时期。几个世纪以来，这个家族的首领一直担任历任帕夏的司库长。但在1829年的一个黑夜，城中首富大卫·沙逊（David Sassoon）把钱藏在腰间，把珍珠缝进斗篷，奔向河边逃命去了。

一八三二年，40岁的大卫·沙逊在国际化都市孟买建立了新家园，他不是一贫如洗的逃亡者，而是一个决心夺回自己与生俱来的权利的继承人。沙逊家的人从来都不喜欢被称作亚洲的罗斯柴尔德家族：在他们看来，罗斯柴尔德家族都是些攀龙附凤之徒。

大卫赶上了好时机。他寻求保护的大英帝国当时正处于鼎盛时期。他买下码头和仓库，还进口新型轧棉机，以使自己的原棉适合英国工厂里的动力织机。

最重要的是，他还经营毒品。东印度公司对鸦片的垄断已被废除。大卫支持英国为迫使中国继续进口印度鸦片而在1839年发动的无理战争。其结果包括英国将香港据为殖民地，以及令清政府开放上海为“通商”口岸。

大卫八个儿子中排行老二的伊利亚斯（Elias）来到香港，标志着一个真正全球性的事业起步——之后他们的生意将覆盖从横滨到伦敦的广阔地域。伊利亚斯经营印度的鸦片、香料和棉花、中国的丝绸和茶叶，在沿海代理其他商人的商品，还投资房地产，为涌入这个新兴城市的中国和外国移民提供住房。为了给自己的业务争取便捷的贷款，沙逊家族在香港协助创立了香港上海汇丰银行（Hongkong and Shanghai Bank）。时至今日，汇丰

银行仍是亚洲实力最雄厚的银行之一。

沙逊家族通过不断的通信来掌控大局，这些信加起来有7000多封。来自巴格达犹太贫困家庭的小伙计和有前途的年轻人被送到沙逊家族在孟买开办的学校。嘉道理就是其中一户。1876年，丧偶不久的里玛·嘉道理（Rima Kadoorie）把四个儿子送到了沙逊的学校。年纪最小的埃利（Elly）慢慢转到了中国沿海工作。威海卫爆发瘟疫时，他向中国雇员提供消毒剂，经理们责备他乱送东西。“如果你觉得人命这么不值钱，”埃利说，“那我辞职。”

大家长大卫于1864年去世后，沙逊家族的能量也消散了。一个主要因素是他们为了在英国追求社会地位而分心不少。埃利的两个儿子罗兰士（Lawrence）和贺理士（Horace）后来和他一起打拼，他在财富和影响力上逐渐已能匹敌沙逊家族。嘉道理家族将电（或者按他们常用的说法，“电力”）带到了香港。之后，中国国民党领导人蒋介石和他著名的新娘宋美龄在该家族在上海经营的大华饭店举行了婚礼。然而，沙逊家族后来还是培养出了最后一个能与嘉道理家族较量的人——维克多（Victor）。这位跛足的花花公子魅力与才智并重。他那装饰艺术风格的华懋饭店于1929年在外滩开业后，一下子就让大华饭店黯然失色。那里举行的化装舞会更是成为了一代传奇。

维克托摒弃了对巴格达犹太家庭的依赖，而是选择建立一支全球性的管理团队。曾供职于《华尔街日报》的乔纳森·考夫曼（Jonathan Kaufman）在富于启发性的《最后的上海王》（The Last Kings of Shanghai）一书中讲述了沙逊和嘉道理家族的故事。正如他在书中所言，中国的现代化之路是“沿着外滩”铺开的。这就是为什么蒋介石的国民党不能像对待中国商人那样敲诈勒索沙逊、嘉道理或其他外国企业。他们要在一片四分五裂的土地上巩固政权，就需要西方的贷款和认可。

对于被称为“上海人”（Shanghailanders）的外国居民来说，那些撕裂中国的力量顶多只是一个背景；他们当中没什么人意识到自己正在历史进程中扮演的角色。此时的上海已是一个魅力之城——查理·卓别林下榻华懋饭

店；诺埃尔·科沃德（Noël Coward）在华懋的浴室里写下了《私人生活》（Private Lives）；华里丝·辛普森（Wallis Simpson）在那里习得了诱使一位国王退位的床上功夫。

这座城市纵情欢乐，仿佛没有明天。考夫曼生动地再现了那个时代，费城圣约瑟夫大学的詹姆斯·卡特（James Carter）也是如此。在《冠军赛马日》（Champions Day）中，卡特以一个异常敏锐的漫游者的视角，透过从前的赛马场（现在是人民公园的一部分）讲述了上海的故事。他是个出色的向导，带领游人探寻一个远去的城市。他写道，一个理想的“上海人”是旅居海外的英国人，“但这个类别也可以很灵活。”这两本书都是警世故事，用卡特的话来说，是提醒世人一旦强者利用所处的环境为自己谋利，进而招致战争和革命，会是怎样的局面。

| 明天并不总会到来

因为不久后发生的事表明，真的没有明天了。“上海人”对横尸街头的中国人视而不见。美国作家、维克多的情人项美丽（Emily Hahn）来到这里后，总算有人指出了这座城市的财富是建立在“众多吃不饱饭的苦力”之上。中国共产党在上海成立绝非巧合：蒋介石对中共的残酷镇压得到了“上海人”的赞同。

那时还有其他威胁在城市上空盘旋。1937年，日军占领了上海华界（见图），一架中国飞机在逃离的过程中掉落了一颗炸弹，遇难者的血肉飞溅到华懋饭店的墙壁上。在1941年12月袭击珍珠港后，日军又占领了自治的上海公共租界。次年赛马被暂停。一名海军指挥官搬进了维克多的套房。在香港，嘉道理家族著名的半岛酒店变成了一个军事指挥部。

正如考夫曼所述，不管这两个家族的财富是建立在何种原罪之上，在这段艰难的岁月里他们都展开了自我救赎。维克多和贺里士携手为逃亡的欧洲犹太人提供庇护所。他们开办学校、作坊和食堂，并募集资金（卓别林捐出了《大独裁者》的收益），还与贪婪的日本占领者展开了危险的谈判。即便上海已沦为一个肮脏地狱，那里的1.8万名犹太难民却无一受到迫害。

那场战争结束四年后，毛泽东领导的共产党夺取了政权。他们给上海“熄灯”，这里已成为外来罪恶的巢穴。维克多·沙逊的财产被没收，他咒骂中国，隐退到了巴哈马。罗兰士和贺里士·嘉道理则在香港重起炉灶。从上海逃离的实业家在九龙附近建起了纺织厂，罗兰士的“电力”驱动这些工厂运转，开启了香港战后的繁荣。兄弟俩吸取了一个宝贵的教训：不要忽视最底层的那些人。温文尔雅的贺里士一生致力于帮助香港的大陆难民建立小农场，向他们提供赠款、贷款、种子和更优良的猪种。嘉道理这个名字在新界乡间备受尊崇。

嘉道理家族从未批评过共产党或指责他们没收了自己的资产。上海的红卫兵拆毁了埃利的墓碑，到上世纪70年代末中国开始开放时，又有人悄悄把它修复了。在北京，罗兰士赞扬中国的经济政策并告诫要小心香港的民主，以此取悦领导人。如今上海又一次成为国际化大都市，而嘉道理家族也已重回外滩。然而现在，在黄浦江对岸的浦东拔地而起的现代摩天大楼令旧时著名的天际线相形见绌：谁是老大，一目了然。

不过，另一则警世故事是否即将在香港上演？中国于上月底实施了严苛的国安法，导致香港与大陆独裁政权之间的区别被消解。嘉道理的继承人——他们仍旧是香港最大的发电商——表达了对该法的赞同。稳定压倒一切。但是，那种无视根本性不公的做法当初在上海行不通，如今在香港也可能行不通。这部新法意欲让公众的不满从眼前消失，而与此同时，许多年长的香港人要靠晚上去捡纸板来换取一些微薄的收入。大亨和官员们对此已熟视无睹。故事肯定不会就此收尾。■



Sino-American tensions

Tectonic plates

The tech cold war is hotting up

OVER THE past few years countless predictions have been made that the global technology industry will suffer a painful rupture because of tensions between America and China. Real damage has been surprisingly hard to spot. Last year Apple made over \$100m of sales a day in China, while Huawei reported record revenues despite America's campaign to cripple it. Investors have piled into tech companies' shares, buoyed by the prospect of new technologies such as 5G and a pandemic that is forcing billions of customers to spend more time and money online. Judged by sales, profits and shareholder returns, it has been a golden era for American and Chinese tech. The industry now has a colossal market capitalisation of \$20trn and accounts for a quarter of the world's stockmarket value.

Yet if you examine the events of the past two weeks you can sense the split that is about to come. On July 6th Mike Pompeo, America's secretary of state, said that the administration was considering banning TikTok, a Chinese-run app that is wildly popular in the West. This followed India's decision a week earlier to prohibit it, and 58 other Chinese apps, after lethal brawls between soldiers in the Himalayas. Britain and France are considering sidelining Huawei from their 5G networks. Between July 6th and 7th Facebook, Google, Microsoft and Twitter all said that they will stop co-operating with Hong Kong's authorities for the time being, because of the introduction of China's brutal security law there. And SMIC, China's aspiring semiconductor champion, has just said that it will raise \$7bn in a state-supported listing in Shanghai—it delisted from New York last year. The proceeds will be used to supersize China's home-grown chipmaking capacity.

The split is happening at two velocities. The American and Chinese software and internet universes are heading at light-speed towards total separation. They were never particularly connected—American software firms made just 3% of their sales in China last year, and China has long kept its internet users isolated from the world. The bill for shutting up shop and finding substitute products is usually low. TikTok creates few jobs and pays little or no tax in America or India, so the main cost of banning it is sullen teenagers. Likewise, Facebook and the other firms taking a stand in Hong Kong do little or no business in China. Two important exceptions have been Microsoft's office software and, especially, Google's system of apps like Gmail and Maps, found on Chinese-made phones sold worldwide. America's blacklisting of Huawei has cut off the world's second-biggest phone seller from some of the world's most popular apps. Chinese handset firms are racing to develop an alternative. The American and Chinese software worlds are thus quickly becoming entirely separate universes.

Hardware is moving much more slowly. That is because it is more globally integrated and involves \$1trn of physical plant and \$400bn of inventories. Later this year Apple will launch a new 5G handset that will still rely on the same vast manufacturing cluster in China that it used five years ago. Even so, the tectonic plates are shifting. Because of a new set of American restrictions on the use of chipmaking tools put in place in May, Huawei may run out of stock of its specialist chips in early 2021 and will have to scramble to find an alternative. That will be cumbersome and costly. The SMIC capital-raising shows that China intends to create a chip giant on a par with Intel or Taiwan's TSMC, although it will take years to do so. If Britain and France both eventually ditch Huawei, they will shift to using Nokia and Ericsson in their networks, which will be expensive and take several years.

If the splintering now seems inevitable, there will be some surprises. One is how the two technospheres of influence are drawn. American policymakers

tend to assume the world will use Silicon Valley products, but plenty of countries may ally with China's tech system or hedge their bets. India is frosty towards both American and Chinese digital firms and hopes to build up its own champions, although it cannot compete yet in hardware. Another surprise is how much the split could cost. The global listed hardware industry has annual expenses of \$600bn, much of which may need to be replicated. Plenty of key firms, including Apple and TSMC, are equally dependent on America and China and have no clear plan to cope with a deeper divide. The tech split is under way. Do not assume it will happen safely. ■



【首文】中美角力

科技板块分裂

科技冷战升温

过去这几年，鉴于中美之间的紧张关系，无数预测都认为全球科技行业将会出现痛苦的分裂。但实质性的损害却出奇地难以察觉。去年，苹果在中国的日销售额超过一亿美元，而华为尽管受到美国的打压，收入也仍创下新高。受5G等新技术前景的提振，加上一场疫情迫使数十亿客户在网上花费更多时间和金钱，投资者蜂拥买进科技公司的股票。从销售额、利润和股东回报来看，这是美国和中国科技行业的黄金时期。该行业如今拥有20万亿美元的庞大市值，占全球股市价值的四分之一。

然而仔细回顾过去两周发生的事件，就会察觉分裂即将发生。7月6日，美国国务卿迈克·蓬佩奥表示，美国政府正考虑禁用TikTok，一款由中国公司运营并在西方广受欢迎的应用。此前一周，在印中两国士兵在喜马拉雅山脉发生了致命的肢体冲突之后，印度决定禁用TikTok和其他58款中国应用。英国和法国正在考虑将华为排除在自己的5G网络建设之外。7月6日到7日，Facebook、谷歌、微软和推特都表示，由于中国在香港实施严酷的国安法，它们将暂停与香港政府的合作。而雄心勃勃的中国半导体领军企业中芯国际刚刚表示，将在政府支持下在上海上市（去年它从纽约退市），融资70亿美元。这些资金将用于扩大中国本土的芯片产能。

分裂正以两种速度推进。美中两国的软件和互联网领域正以光速走向彻底决裂。它们之间从未有过特别的联系——美国的软件公司去年在中国的销售额仅占它们总销售额的3%，而中国一直将其互联网用户与世界其他地方隔绝开来。禁用软件和寻找替代品造成的经济损失通常很低。TikTok在美国和印度创造的就业机会少之又少，也很少缴税或不缴税，所以禁用它的主要代价就是青少年会很郁闷。同样，Facebook和其他在香港问题上表明立场的公司在中国大陆也很少或没有业务。不过有两个重要的例外，即微软的office软件以及谷歌的邮箱和地图等应用——特别是谷歌的应用系统被安装在中国制造并销往世界各地的手机中。美国把华为列入黑名单后，

这家世界第二大手机销售商就无法再使用一些全球最受欢迎的应用。中国的手机厂商正在加紧开发替代品。这样，中美两国的软件领域正飞速成为两个完全独立的世界。

硬件领域的分裂要慢得多。这是因为它全球一体化的程度更高，并且涉及一万亿美元的实体工厂和4000亿美元的库存。今年晚些时候，苹果将推出新款5G手机，新手机的生产仍然要依赖它五年前在中国使用的同一个庞大的制造集群。即便如此，科技板块还是在移动。由于美国在5月新出台了一系列针对使用芯片制造设备的限制措施，华为可能会在2021年初耗尽所有专用芯片的库存，并不得不努力寻找替代品。这既费力又费钱。中芯国际的融资表明中国大陆想要打造一家可比肩英特尔或台湾台积电的芯片巨头，尽管这将耗时多年。如果英国和法国最终都放弃华为，它们就要在自己的网络中改用诺基亚和爱立信的设备，而这也会很昂贵，并且要花好几年时间。

如果说分裂看来已不可避免，前路还是会有一些出人意料之处。一是这两个科技大国如何划分势力范围。美国的政策制定者往往认为全球会使用硅谷的产品，但也有许多国家可能会与中国的科技体系结盟，或者两边下注。印度对美国和中国的数字企业都很冷淡，它希望打造出自己的领军企业，尽管它目前在硬件方面还不具备抗衡能力。另一个意外是分裂可能造成的代价几何。全球的上市硬件企业每年支出6000亿美元，日后这其中的一大块可能需要重复支出。包括苹果和台积电在内的许多重量级公司对美国和中国的依赖程度不相上下，也没有明确的计划来应对扩大的鸿沟。科技分裂已经开始，别以为它会发生得很安稳。 ■



If covid-19 devastated aviation

Peak plane

How the pandemic transformed the travel industry. An imagined scenario from May 2022

Editor's note: This article is from the *The World If* series on climate change. It is fiction but grounded in historical fact and real science.

IN SEPTEMBER 2019 a group of climate activists formulated a plan to shut down London Heathrow, Europe's largest airport. Heathrow Pause, a splinter group of the Extinction Rebellion movement, had been inspired by an incident at Gatwick the previous year, when an unauthorised drone closed Britain's second-largest hub for three days. They hoped to repeat the trick at Heathrow. But their drones failed to get off the ground, due to signal-jamming by the airport. In December 2019, Extinction Rebellion tried again to close Heathrow, this time by blocking its entrance road with a pink bulldozer. But police confined the protest to a single lane of traffic, meaning that incoming passengers could simply drive around the problem.

The activists lying in front of the bulldozer that cold December morning could not have known that a virus just 0.1 microns wide, more than 8,000km away in China, was inadvertently about to help their cause. Few industries were harder hit by the subsequent covid-19 pandemic than air travel. Government lockdowns, travel restrictions and cancellations by fearful passengers soon grounded most of the industry. By April 2020 Heathrow's passenger numbers had fallen by 97% to the lowest monthly figure since the 1950s. Global passenger numbers did little better, falling that month by 94% year on year, to levels last seen in 1978. Half a year of lost revenue later—amounting to well over \$250bn—the industry's finances were in ruins.

Two years on, the forecast made in May 2020 by the International Air Transport Association (IATA) that passenger numbers would return to pre-pandemic levels by 2023 now looks wildly optimistic. But the trade body's prediction that only 30 of the world's 700 or so airlines would survive the crisis without government help was spot on. Carriers that failed to get bail-outs fell like dominoes, starting with Flybe, Europe's largest regional airline, in March 2020, Virgin Australia in April and LATAM, Latin America's largest carrier, in May. Sir Richard Branson, founder of the Virgin Group, became an illustration of his old quip: "The easiest way to become a millionaire is to start out as a billionaire and then go into the airline business."

Even airlines that got government bail-outs did not find life easy. Austria and France led the way by imposing strict environmental conditions. Airlines were forced to cut their emissions to meet aggressive targets and to end competition against greener alternatives such as high-speed rail. That raised their costs and limited their potential revenue. And they were soon cash-strapped again. America's airlines quickly chewed through \$25bn in federal grants and loans; Air France-KLM and Lufthansa of Germany did the same with bail-outs worth nearly €10bn (\$11bn) each. The result was a drastic slimming down of the world's flag-carriers.

Airline executives had initially thought the pandemic would cause manageable, but not catastrophic, disruption. Looking at previous epidemics in Asia, such as SARS in 2002-03 and the South Korean outbreak of MERS in 2015, IATA expected a sharp dip in traffic, followed by a return to the original trend six or seven months later. In retrospect, that was overly hopeful. A short, stuttering recovery during the autumn of 2020 was choked off by the pandemic's second wave of infections. "This time is very different," says Leigh Bochicchio of the Association of Corporate Travel Executives, an American industry association. "It's a very different beast to SARS or 9/11." After those earlier shocks, there was no second wave of

infections or terror attacks to remind people of the danger of flying.

And in retrospect, SARS was much easier for airlines to manage than covid-19. SARS showed symptoms immediately and could be detected with temperature checks at airports. It was not initially contagious; those infected could be isolated before they spread it to others. Covid-19, in contrast, shows no symptoms for up to two weeks after infection, a period in which it is contagious. No wonder experts soon found that airline travel was the primary means by which the disease spread around the world.

In the past, the airline industry has always fully recovered from crises. But this time has been different. “Peak plane”, once Extinction Rebellion’s fantasy, no longer looks so inconceivable. With the prospects for a vaccine still uncertain, business travel began to pick up again in 2021, though only as a trickle. The biggest global downturn since the Depression left corporate travel budgets an easy cost-code to squeeze.

Even firms that are solvent enough to let their employees fly have not been keen to do so. “People are more comfortable with online meetings, and that will never go away,” notes Ms Bochicchio. After the global financial crisis of 2007-09, international business travel fell by a third in many countries, and never recovered. Companies found new ways of doing business using video calls. That story repeated itself in spades after covid-19. Many corporate events and conferences have gone online permanently. Another chilling effect was that firms feared being sued by employees who caught covid-19 on business trips—a possibility their insurers increasingly refused to cover. As a result, the average age of business travellers is now falling: surveys show millennials are more likely to regard business travel as a status symbol than older workers, and consider themselves at less risk from covid-19.

Leisure travel has been much slower to recover. That was not due to any

initial reluctance to get back in the sky. Surveys during the pandemic found that 69% of Americans said they missed travelling. Half of Chinese expected to travel more once the crisis was over. Perhaps most remarkably of all, 23% of Britons said they planned to be on the first flight deemed safe.

But many newly established “air bridges” and “travel bubbles”—pairs and groups of countries between which travellers could move without quarantine—collapsed in panic when the second wave of the pandemic hit in autumn 2020. “Staycations”—holidaying within one’s own country—became the norm in 2021, as crowded aeroplane cabins were shunned in favour of cars, trains and even cruise ships (which, despite their association with the early weeks of the outbreak, turn out to be well suited to social distancing).

The aviation industry did its best to win back customers with a marketing blitz, but cabin crew dressed in personal protective equipment, who treated all passengers as biohazards, failed to reassure. The requirement to leave middle seats empty, to maintain social distancing, was dropped by governments when airlines complained that it cut their capacity. But that prompted concerns that airlines were more concerned with profits than with passenger safety.

| *The end of low-cost flights*

Rising ticket prices have also deterred travellers from flying away on holiday. Although fares initially fell to put bums back on seats after the first and second waves—dropping by 35% in 2021, just as Dollar Flight Club, an American travel website, had predicted—the low prices didn’t last long. Ryanair, Wizz Air and Air Asia, the world’s biggest budget carriers after the pandemic, waged the “mother of all fare wars” in an effort to put all non-state-subsidised rivals out of business in Europe and Asia. The resulting consolidation has left little competition in the industry. As soon as they could, airlines began to pass on the extra cost of their new counter-

coronavirus measures to passengers. Analysts think fares could soon be double what they were before the pandemic.

Perhaps the clearest sign of the long-term change in direction for aviation has been the collapse in demand for new aircraft. The world's two biggest planemakers, Airbus and Boeing, predicted just before the pandemic that global air travel would grow by 4.3% each year over the next 20 years, requiring around 40,000 new airliners to be built. Now they are not so sure. Airlines permanently grounded over 5,000 planes during the pandemic. Boeing cut future production by 50% and cancelled plans to develop two new airliners in the coming decade. Even Airbus, which has enough orders to keep its assembly lines busy for a decade, decided to slow production by 30%.

The biggest casualties were the biggest birds. Boeing 747 jumbos, once the "Queens of the Skies", were nearly all grounded in 2020, never to fly again. The even-larger superjumbo fared almost as badly. "The A380 is over," lamented Sir Tim Clark of Emirates during the pandemic. Having once owned 115 of the 242 in existence, Emirates retired 40% of them in 2020.

Planemakers and airlines alike are pinning hopes of a travel revival on the wanderlust of the young, and of the rising middle classes in the developing world. Their faith may be misplaced. The young are highly climate-conscious and have taken to "train-bragging", encouraged by campaigners such as Greta Thunberg. Several European governments have stepped up investment in high-speed rail as part of their stimulus packages. Polls suggest people under 25 see climate change and pollution as the two most important issues facing the world. In the developing world, meanwhile, the pandemic shattered the illusion in Africa and India that travelling by plane was any safer or more hygienic than overcrowded diesel trains or by car.

That covid-19 has exposed the fragility of globalisation is particularly

apparent in the case of aviation. The industry can no longer rely on the steady growth of the past, or indeed any growth at all. Yet historians will write that it was not radical environmental movements such as Extinction Rebellion that killed the trend. Instead it was the combination of a microscopic virus and free-market capitalism.

The five-year period before the pandemic was the only one since Orville and Wilbur Wright made their first flight in 1903 in which the industry covered its cost of capital. Burned again by covid-19, many investors have now decided to stay away from anything that flies. Warren Buffett, a billionaire investor, once quipped that “if a farsighted capitalist had been present at Kitty Hawk, he would have done his successors a huge favour by shooting Orville down.” During the pandemic, Mr Buffett realised that this historical observation was no joke. Selling his shares in American airlines at a multi-billion dollar loss, he noted that they should be avoided by investors. His reason: “The world has changed after covid-19.” ■



如果新冠肺炎摧毁了航空业

航班不再增

疫情如何改变了旅游业的形态。设想2022年5月的情景

编者注：本文是关于气候变化的《假想的世界》系列文章之一。它是虚构的，但基于历史事实和科学研究。

二〇一九年九月，一群气候活动人士制定了一项计划来关停欧洲最大的机场——伦敦希思罗机场。“希思罗暂停”（Heathrow Pause）是“反抗灭绝”（Extinction Rebellion）运动的一个分支，受2018年在盖特威克机场发生的事件启发而建立，当时这个英国第二大机场因被一架未经授权的无人机干扰而关闭了三天。活动人士希望在希思罗机场重现这一幕。但机场实施了信号干扰，他们的无人机没能起飞。12月，“反抗灭绝”再次试图关停希思罗机场，这次是用一台粉红色的推土机堵住进入机场的道路。但警察把抗议活动限制在一条行车道上，进机场的乘客只需简单绕行即可。

在那个寒冷的12月早晨躺在推土机前的活动家们怎么也想不到的是，在8000多公里外的中国，一种仅0.1微米大的病毒即将在无意间帮助他们达成心愿。在随后发生的新冠肺炎大流行中，没有几个行业比航空业受到的打击更大了。政府实施了封锁和旅行限制，加上惶恐的乘客纷纷取消航班，很快就将大部分飞机禁锢在地面上。到2020年4月希思罗机场的乘客人数已经减少了97%，降至1950年代以来的最低月度数字。全球乘客数字稍好一些，当月同比下降了94%，跌至1978年以来的最低水平。半年过后，收入损失累计已超过2500亿美元，航空业的财务状况已经一片狼藉。

行业组织国际航空运输协会（以下简称IATA）曾在2020年5月预测称，乘客人数将在2023年前恢复到疫情前水平。两年过后，这一预测看来太过乐观了。但该组织的另一个预测倒是完全说中了：如果得不到政府援救，全球700余家航空公司中只有30家能捱过这场危机。没能获得纾困的航空公司如多米诺骨牌般相继倒下：从2020年3月欧洲最大的支线航空公司Flybe倒闭开始，4月是维珍澳大利亚航空（Virgin Australia），5月是拉美最大

的航空公司南美航空集团（LATAM）。维珍集团的创始人理查德·布兰森爵士（Richard Branson）自证了他曾经说过的玩笑话：“成为百万富翁的最简单方法是先成为亿万富翁，再从事航空业。”

即便获得了政府纾困的航空公司日子也并不轻松。奥地利和法国率先实施了严格的环境条规。航空公司被迫削减排放以达到激进的目标，并终结与高铁等更环保的替代出行方式的竞争。这增加了成本，限制了潜在收益。它们很快又再度现金短缺。美国的航空公司很快就烧完了250亿美元的联邦政府拨款和贷款；法航-荷航集团和德国汉莎航空同样迅速耗尽了各自拿到的近100亿欧元（110亿美元）纾困金。其结果是全球各地的国家航空公司都大幅瘦身。

航空公司高层最初以为疫情造成的破坏可控而不至于是灾难性的。参考亚洲过去爆发的流行病，如2002到2003年的SARS和2015年韩国的中东呼吸道综合症（MERS），IATA预期客运量会急剧下降，然后在六七个月后恢复原本的升势。现在回头看，这真是太过乐观了。2020年秋季的第二波疫情扼杀了短暂而又磕磕绊绊的复苏。“这次很不一样，”美国行业组织商务游高管协会（Association of Corporate Travel Executives）的利·波奇基奥（Leigh Bochicchio）说，“这是和SARS或911全然不同的猛兽。”在以往这些危机之后，并没有发生第二波感染或恐怖袭击提醒人们乘飞机有危险。

而且，回过头看，对航空公司来说，SARS要比新冠肺炎容易应付得多。感染SARS会立即显现症状，可以通过在机场检测体温来发现。感染之初并无传染性，感染者可以在传给其他人之前就被隔离。相比之下，感染新冠肺炎后长达两周里可能都没有症状，却具有传染性。难怪专家们很快就发现，航空旅行是这种病毒在全世界范围内传播的主要途径。

过去，航空业每次都能从危机中完全康复。但这次不一样。“航班不再增”曾是“反抗灭绝”运动人士的幻想，如今看来却没那么不可思议了。疫苗的前景仍不确定，商务旅行在2021年开始回升，但也只是涓涓细流。自大萧条以来全球最严重的低迷期让企业很容易为了节约成本而压缩差旅预算。

即使是那些有足够财力让员工去坐飞机的公司也不大愿意这么做。波奇基奥指出：“人们现在更适应在线上开会了，而这一点永远不会再调转回去。”在2007至2009年全球金融危机之后，许多国家的国际商务旅行减少了三分之一，且从未收复失地。公司发现了通过视频电话来做生意的新方式。新冠肺炎之后，这种变化更是大范围地上演。许多公司的活动和会议永久地转移到了线上。另一个寒蝉效应是，公司担心被在商务旅行中感染新冠的员工告上法庭，而它们的保险公司越来越拒绝承保这种可能性。其结果是，商务旅客的平均年龄正在下降：调查显示，千禧一代比年长的员工更可能将商务旅行视为一种身份象征，并认为自己在疫情中的风险较小。

休闲旅行恢复的速度更是慢得多。这并不是因为人们不想乘飞机出行。疫情期间的调查显示，69%的美国人说自己怀念旅行。有一半中国人预计自己在这场危机过去后会更多地出游。也许最引人注目的是，23%的英国人说他们要赶上第一班被视为安全的航班。

但是，2020年秋天第二波疫情爆发时，许多刚刚搭建起来的“空中桥”和“旅行小圈子”（旅行者可在两个或若干国家之间自由往来而无需被隔离）在恐慌中坍塌。“宅度假”，也就是在自己国家内部旅行，在2021年成为常态，因为人们避开拥挤的飞机客舱，而转向汽车、火车，甚至邮轮（尽管它们与疫情爆发的最初几周联系在一起，事实证明它们非常适合社交疏离）。

航空业竭尽全力用一场闪电营销战赢回客户，但机组人员都穿戴着个人防护装备，像对待生物危害那样小心翼翼地对待所有乘客，实在没法让人放松心情。此前为了保持社交距离，航空公司被要求在所有乘客之间隔开一个空座位。在它们抱怨这么做削减了载客能力之后，政府撤销了规定。但这让人们担心航空公司更重视利润而不是乘客的安全。

| 廉价航班不再有

机票涨价也阻挡了旅行者在假期飞行。尽管在第一波和第二波疫情之后，票价一开始都跌了（正如美国旅游网站美元飞行俱乐部[Dollar Flight Club]

预测的那样，到2021年下跌了35%）从而吸引到乘客回归，但低价并没有持续多久。疫情结束后全球最大的廉价航空公司瑞安航空、维兹航空和亚航掀起了“前所未有的票价大战”，要把所有不拿国家补贴的竞争对手都驱逐出欧洲和亚洲市场。由此带来的整合使得这个行业已经几乎没有了竞争。航空公司立刻开始把防病毒措施带来的额外成本转嫁给乘客。分析人士认为机票价格可能很快就会比疫情前高出一倍。

航空业发生长期改道的最明显迹象可能是对新飞机的需求骤跌。全球最大的两家飞机制造商空客和波音在疫情发生前才刚刚做出预测，认为未来20年里全球航空旅行将以每年4.3%的速度增长，因而需要建造约四万架新飞机。现在它们已经不大确定这一点了。疫情期间航空公司永久停飞了五千多架飞机。波音将未来的产量削减了50%，并取消了在未来十年里研发两款新客机机型的计划。甚至连手头的订单数量足以使得装配线连轴转十年的空客也决定把生产放缓30%。

伤亡最惨重的是最大的飞机。波音747大型客机——曾经的“空中女王”——在2020年几乎全部停飞，从此不再上天。甚至更大的巨无霸客机也差不多同样倒霉。“A380的日子到头了。”阿联酋航空的蒂姆·克拉克爵士（Tim Clark）在疫情期间叹道。阿联酋航空曾经拥有全球242架A380中的115架，但在2020年不得不过半退役。

飞机制造商和航空公司希望年轻人的旅行癖和发展中国家中产阶级的崛起会带来旅行复兴。它们可能押错了方向。在格蕾塔·桑伯格（Greta Thunberg）等活动家的鼓励下，年轻人高度关注气候，并开始“以乘火车为荣”。作为刺激经济计划的一部分，一些欧洲国家政府已经加大了对高铁的投资。民调显示，25岁以下人群把气候变化和污染视为世界面临的两个最重要议题。与此同时，在发展中国家，疫情戳破了非洲和印度人的错觉，他们过去以为乘飞机旅行要比乘拥挤不堪的柴油火车或开车更安全或更卫生些。

新冠肺炎暴露出全球化的脆弱之处，这一点在航空领域表现得尤为明显。这个行业不能再指望过去的稳定增长，甚至根本不能指望任何增长。不

过，历史学家将会写道，扼杀了增长趋势的并非“反抗灭绝”这类激进的环境运动，而是一种微型病毒和自由市场资本主义的混合物。

自1903年奥维尔·莱特和威尔伯·莱特兄弟首次飞上天空以来，航空业在疫情发生前的五年里首次取得了超过资本成本的回报，结果又被病毒付之一炬。许多投资者现在已经决定远离一切在天上飞的东西。亿万富翁投资者沃伦·巴菲特曾打趣说：“如果当时在小鹰镇有一个有远见的资本家在场，他会把奥维尔射落下来，给自己的继承者们帮一个大忙。”疫情期间巴菲特意识到他这个历史点评其实很有道理。他抛售了自己在美国航空公司的股份，损失了几十亿美元。他说投资者应该避开这些股票。他的理由是：“新冠肺炎后世界已经改变。”■



China's stockmarket

A bull market returns

Market mania comes to China again. Can it last this time?

IN CHINESE STOCKMARKET mythology, the rarest of beasts is the slow bull. The past couple of decades have brought two fast bulls: vertiginous surges in share prices, neither lasting more than a year. Those soon led to fast bears when stocks crashed and, eventually, to slow bears as the descent became more gradual. Most of the time there have been what might be termed long worms as the market moved sideways, such that the CSI 300 index, a gauge of China's biggest stocks, has averaged the same level over the past five years that it first reached back in 2007. The slow bull—a steady, almost dependable, rise year after year, well known to investors in America—has remained elusive.

China's indomitable punters now hope that a trundling taurus has at last arrived. As of last week, stocks had jumped by 16% in July and were up by nearly 40% from their low in March. That might sound like another fast, doomed bull run. But some believe this one will be more enduring than those of the past.

For starters, China appears to be in much better economic shape than other large economies. Because investors must allocate their funds somewhere, there is always a comparative element to stockmarket performance. China is the only big economy forecast to grow this year, and is also expected to record the strongest rebound next year, according to projections published by the IMF at the end of June. There are grave concerns about the toll that the coronavirus might take in America during the flu season in the autumn. By contrast, China has shown every intention of smothering renewed outbreaks. That has given people and businesses greater certainty about the path ahead.

Market dynamics also seem to be helping. Even after the rally, valuations in China are reasonable. The CSI 300 trades at 14 times the value of company earnings, far below the 27-times multiple of the S&P 500, America's most-watched share index (see chart). Foreign investors have more ways to enter China's previously walled-off market; many are compelled to do so, because its shares are now included in key indices tracked by institutions. During the first three trading days of July, 44bn yuan (\$6bn) flowed into Chinese equities via accounts in Hong Kong, a record high for any three-day period.

Although more investors have started buying shares with borrowed money, the outstanding balance of such margin trading is just over half the peak it reached five years ago, during China's most recent manic run. It is now easier for companies to list shares on the mainland, so new offerings should help absorb some of the cash rushing into the stockmarket. "This lays the foundation for a slow-bull market that could last for ten or 20 years," says Chang Shishan of Kangzhuang, an asset-management firm.

Nevertheless, it is hard to shake the feeling that the optimists might once again be getting ahead of themselves. The outlook for profitability, which ultimately should determine share prices, is still grim. Over the first five months of 2020, industrial profits were down by 19% compared with a year earlier.

Most worrying is the way that the Chinese media are swinging into cheerleading mode. If past episodes are anything to go by, this is one of the telltale signs of irrational exuberance. "The clicking of the bull's hooves is a beautiful sound for our post-virus era," declared a front-page editorial in the *China Securities Journal*, a state-run newspaper, on July 6th. The *Shanghai Securities*, its sister publication, was less poetic but more direct in an article that was posted online on July 3rd: "Hahahahaha! It looks more and more like a bull market!" Healthy bulls need only a diet of grass. Injecting them with steroids is an invitation to trouble. ■



中国股市

牛市回归

中国股市再掀狂热。这一次能长久持续吗？

在中国股市的神话中，最罕见的兽类是“慢牛”。过去二三十年里曾经出现过两次“快牛”：股市暴涨，但都没持续超过一年。之后股市崩盘，“快牛”很快变成“快熊”，而随着下跌逐渐放缓，最终又变成了“慢熊”。在大多数时间里，股市可能都应该算是“长虫”，因为市场一直在一定范围内上下蠕动：过去五年里，代表中国最大规模上市公司的指标沪深300平均保持在它于2007年首次跌至的低位。美国投资者熟悉的“慢牛”，也就是年复一年稳定地、几乎完全可靠地上涨，在这里很难看到。

现在，百折不挠的中国股民们期盼着一头缓步而来的金牛终于出现。7月截至上周股市已经上涨16%，比3月时的低谷高出近40%。这听起来像是又一头疾奔而来却耐力不足的牛。但一些人相信它会比以往那些坚持更久。

首先，中国的经济状况似乎要比其他大型经济体好得多。因为投资者总得把他们的资金投到某个地方，股市表现总归存在一个相对因素。国际货币基金组织（IMF）6月底发布的预测认为，中国是今年唯一预计能实现正增长的大型经济体，而且有望在明年出现最强劲的反弹。人们非常担忧到了今秋流感季新冠病毒可能会在美国造成损害。相比之下，中国已显示出扑灭新的疫情苗头的决心。这让民众和企业对前路感到更为确定。

市场动态似乎也很有利。即便在这轮拉升之后，中国股市的估值仍是合理的。沪深300的市盈率为14倍，远低于美国最受关注的指数标普500的27倍（见图表）。外国投资者已经有更多方式进入中国曾经封闭的资本市场，而很多投资者是被迫投资中国市场的，因为中国股票现在被纳入了机构跟踪的关键指数中。7月的前三个交易日，440亿元资金通过香港账户流入中国股市，创下三天资金流入量之最。

尽管更多投资者已经开始借钱来买股票，这些融资余额才刚超过五年前中

国最近一次疯狂牛市时峰值的一半。现在在中国大陆上市更容易了，因此新上市的公司可以帮助吸收一部分涌入股市的资金。“这为可能持续10到20年的慢牛奠定了基础。”康庄资产管理有限公司的常士杉说。

然而，这很难让人完全摆脱掉一种感觉，就是乐观者可能又一次高兴过早了。股价最终还是应该由盈利决定，而盈利的前景仍不乐观。2020年的前五个月，工业利润同比下降了19%。

最让人担心的是中国的媒体正在迅速进入啦啦队模式。如果说过去种种有任何参考意义的话，这种行为是非理性繁荣的迹象之一。“嗒嗒的牛蹄声是后疫情时代的美丽召唤。”官媒《中国证券报》7月6日的头版评论文章宣称。它的姊妹刊物《上海证券报》7月3日在网上发表的文章没这么诗情画意，但更为直接：“哈哈哈哈哈！牛市特征越来越明显了。”健康的牛只需要吃草。给它们打激素就是在找麻烦。■



Property troubles

Watch this space

Investors have loaded up on commercial property. Now they face a reckoning

YOU MAY not realise it, but a growing share of your savings and pensions pot has been wagered on the commercial buildings in which you work, shop and sleep. The original idea was that these investments would provide a steady stream of earnings for decades into the future, rather as government bonds did before interest rates fell so low. But now the virus has thrown that assumption into a cement mixer.

Across the world millions of tenants have stopped paying rent, leading to chaos among shopping-mall and office landlords. In the longer term, a renewed appreciation of the threat from pandemics, and of the potential of new technologies, could lead to a sharp shift in how commercial buildings are used. Savers and fund managers need to be alert. A safe, slow-moving asset class has become an unpredictable one that demands scrutiny and active management.

Commercial property has become an investment craze over the past two decades. In that period the nominal yield on a long-term American government bond has dropped from over 6% to less than 1%. Desperate to find other steady higher-yielding sources of earnings, pension trustees and fund managers have piled into malls, offices, hotels and warehouses. A corner of the economy that had been the preserve of moguls, amateurs and aristocrats has become increasingly infiltrated by strait-laced institutions and algorithm-crunching fund managers. The typical pension fund's allocation to commercial property has risen from 5% in 2000 to over 10% now; institutional investors have about \$11trn sunk into the asset class. Leases routinely stretch a decade or more into the future. The combination of reliable rental income and capital appreciation has meant that

commercial property has successfully given investors annual returns of over 7%. All they needed was patience. That will no longer be enough.

The immediate problem is that tenants are behind on the rent. Every recession involves sporadic delinquencies, but the lockdowns have led to anarchy in some bits of the property business. Perhaps a quarter of free-standing shops, half of mall tenants and 60% of restaurants in America and other Western markets are not paying their dues. This can be a spontaneous rebellion or landlords may have offered holidays. Some cities and governments have introduced moratoriums. Landlords have taken a hit to their income. So far they have been unwilling or unable to repossess buildings that may have no other prospective tenant. A growing number have defaulted on their debts. Commercial-mortgage-backed securities, which bundle up property loans, have seen delinquency rates exceed the levels in the financial crisis of 2007-09.

Temporary delinquencies are only part of the problem. In the longer run the uses of property may change. E-commerce activity has risen to the level pundits had thought it would reach three to five years from now, speeding up the decline of bricks-and-mortar shops and boosting demand for warehouses. Firms that have found remote-working tolerable may shrink the office space they hire. Video calls in lieu of business trips could reduce the number of hotel nights billed. Even as economies open up again, there are signs that behaviour may have changed permanently. The latest mobility-tracking data suggest that activity in offices in America is 36% below normal levels. It is 15% below the usual level for retail and recreation spaces such as restaurants, shops and cinemas.

Savers and the fund trustees who represent them should follow two tracks. The first is to get a realistic picture of the losses they face. If the property industry used to be amateurish, it is now all too often professionally opaque, with layers of holding companies and debt standing between the

bricks and girders and their ultimate beneficiaries. The managers of buildings and investment vehicles may have an incentive to mask difficulties. Some, for example, are bailing out struggling retail tenants, perhaps in order to avoid admitting to rent defaults. Others are sticking to unrealistic valuations, which the industry's arcane accounting practices make easier to sustain.

The bigger task is for investors to embrace the restructuring that must take place. Hotels may need to become apartment blocks; malls may need to be reincarnated as e-commerce-fulfilment centres; and office blocks may need to be refurbished so that desks are farther apart. All of this involves not sitting on properties and milking them for rent, but reinvesting in them and, often, selling them to different owners. That holds open the potential for greater efficiency, but also for fee-skimming and unnecessary losses if unaltered buildings are sold off cheaply.

Property has long been a slow-moving asset class because leases last for years and tenants normally change their behaviour only gradually. Landlords and their financial backers have thus got used to a business that moves at a glacial pace. For two decades a reliably easy way to make money has been to buy a commercial building and go to sleep. Time to wake up. ■



【首文】房地产困局

留心这个空间

投资者购买了大量商业地产。现在他们面临清算

尽管人们可能没有意识到，但他们的存款和养老金正被越来越多地押在写字楼、商场和旅馆等商业地产上。最初的构想是，这些投资能在未来几十年里带来源源不断的稳定收入，有点像利率还没降到如此低水平时的政府债券那样。而如今，新冠病毒让这种设想化成了泡影。

全球已有数以百万计的租户停缴租金，这在购物中心和写字楼的房东中引发了混乱。从长远来看，对大流行病的威胁以及新科技的潜力的重新认识可能会导致商业地产的用途发生骤变。储户和基金管理人需要保持警觉。房地产这一稳健而变动缓慢的资产类别如今已变得难以预测，需要对它多加审视、积极管理。

过去20年里，商业地产成为投资热点。在此期间，美国长期政府债券的名义收益率已经从超过6%下降到不足1%。养老金受托人和基金管理人急于找到其他稳定的高收益来源，蜂拥进入购物中心、写字楼、酒店和仓库等领域。经济中的这一部分曾经是大亨、业余投资者和显贵们的专属领地，如今越来越多刻板守旧的传统机构和使用算法交易的基金管理人也开始涉足其中。养老基金对商业地产的一般配置比例在2000年是5%，现在已超过10%；机构投资者在这一资产类别上已投入约11万亿美元。租约通常一签就是10年或更久。可靠的租金收入再加上资本增值，让投资者成功从商业地产上获得了超过7%的年回报率。过去投资者需要的只是耐心。而将来，仅有耐心不够了。

眼下迫切的问题是租户拖欠租金。尽管这种情况在每个经济衰退期都时有发生，但此次疫情期间实施的禁足令已经让房地产行业的某些部分陷入混乱。在美国和其他西方市场，可能有25%的独立店铺、50%的购物中心租户以及60%的餐馆经营者没有在缴纳房租。这可能是租户自己拖延，也可能是房东主动提出延缴。一些城市和政府出台了延缴措施。房东的收入受

到严重影响。直到目前，他们一直不愿意或者无法从欠费的租户那里收回房产，这些房产可能也找不到新租户。越来越多人开始拖欠贷款。打包房地产贷款的商业抵押担保证券的违约率已经超过了2007至2009年金融危机时的水平。

暂时拖欠租金只是问题的一部分。从长远来看，房地产的用途可能会改变。电子商务活动已经发展到了专家原以为三五年后才会达到的水平，这加快了传统实体店的衰落，也加大了对仓库的需求。那些发现远程办公可行的公司或许会缩减自己租用的办公空间。用视频电话代替出差，会减少付钱住酒店的次数。种种迹象表明，在经济重启之时，人们的行为模式可能已经发生了永久改变。最新的移动追踪数据显示，美国写字楼的人员活跃度比正常水平低36%。餐馆、商店和电影院等零售和娱乐场所的活跃度比正常水平低15%。

储户和代表他们的基金受托人应该遵循两点。首先，对面临的损失有现实的认识。如果说房地产行业过去不够专业的話，如今它在制造不透明方面倒是常常很专业——在这些钢筋水泥建筑及其最终受益人之间隔着一层又一层的控股公司和债务。房产和投资工具的管理人可能有意粉饰太平。比如，一些管理人对陷入困境的零售商户出手相助，或许是不愿意承认有欠租其事。其他一些管理人坚持不切实际的估价，而该行业晦涩难懂的会计操作让这样的估价更容易维持下去。

对投资者而言，更重大的任务是积极接纳必然要发生的改造。酒店可能需要变成公寓楼；购物中心可能需要变身为电子商务履单中心；写字楼可能需要翻新，拉大办公桌之间的距离。所有这些都需要对房地产进行再投资，并且往往还要为它们寻找各类新买家，而不是坐收房地产租金就行了。这个过程有可能提高效率，但如果未经改造的房产被贱卖，也可能被人从中渔利，遭受不必要的损失。

由于租约一签就是好几年，而且租户经营方式的改变通常都是渐进的，因此房地产这一资产类别一直变动缓慢。房东和他们的金融资助者也因此习惯了这种龟速发展的业态。20年来，一种可靠又轻松的赚钱方式就是买下

一处商业地产，此后便可高枕无忧。该醒醒了。■



Property in America

The house wins

Unfazed by recession, the housing market remains buoyant

AMERICA'S HOUSING market is behaving oddly. Residential property—worth \$35trn, slightly more than America's stockmarket—seems strangely oblivious to the economic carnage around it. House prices in May were 4.3% higher than a year earlier. That rate of growth is only marginally below the average since the end of the housing crash a decade ago. Prices in even the costliest places, such as San Francisco, where the average pad sets you back \$1.1m, continue to march upwards. Many economists still expect house prices to fall over the whole of 2020—but such forecasts are looking increasingly shaky.

At first glance this is surprising. House prices typically nosedive during recessions. A rising number of mortgage defaults leads to more properties being put up for sale. Falling household incomes reduce buyers' purchasing power. In the recession of the early 1990s house prices dropped by 10% in real terms; they fell by three times that in the downturn that followed the financial crisis of 2007-09. The fall in GDP associated with the coronavirus pandemic, and the rise in unemployment, is unprecedented. Despite that, there is little sign so far that America's housing market is about to subside.

The rate of foreclosures looks unlikely to reach the heights hit during the last recession. Housing debt, relative to incomes, is lower. The share of mortgages lent to borrowers with very low credit scores is less than half what it was in 2007, in part a consequence of tighter financial regulation. Meanwhile, fiscal help has come a lot faster than it did a decade ago.

During the last crash, schemes to help homeowners did not arrive until millions of families had already seen loans foreclosed. This time the

government's stimulus package has made requesting up to a year's pause in mortgage payments easier: homeowners can get this without having to do very much to prove they need it. All that casts a different light on the apparently alarming increase in the share of mortgages on payment holidays, from practically zero just before the pandemic to close to 10% in May. Analysts at Capital Economics, a consultancy, reckon that many requests for forbearance have been made by borrowers who are in fact able to keep up their mortgage payments, but are "requesting assistance...as an insurance policy".

Cash handouts from the government have also been generous—so much so that, in stark contrast to the usual declines seen during recessions, Americans' aggregate household income is forecast to rise in 2020 by about as much as it did in 2019. That will help borrowers keep up with their mortgage payments. Indeed, a fifth of Americans receiving a stimulus cheque from the federal government have put it towards their mortgage. Looser monetary policy has also helped. Since the beginning of the year the interest rate on 30-year mortgages has fallen by about half a percentage point, to an all-time low of just over 3%. Mortgage companies are overrun with applications from people seeking to refinance. House-hunters, including those seeking to escape city centres after the pandemic, can now afford more expensive properties. As lockdowns were lifted, pent-up demand for housing led to a 20% year-on-year rise in mortgage applications in June.

What happens to the housing market next depends on the evolution of the covid-19 outbreak and, in turn, that of the overall economy. Yet when the fog does eventually clear, a period of even stronger price growth might not be a surprise. A raft of academic evidence draws a strong link between loose monetary policy and bubbly housing markets. Other researchers noted before the pandemic that the supply of new housing in America was failing to keep up with demand—owing in part to increasingly complex land

regulations and reduced competition in house-building. Social-distancing requirements are also likely to hold construction back in the coming months. With supply constrained and demand boosted, house prices seem to rest on solid foundations. ■



美国房地产

房子赢了

房地产市场没有受经济衰退的影响，依然兴旺

美国房地产市场表现古怪。住宅物业——价值35万亿美元，略高于美国股市——似乎竟对周遭的经济惨状浑然不觉。5月份的房价比去年同期上涨了4.3%，这一增速仅略低于自十年前房市崩盘以来的平均水平。即使是最贵的地方房价也在继续涨，比如一套公寓均价110万美元的旧金山。许多经济学家仍预计2020年全年房价会下跌，但这样的预测看上去越来越站不住脚了。

乍一看这让人惊讶。经济衰退期房价通常会暴跌。房贷违约增加，导致更多房产被挂牌出售。家庭收入下降令买房者的购买力缩水。房价实值在上世纪90年代初的经济衰退中下跌了10%，在2007至2009年金融危机之后的衰退中下跌了30%。因新冠疫情导致的GDP下降和失业率上升前所未有。尽管如此，到目前为止看不到什么迹象显示美国房市即将下滑。

止赎拍卖房产的比率看起来不太可能达到上次经济衰退时的高点。房贷相对于收入的比例下降了。一定程度上由于金融监管变得更加严格，发放给信用评级很低的借款人的房贷比例不到2007年的一半。与此同时，财政援助比十年前来得快得多。

在上一次危机中，直到数百万家庭的房产被收回拍卖，救助房主的计划才开始实施。这一次，政府的经济刺激计划降低了申请暂缓偿还房贷（最长可暂缓一年）的难度：房主并不需要如何费力证明自己真有这样的需要就能获得批准。所有这些使得暂缓还贷比例那貌似惊人的增长——从疫情前的几乎为零增至5月份的近10%——具有很不一样的意义。咨询公司凯投宏观（Capital Economics）的分析师估计，许多要求延期还款的借款人其实有能力继续偿还房贷，但他们“把寻求援助……当作一份保险”。

政府提供的现金补贴也非常慷慨，力度之大使得美国2020年家庭总收入的

增幅预计将与2019年相当，与以往衰退期通常出现的下降对比鲜明。这有助于借款人保持正常偿还房贷。事实上，五分之一收到联邦政府纾困支票的美国人已经用它来还贷了。更宽松的货币政策也有帮助。自今年年初以来，30年期房贷利率已经下降了大约0.5个百分点，至3%出头的历史最低水平。人们的再融资申请淹没了抵押贷款公司。想要买房的人，包括那些想在疫情后逃离市中心的人，现在可以买得起更贵的房子了。随着封锁放松，被压抑的需求推动6月的房贷申请同比增长了20%。

房地产市场接下来的发展取决于疫情的走势，以及由疫情决定的整体经济走势。不过，当迷雾最终消散，房价在一段时间内出现更强劲的增长可能并不让人意外。大量学术证据表明，宽松的货币政策与房地产市场泡沫之间存在密切关联。其他研究人员在疫情前就指出，美国的新房供应跟不上需求，一定程度上是因为日益复杂的土地法规和房屋建设竞争的减少。社交隔离的要求也有可能在未来几个月里阻碍施工。供应受限而需求增加，房价似乎有着坚实的基础。 ■



The Economist Film

\$1bn to save the ocean - What would you do?

We asked Sir David Attenborough and four other leading thinkers on ocean conservation how they would invest \$1bn to protect the ocean. Some of their answers may surprise you.



经济学人视频

用10亿美元保护海洋 - 你会怎么花？

我们向大卫·爱登堡爵士等四位顶尖海洋思想家提出了“如何用10亿美元保护海洋”，某些答案会让你意外。



Trade and geopolitics

A hill of beans to die on

Two books explain the origins of the tension—and why it is set to last

ROBERT LIGHTHIZER, the United States trade representative, joined the Trump administration as a longtime critic of China. A protectionist, he had prospered as a lawyer by fighting Chinese steel firms over their exports to America, denounced the country's admission to the World Trade Organisation (WTO) in 2001, and disparaged the American government's approach to its subsequent rise. As America's chief trade negotiator from 2017, he saw an opportunity to right old wrongs.

Two new books offer accounts of the economic conflict that Mr Lighthizer stepped into. In "Superpower Showdown" Bob Davis and Lingling Wei chronicle his attempts to negotiate a deal between America and China, which were at times so muddled that the Chinese failed to realise who was leading the talks. "Trade Wars are Class Wars", by Matthew Klein and Michael Pettis, offers a deeper argument about the source of the trouble. The pair think the real battle is being fought inside China, between workers and elites.

Both books point out that the problems had been building for decades, but, say Messrs Klein and Pettis, the rot took a while to set in. When a country is trying to grow richer, it can help to keep consumer spending low and to channel resources into investment instead. But in China this strategy lingered for too long. Suppressed interest rates robbed savers of spending power and encouraged wasteful investment; internal migration restrictions held down wages; a weak currency subsidised exporters at the expense of consumers. The result is that Chinese producers make more stuff than ordinary people can afford to buy.

Diplomatic tensions arose when the excess spilled into foreign markets. Spurred on by the world's hunger for dollars, America has mopped up much of it—to the detriment of its own manufacturing base.

“Superpower Showdown” illustrates these trends with stories from both sides of the Pacific. It includes the tale of Liu Zhanyi, whom locals in Guangrao often mistook for a truck-driver because of his modest attire, instead of recognising him as the owner of one of China's largest tyre exporters. Between 2004 and 2008, as his business was enjoying success, employment in the American tyre industry shrank by 14%. The Obama administration responded with temporary tariffs on Chinese-made tyres in 2009, to little effect. By then some tyre wholesalers and retailers were so dependent on imports that the tariffs pushed them into bankruptcy.

Mr Lighthizer took a different line of attack. He convinced Mr Trump to launch an investigation into China's economic practices, including the alleged theft of American intellectual property. Unsurprisingly, this concluded that the Chinese had indeed sinned, for example by abusing joint ventures with foreign companies to force them to hand over valuable technology. It was not lost on the Chinese that Thomas Murphy, chairman of General Motors, had first suggested these partnerships in 1978 as a way to boost China's car industry.

Resolving this clash of economic systems peacefully was always going to be difficult, particularly given the interventionist inclinations of China's president, Xi Jinping. Mr Lighthizer understood the challenge, but figured that the administration's pressure might bolster market-minded reformers within China and loosen the state's grip on the economy. That had happened when China joined the WTO. He hoped to repeat the trick.

What followed was, in Mr Davis's and Ms Wei's telling, a stunningly cack-handed negotiation. Mr Lighthizer was undermined by colleagues pushing

for tariffs on American allies who might have helped cajole the Chinese. Mr Trump himself was torn between a desire to lift the stockmarket and fury that the Chinese were not buying more soyabeans (John Bolton, his former national security adviser, alleges in his new book that the president was preoccupied with the impact on his own re-election prospects). At one point in the talks Washington was full of references to Mr Trump as the title character in “Jack and the Beanstalk”: might all this fuss have been over a cup of beans? A Chinese delegation interpreted a packed room of officials as evidence that they were being taken seriously. In fact it indicated that the Americans did not trust each other.

Ultimately the two sides settled, literally and metaphorically, for a few beans. The initial deal they signed in January 2020 left the hardest problems for another day. Mr Klein and Mr Pettis demonstrate that giving up is unwise, because ordinary folk deserve a bigger share of the economic pie, and conflicts will persist until they get it. Mr Davis and Ms Wei show that the Trump administration was unfit to do the job. ■



贸易与地缘政治

死磕豆大的事情

两本书分析中美关系紧张的根源，以及它势必持续的原因【《超级大国的对决》、《贸易战是阶级战》书评】

美国贸易代表罗伯特·莱特希泽（Robert Lighthizer）在加入特朗普政府之前就一直在抨击中国。他奉行贸易保护主义，早年做律师时针对中国钢铁企业对美出口的争议发起贸易诉讼而一战成名，到2001年中国加入世贸组织时他大加抨击，随后又指责美国政府面对中国崛起无所作为。2017年起他担任美国首席贸易谈判代表，自此找到了拨乱反正的机会。

两本新书讲述了莱特希泽涉入的这场经济冲突。在《超级大国的对决》（Superpower Showdown）一书中，鲍勃·戴维斯（Bob Davis）和魏玲灵记录了莱特希泽试图与中国达成协议，这些谈判有时极为混乱，以至于中方都搞不清楚究竟是谁在主导。马修·克莱因（Matthew Klein）和迈克尔·佩蒂斯（Michael Pettis）合著的《贸易战是阶级战》（Trade Wars are Class Wars）对问题的根源做了更深入的探讨。两位作者认为，真正的“战事”正在中国国内上演，发生在劳动阶层与精英之间。

两本书都指出问题已经积累了几十年，但克莱因和佩蒂斯指出，形势的恶化过了一段时间才显露出来。当一个国家努力走向富裕时，保持低消费并把资源引向投资可能是有用的。但在中国，这种策略持续太久了。利率受抑打击了储蓄者的消费力，并助长了浪费性投资；国内的人口迁移限制抑制了工资水平；疲软的汇率补贴了出口商却损害了消费者的利益。结果就是中国厂商生产出的大量商品超出了普通人的消费能力。

这些过剩商品涌入国外市场，引发外交关系紧张。受全球渴求美元的推动，美国消化了这其中大部分商品，结果损害了自身的制造业基础。

《超级大国的对决》通过在太平洋两岸发生的故事说明了这些趋势。其中包括刘占一的经历。在广饶，当地人常常误以为衣着朴素的刘占一是个货

车司机，其实他是中国数一数二的轮胎出口商。2004年至2008年间，刘占一的生意蒸蒸日上，而同期美国轮胎产业的就业萎缩了14%。奥巴马政府在2009年对中国制造的轮胎征收临时关税，但收效甚微。美国一些轮胎批发商和零售商那时已极度依赖进口，加征关税反而把它们推向了破产。

莱特希泽采取了不同的攻击路线。他说服特朗普启动调查中国的经济行为，包括涉嫌窃取美国知识产权。调查结果自然是认定中方有罪，例如滥用与外国公司建立的合资经营关系，逼迫对方向中方转移高价值技术。通用汽车董事长托马斯·墨菲（Thomas Murphy）在1978年首次建议建立这种合作关系来促进中国汽车产业的发展，中国人当然是听进去了。

要和平解决这种经济体制的冲突一向是个难题，尤其是在中国国家主席习近平的干预主义倾向之下。莱特希泽明白其中的挑战，但认为美国政府的施压也许可以助力中国内部有市场意识的改革者，让中国政府放松对经济的管制。在中国加入世贸组织时曾发生过这种情况，而他希望重施故技。

但随后发生的，按戴维斯和魏玲灵的说法，却是笨拙得惊人的谈判。先有莱特希泽被同僚坑了一把，他们推动向本可能帮助说服中国的美国盟友征收关税。然后是特朗普本人摇摆不定，既想提振股市，又要怒斥中国进口美国大豆太少（他的前国家安全顾问约翰·博尔顿[John Bolton]在自己的新书中称，特朗普只是一门心思算计对自己连任前景的影响）。在连串谈判中的某个节点，华盛顿到处都在说特朗普就像《杰克与豆茎》（Jack and the Beanstalk）中的主角：各种大费周章，也许只是为了一点豆子？一个中国代表团看到满满一屋子参加谈判的美国官员，还以为是对自己的重视。实际上这表明美国人之间互不信任。

最终，双方就“豆大”的事情达成了协议。于2020年1月签署的第一阶段协议把最棘手的问题留待日后解决。克莱因和佩蒂斯论证说，放弃协商是不明智的，因为普通民众理应从经济蛋糕中分到更大的一块，得不到的话矛盾就会一直持续。戴维斯和魏玲灵认为，特朗普政府并不胜任这项工作。





E-sports

Citius, Altius, Fortnite

Why the next Olympic games should feature Fortnite

CHAMPIONS FROM many countries are dropped on an island, wearing tight, garish outfits that show off their muscles. They search for weapons, such as guns and rocket-launchers. In teams of two, they try to kill everyone else on the island. The last pair standing wins gold medals and global adulation.

The Tokyo Olympics, which were supposed to start this month, have been postponed until 2021, thanks to covid-19. That delay offers a chance for reflection. The International Olympic Committee wants to make the games more popular with young people. To that end, it is introducing new events, such as skateboarding, surfing and climbing. Why not go further and let national teams compete at video games? Electronic sports such as “Fortnite”, described above, are vastly more popular than Olympic oddities such as dressage or curling. In fact, they are more popular than most mainstream sports. Only 28% of British boys aged 16-19 watch any traditional live sports; 57% play video games.

Stick-in-the-muds may grumble that e-sports are not proper sports. Many parents, observing their surly teenagers sitting on the sofa all day twiddling their thumbs and shouting “Quick, pass me the shotgun!” at a screen, would agree. Yet video games are highly competitive, with professional leagues that play to packed stadiums. There are perhaps only 200 tennis stars in the world who can make a living from playing in tournaments. By contrast “League of Legends”, a fantasy game played by teams of five, supports over 1,000 on good wages. Its World Championship final last year was watched by 44m people.

New sports have always been unpopular at first. King Edward II of England tried to ban football in 1314, because he thought boys should be learning archery instead. In 19th-century America churchy types objected to baseball, which they worried was too much fun. The best e-sports require as much skill and dexterity as many conventional sports—professional gamers typically carry out five distinct actions every second. Video games are also cheaper and more accessible than, say, sailing or horse-riding.

Critics of e-sports offer moral objections, too. They are addictive. Prince Harry has called for “Fortnite” to be banned for this reason. They are violent. Surely, at a time of global disharmony, it is a bad idea to make simulated killing an Olympic sport? The Olympics aim to promote peace. Finally, video games are crassly commercial. Nobody owns basketball; “League of Legends” is owned by Tencent, a Chinese megacorporation.

None of these arguments is very convincing. The idea that an activity, rather than a substance, can be addictive is contentious among doctors, as is the existence of a causal link between gaming and violence. And the notion that warlike sports have no place in the Olympics is hard to square with history. Javelin-throwing and wrestling were introduced in 708BC. They are still there. Modern pentathlon, which includes shooting and fencing, was designed to train soldiers. The imaginary mayhem in “Fortnite” cannot be compared to the real harm caused by boxing. Packs of e-sports fans do not rampage through town centres as soccer or ice-hockey fans sometimes do.

As for the fact that e-sports belong to companies, so what? The Olympics already generates billions from broadcasting and sponsorship. Commercial pressure can make for livelier entertainment. Having a video game named as an Olympic sport would be a huge prize. Companies would vie to create games as exciting to watch as they are to play. This sounds like a recipe for fun. Those who disagree can always watch the 20,000-metre speed-walk.

Put “Fortnite” in the Olympics, and millions will tune in who might otherwise not have bothered. They might even stumble across a traditional sport and decide to try it, too. And if the experiment fails, no matter. The International Olympic Committee could drop it in 2024, as it has previously dropped croquet, tug-of-war and solo synchronised swimming. ■



【首文】电子竞技

更快、更高、更好玩

为什么下届奥运会应该把《堡垒之夜》纳入比赛项目

来自许多国家的高手被空降到一个小岛上，个个身穿花哨惹眼的紧身服，肌肉毕现。他们两人一组，要寻找枪支和火箭筒等武器，目标是杀死岛上其他所有人。最后存活下来的一组将赢得金牌和全球观众的追捧。

原定7月举行的东京奥运会因为新冠疫情推迟至2021年。这让人们有时间来琢磨一些变化。国际奥委会希望奥运会能更受年轻人的喜爱，为此正在引入滑板、冲浪和攀岩等新项目。那何不更进一步，让各国队伍也在电竞中一决高下呢？上文描述的《堡垒之夜》（Fortnite）之类的电竞比赛远比盛装舞步或冰壶之类的奇葩奥运项目更受欢迎。实际上，它们比大多数主流运动都更受欢迎。16至19岁的英国男孩中只有28%现场观看过任何形式的传统体育比赛，但有57%玩电子游戏。

守旧的人可能会抱怨电竞算不上体育运动。看着自己叛逆暴躁的孩子整日窝在沙发上，晃动着拇指，冲着屏幕大喊“快，把霰弹枪递给我！”，很多父母都会认同这一点。但是，电子游戏极具竞争性，专业战队在体育馆比赛时，全场座无虚席。全球可能只有200名明星网球选手可以靠打比赛谋生。相比之下，由五人组队参加的幻想游戏《英雄联盟》（League of Legends）让1000多人拿着不菲的薪水。去年的冠军联赛全球总决赛有4400万人观看。

新的运动起初都不受欢迎。英格兰国王爱德华二世在1314年试图禁止人们踢足球，因为他认为男孩子应该学习箭术。在19世纪的美国，恪守教会仪式的人反对棒球，因为担心它太好玩了。最好的电竞与许多常规运动一样讲求技巧和敏捷熟练，专业游戏玩家通常每秒要执行五个不同操作。比起帆船或马术等运动，电子游戏也更便宜，更容易参与。

电竞的批评者也提出了道德上的反对理由。电子游戏会让人上瘾。为此，

哈里王子呼吁把《堡垒之夜》禁掉。电子游戏很暴力。这个世界如今已经够不和谐了，再把杀戮游戏纳入奥运会项目肯定不好吧？奥运会的宗旨可是促进和平啊。最后，电子游戏纯粹是商业化的。没有人拥有篮球运动，而《英雄联盟》却归中国巨头企业腾讯所有。

这些论点都不是很有说服力。一项活动而不是某种物质会导致成瘾的说法在医生之中存有争议，游戏和暴力有因果关联的观点也一样。与战斗有关的运动没资格进入奥运会的看法也与历史不符。标枪和摔跤在公元前708年被纳入奥运会，现在仍是奥运项目。包括射击和击剑的现代五项最初是为了训练士兵。《堡垒之夜》中的虚拟战斗无法与拳击造成的实实在在的伤害相提并论。电竞迷人数众多，但不会像足球迷或冰球迷那样不时在市中心闹事。

至于说电竞项目属于某些公司，那又如何呢？奥运会已经通过转播权和赞助产生了巨额收入。商业压力可以让娱乐更具活力。如果一款电子游戏能成为奥运项目，将是一项巨大的激励。游戏公司将争相开发既好玩又好看的游戏。这听起来是靠谱的趣味配方。不同意的人总还可以去看两万米竞走。把《堡垒之夜》纳入奥运会，成百千上万原本对奥运没兴趣的人可能会收看。他们甚至说不定会偶然看上一项传统运动，决定自己也试试看。而就算这项实验失败了，也没关系。国际奥委会可以在2024年放弃这个项目，就像它曾经放弃过门球、拔河和单人花样游泳一样。■



Business in India

All aboard

Foreign investors are rediscovering that the road to riches in India runs through powerful local partners

FACEBOOK WAS first to open its wallet. In April the social network said it would spend \$5.7bn on a 9.9% stake in Jio Platforms, the digital arm of Reliance Industries, India's biggest firm. The investment was followed in short order by nine other entities, including global private-equity (PE) giants such as KKR, as well as Saudi and Emirati sovereign-wealth funds. Collectively, this year foreigners have poured or pledged to pour \$15.2bn into Jio. That would give them a combined stake of 25%. Microsoft is rumoured to be next in line.

For Reliance, the bonanza is a way to manage the huge debts it has taken out to bankroll Jio's vaulting ambitions. For the foreigners, the appeal rests in part on its promise to tap into India's underserved legions of digital consumers. Since its launch in 2016 Jio has become the country's pre-eminent technology platform, with nearly 400m mobile subscribers, a broadband network, as well as entertainment, retail and finance businesses.

The investments were hailed by the local press and security analysts as an endorsement of a new digital champion—and of India itself. A recent flurry of dealmaking seems to corroborate this rosy view (see table). In February the Adani Group, another conglomerate, completed a \$450m sale of 25% of its Mumbai power operations to Qatar's government and received a \$900m investment in a 37% stake in its gas operations by Total, a French oil giant. Talk of more deals abounds, notably one possibly involving Lockheed Martin that could enable the local production of jets for India's air force at a time of rising tensions with China. (In May Chinese soldiers engaged in a

brief but deadly skirmish with Indian border forces.)

Look closer, though, and the apparent thumbs-up from foreign investors is not quite what it seems. After years of trying to make it on their own with mixed results, some foreigners appear to have concluded that getting ahead in India requires a powerful local partner. Mukesh Ambani, Reliance's boss and India's richest man, or Gautam Adani, the industrialist behind Adani Group, fit the bill to a tee.

In recent months this vision of India as a place where foreign money may be welcome but foreign competition is not has been more volubly embraced by the government of Narendra Modi. In a speech in May about India's response to covid-19, which has hit India particularly hard, the prime minister referred to "self-reliance" 17 times. "We must", he summed up, "make the Local the mantra of our life."

That is a long way from the pro-business, investor-friendly posture which first got Mr Modi elected in 2014. But to seasoned observers of India Inc it shares some parallels with a more insular past.

After independence from Britain in 1947 the main way for most outsiders to partake in India's economy was through joint ventures with domestic partners or some other form of local ownership. Some Indian partners were chosen on the basis of access to the levers of power rather than managerial acuity. India's largest carmaker, Maruti Suzuki, created in 1982, was the brainchild of Sanjay Gandhi. His mother, Indira, was prime minister at the time. The Gandhis took care of the politics; Suzuki of Japan brought the cash and built the cars.

Things began to change after 1991, when India emerged from decades of self-imposed isolation and interventionism of the so-called "Licence Raj". A series of liberalising governments cut tariffs and opened industries up to

competition (see chart 1). But many stifling rules remained in place. Some were newly imposed. Shops were limited to a certain size and certain prices, for instance of drugs, remained controlled. By 2001 so many multinationals in industries from petrol (Caltex) to pharmaceuticals (Astra, Roche, Rhône-Poulenc) were once again fleeing red tape and other foibles that the *Times of India*, a leading daily, bewailed “the second quit India movement”.

In the 2000s a new generation of firms had another go at conquering the Indian market. Foreign direct investment poured in (see chart 2). Marks & Spencer, a British retailer, plotted its entry in 2001, followed by Starbucks in 2007. Both have since allied with local powerhouses (Reliance and Tata, another conglomerate, respectively).

| *Individualists' lament*

The dilemma lives on. Last year Ford announced that it would become a minority shareholder in a carmaking joint venture with Mahindra, a large industrial group. Firms that have resisted such tie-ups can struggle. General Motors threw in the towel in 2019, as part of a shift to focus on its American and European operations. Amazon, which has ploughed \$6.5bn into its Indian operations, has yet to make money in the country. Walmart's \$16bn purchase in 2018 of a controlling stake in Flipkart, an Indian e-commerce firm, has been similarly hard work. As foreign entities, Amazon and Walmart must contend with a tax on transactions, limits on the size of their inventory and on sales of their own brands, as well as frequent visits from competition authorities.

A popular alternative is to operate a listed Indian subsidiary, like Suzuki or a number of big Western corporations, from consumer-goods titans (Unilever, ColgatePalmolive and Nestlé) to industrial giants (Bosch and Siemens). Even that does not guarantee peace of mind, however. After a protracted legal battle with India's taxman, first over a capital-gains levy

related to its \$11bn purchase of an Indian mobile business, then over allegedly unpaid fees related to its spectrum rights, Vodafone Idea, India's third-largest wireless carrier, was ordered by a court to pay \$6.8bn in back taxes and fees. In an epic tale of value-destruction, the company now teeters on the brink of bankruptcy, weighing on Vodafone Group, its British corporate parent.

The contrast with Jio is stark. The Indian champion has managed to snap up mobile spectrum at low prices and extend promotional rates. Given Facebook's fruitless efforts to gain regulatory approval for a payment feature in its ubiquitous WhatsApp messaging service, the social network may have quite reasonably decided that teaming up with Jio is a better bet.

Perhaps the best that can be said of the revival of collaborations between Western and Indian firms is that the deals are happening at all. Chinese companies face tougher times. Even before the latest border flare-up Mr Modi had made it clear China is less welcome. In April his government issued a rule subjecting "opportunistic takeovers" of Indian companies by "any entity of a country which shares land border with India" to a special review. India's other, poorer neighbours—Bangladesh, Bhutan, Myanmar, Nepal and Pakistan—are unlikely to be the rule's main target. On June 29th Delhi banned 59 mobile apps including TikTok, a hit Chinese-owned short-video platform. Media reports warn of impending restrictions on 1,172 items, from toasters to lifts, made in whole or part in China.

Time will tell if Western investors' latest dalliances of convenience pay off. The lot of Reliance businesses' partners has not always been easy. India's securities regulator has ordered Reliance Industries to compensate minority shareholders in Reliance Petroleum, an affiliate for a series of transactions between the two entities that, the regulator says, disadvantaged the outside investors. The case is pending. Reliance Industries denies any wrongdoing.

As good as Jio looks on paper, it must still show it has what it takes to run a modern tech behemoth. Ventures such as Jiomart (e-commerce) and JioMoney (finance) have yet to live up to the hype. Until they do, Jio's nationality may remain its chief attraction. ■



印度营商

统统上车

外国投资者再次发现，要在印度赚钱，就需要联手强势的本地伙伴

最先打开腰包的是Facebook。4月，这家社交网络公司表示将斥资57亿美元收购印度最大的企业信实工业公司（Reliance Industries）的数字部门Jio Platforms（以下简称Jio）9.9%的股份。紧随其后投资Jio的还有另外九家机构，包括KKR等全球私募股权巨头，以及沙特和阿联酋的主权财富基金。今年，外资对Jio的投资或承诺投资共计152亿美元，这将让它们总共持有这家公司25%的股份。据传下一个投资的会是微软。

对信实而言，这股投资热潮倒是可以帮助它应付之前为支持Jio的宏图壮志而借下的巨额债务。对外资而言，投资Jio的吸引力一部分在于有望通过它打入印度庞大的、目前服务不足的数字消费市场。自2016年推出至今，Jio已成为印度首屈一指的技术平台，拥有近四亿移动用户、一个宽带网络，以及娱乐、零售及金融业务。

当地媒体和证券分析师为之喝彩，称这些投资是对这家崛起的数字领军企业及印度本身的认可。近期的连串交易似乎印证了这种乐观的看法（见表）。2月，另一家企业集团阿达尼集团（Adani Group）以4.5亿美元的价格将其孟买电力业务25%的股份出售给了卡塔尔政府，并获得法国石油巨头道达尔为购入其天然气业务37%的股份支付的九亿美元。市场议论纷纷，称还有更多交易，其中一条惹眼的消息是，在中印关系日益紧张之际，美国洛克希德·马丁公司（Lockheed Martin）可能协定在当地为印度空军生产飞机。（5月，中印边境部队爆发了短暂的小规模冲突，导致人员伤亡。）

但是，细看会发现，外国投资者的支持并不完全是表面看起来那回事。多年来他们一直想在印度自立门户，但收效不一，一部分人似乎得出结论，要在印度成功就得有强大的本地合作伙伴。最合适的人选莫过于信实的老板、印度首富穆克什·安巴尼（Mukesh Ambani），或者阿达尼集团的实

业家老板高塔姆·阿达尼（Gautam Adani）。

近几个月来，莫迪政府的言论更印证了这种认为印度可能欢迎外资却不喜欢外国竞争的看法。5月，莫迪在关于印度应对新冠疫情（对印度打击异常严重）的讲话中17次提到了“自力更生”。“我们必须，”他总结说，“把‘本地’这个词变成我们人生的真言。”

这与2014年助力莫迪当选的那种亲商和对投资者友好的姿态大相径庭。但在老道的印度商业观察人士看来，这与印度较为封闭保守的过去有一脉相承之处。

自1947年印度脱离英国统治获得独立后，大多数外商参与印度经济的主要方式是与国内合作伙伴合资或其他形式的本地参股。一些印度合作伙伴被选中，是为了要借它们获得权力支持，而不是因为它们的管理能力有多好。印度最大的汽车制造商马鲁蒂铃木公司（Maruti Suzuki）由桑贾伊·甘地（Sanjay Gandhi）于1982年一手创立。他的母亲英迪拉（Indira）是当时的印度总理。母子两人负责打通政治关系，日本铃木公司只管投资和造车。

形势在1991年后开始发生变化，当时印度摆脱了几十年自我实施的孤立政策和通过名为Licence Raj的牌照制度施行的干预主义。启动自由化的各地政府纷纷削减关税，开放行业引入竞争（见图表1）。但许多令人窒息的规则依然存在，还有一些是新增加的。商店被限制在一定规模内，药品等商品的价格仍受到管控。到2001年，从汽油（加德士）到制药业（阿斯特拉、罗氏、罗纳普朗克）的众多跨国公司再次因为当地的官僚做派和其他问题出逃，以致印度主要日报《印度时报》（Times of India）哀叹这是“第二次‘退出印度运动’”。

本世纪头十年，又有新一批公司尝试征服印度市场。外国直接投资大量涌入（见图表2）。英国零售商玛莎百货（Marks & Spencer）在2001年进驻印度市场，之后星巴克在2007年进入。两者都和当地巨头结盟，分别是信实和另一家企业集团塔塔。

两难的处境依旧。去年，福特宣布将与印度大型工业集团马恒达（Mahindra）合资成立一家汽车制造公司，成为少数股东。那些拒绝这类合作的公司日子可能不好过。通用汽车在2019年宣布放弃印度市场，转而专注美国和欧洲业务。亚马逊已对其印度业务投入65亿美元，至今未有盈利。沃尔玛在2018年以160亿美元收购了印度电商Flipkart的控股权，之后的发展却同样步履维艰。作为外国实体，亚马逊和沃尔玛必须承担交易税，在库存量和销售自有品牌上受到限制，还要面对反垄断监管机构的频繁调查。

一个常见的替代策略是在印度运营上市子公司，例如日本铃木公司或一些西方大企业——从联合利华、高露洁棕榄和雀巢等消费品巨头，到博世和西门子等工业巨头。但即便这样也不是就高枕无忧了。印度第三大无线运营商“沃达丰Idea”（Vodafone Idea）经历了与印度税务机构旷日持久的官司——先是关于它以110亿美元收购一家印度移动通信公司的资本利得税，然后又是未支付频谱使用费的指控，最后被法院下令补缴68亿美元的税款和费用。经历了如此漫长而悲壮的价值毁灭故事，该公司现在濒临破产边缘，也拖累了英国母公司沃达丰集团（Vodafone Group）。

这与Jio的情况形成了鲜明对比。这家印度领军企业以低价抢得移动频谱并向客户提供优惠资费。Facebook之前设法争取印度监管部门批准在其流行通信服务WhatsApp中添加支付功能，但徒劳无功。这么看来，它很可能是合情合理地得出了结论，认为和Jio合作是更好的押注。

有关西方企业和印度公司的再度携手，最积极的评价也许是它们居然还能在印度做交易。中国公司就没有这样的待遇。甚至在最近的边境冲突之前，莫迪就已明确表示不那么欢迎中国。4月，印度政府颁布新规，将就“来自与印度接壤的任何国家的实体”对印度公司的“投机性收购”开展特别审查。印度那些较贫穷的邻国，如孟加拉国、不丹、缅甸、尼泊尔和巴基斯坦，不太可能是这条规则的主要目标。6月29日，德里对59个移动应用颁布禁令，其中包括TikTok这一中资热门短视频平台。媒体报道警告称，印度政府即将对全部或部分在中国生产的1172种产品（从烤面包机到升降

机) 实施限制。

西方投资者最近在印度享受的便利能否带来成果，还需要时间验证。信实的合作伙伴们也不总是一路绿灯。印度证券监管机构已下令信实工业向下属的信实石油公司 (Reliance Petroleum) 的少数股东提供赔偿，称这两家实体之间的一系列交易不利于外部投资者。该案正在审理中。信实工业否认有任何不当行为。

Jio尽管表面看来不错，它仍必须证明自己具备一家现代科技巨头所应有的能力。Jiomart (电子商务) 和JioMoney (金融) 等公司至今的表现还没达到被热烈吹捧的那种程度。在成功证明自己之前，Jio的主要吸引力也许就是国籍了。■



Advertising

The new admen

A notoriously recession-prone and inefficient business is getting up to snuff

SOMBRE PIANO music? Check. Footage of deserted streets? Check. Maudlin voice-over lamenting “uncertain times”? Check. Seeking a television commercial fit to air amid a pandemic, brands from AT&T to Budweiser sent for their finest admen. All seemed to come up with the same cliché, proclaiming: “We’re in this together.”

This is a hard year for advertising, and not just on the creative front. Global ad spending is expected to be 10% lower than in 2019, according to GroupM, the world’s largest advertising firm by billings. The pandemic led advertisers to trim marketing budgets, deprived sellers of ad space, such as cinemas, of audiences, and left the admen with no work. Rishad Tobaccowala, an adviser to Publicis Groupe, the world’s third-biggest agency, likens it to an asteroid strike: “The Earth will go on. But some dinosaurs will die.”

As the dust settles, a reshaped advertising world is emerging. The buyers are lying low but look ready to splurge. Most of their money will for the first time go online. Offline-ad sellers, long in decline, and the creative agencies, whose middleman business is being pinched from both sides, face gradual extinction.

Despite a slump like no other, ad spending may fall by less this year than the 11.2% drop that followed the financial crisis in 2009. And whereas most of the advertising dollars pulled during the recessions of 2001 and 2009 never came back, this time they may return to pre-pandemic levels as early as next year, believes MoffettNathanson, a research firm (see chart 1). How come? In a word: internet.

In 2001, when Google was a startup and Mark Zuckerberg in high school, digital advertising made up 5% of America's ad mix (see chart 2). In 2010 advertisers spent twice as much on print and radio as online, even as people were spending more time with computers and smartphones than with magazines or radio. Eventually, companies that pulled radio and print commercials in these downturns realised they didn't need them.

They are more reluctant to trim online adverts. Whereas old-school formats are taking their customary beating this year—print advertising will fall by 32%, expects MAGNA, a research arm of Interpublic, another big agency—digital will be flat, or even tick up. The internet draws in new advertisers and persuades existing ones to spend more. Smaller firms that cannot pay for pricey television clips can afford to experiment online. The 100 biggest advertisers on American network TV account for more than 70% of ad sales but in search and on Facebook the top 100's share is 26% and 20%, respectively. Companies are also diverting their “below the line” marketing budgets—for things like direct mail and in-store promotions—online. The analytics offered by technology giants have encouraged buyers to keep running commercials until the return on investment shows signs of decline. And the growing number of firms that only exist on the internet cannot easily cut online ads. For them, digital advertising is “the new rent”, says Mark Shmulik of Bernstein, a research firm. Online retailers save on physical shopfronts but must maintain a visible virtual presence, recession or not.

Meanwhile, everyone is at the mercy of a near-duopoly. Two landlords, Google and Facebook, control 60% of worldwide digital-ad real estate. Investors long for Google to introduce ads to its Maps app. Their calls may grow louder as Google's net advertising revenue in America is expected to fall by 4% this year, according to eMarketer, a research firm. Facebook could put more on Instagram. WhatsApp, also part of Facebook, is “the most under-monetised app in existence”, says Bernstein.

| *Matchmakers*

There is one final—and vital—reason for the resilience of digital-ad spending. Whereas a decade ago it bore little relation to people’s actual media habits, today it is closely aligned with how they while away their time, notes Mary Meeker of Bond Capital, an investment firm (see chart 3).

Those habits’ further evolution will also favour digital ads. Mobile screens have overtaken TV as the biggest grabber of people’s attention. Even before the pandemic more Americans were cancelling cable-TV contracts each year. Now cash-strapped consumers are switching en masse to cheaper streaming services such as Netflix. In the next few years TV advertising, which has held up reasonably well, “will finally start to crack”, predicts MoffettNathanson.

As more ad dollars migrate online, an even bigger wedge will end up with Google and Facebook, which last year hoovered up 90% of new online ad spending, according to Bernstein. They are on track to increase their share of the worldwide digital-ad business to 70% or so within a few years, and still have ample capacity to display more ads (see chart 4).

If the flood of online ad spending continues, however, current digital-advertising space may reach “a point of saturation”, warns Andrew Lipsman of eMarketer. Ads will then seep to other digital media.

One is gaming, which has come a long way since 1993, when Electronic Arts showed pitch-side ads in its first “FIFA” football game. Last year King, which makes the “Candy Crush” games, took \$150m in net ad bookings. Today gaming firms make ads more engaging by, say, letting players earn power-ups in exchange for watching a commercial. King claims that consumers are 18% more likely to remember an ad they see in “Candy Crush” than one viewed while streaming or using social media. Jonathan Stringfield, head of marketing at King’s parent company, Activision Blizzard, recalls how six or

seven years ago he had to persuade sceptical advertisers that Facebook, where he worked at the time, was a serious place to market their brand. “This really feels like history repeating itself [with gaming],” he says.

Video-streaming, if anything, looks ready for an even bigger bonanza. Netflix insists it will never run commercials. But other streamers, including Disney’s Hulu and NBCUniversal’s Peacock, are already supported by advertising. As the streaming wars heat up, subscription-based services may decide to sell commercials in order to fund their investment in new content.

Then there is Amazon. The e-empire is still a distant third in digital ads but growing fast. It has bitten off a chunk of Google’s search business: more than half of all online product searches now happen on Amazon.com. Its advertisements are particularly effective: shoppers come to the site ready to buy and its purchase-history data allow it to target consumers minutely. It has yet to run commercials on its Prime Video service. But if it does, advertising dollars will pour in, says Mr Lipsman. A viewer shown an ad could place an order on Amazon without leaving the app—or, with voice control, lifting a finger. Mr Lipsman expects Amazon to sell commercials on Prime Video within two or three years. Its two big-tech rivals hope, with Facebook Shops and Google Shopping, to crack retail faster than it can expand in advertising.

The tech giants are stealing business from the admen, too, by making it easy for advertisers to create their own ads. In Britain only 13% of online search adverts and 44% of online display ads go through the five largest agencies, which handle most of TV advertising, according to Enders Analysis, a research firm. The share prices of the big five—WPP (which owns GroupM), Omnicom, Publicis, Interpublic and Dentsu—have been flat or sliding for at least three years; all have dived in the pandemic.

The agencies are fighting back, offering more data analytics and pitching themselves as broader brand consultancies. Since 2006 Publicis has spent \$15bn buying specialist firms in those areas. Mr Tobaccowala estimates that only 35-40% of the group's business is now conventional advertising. Consulting firms have expanded in the opposite direction; Accenture has acquired more than two dozen advertising agencies in the past ten years. Mr Tobaccowala believes his industry can dodge the asteroid. "Agencies are like cockroaches and not like dinosaurs," he says. "We scurry around, we figure out the new world." Nowadays this counts as optimism. ■



广告

新广告人

一个以容易衰退和低效著称的行业正在重生

忧郁的钢琴曲？有。荒凉街道的镜头？有。哀叹“动荡时代”的伤感画外音？也有。从AT&T到百威啤酒，各大品牌召集最优秀的广告人，打造适合在疫病大流行时期播出的电视广告。最终，它们拿出的似乎都是同一个陈词滥调：“我们同舟共济。”

对广告业来说这是艰难的一年，不仅仅是在创意方面。以营业额计全球第一大广告公司群邑集团（GroupM）称，全球广告支出预计将比2019年下降10%。这场疫情让广告客户削减营销预算，让电影院等广告位销售商失去了受众，导致广告人无所事事。世界第三大广告公司阳狮集团（Publicis Groupe）的顾问里沙德·托巴科瓦拉（Rishad Tobaccowala）把这种情形比作小行星撞击：“地球还是照转。但有些恐龙会灭绝。”

撞击掀起的尘埃渐渐落下之际，一个新形态的广告世界在眼前浮现。买家们目前按兵不动，但似乎随时准备大举撒钱。它们的大部分资金将首次用于线上广告。一直在衰落的线下广告销售商，以及中介业务受到两头挤压的创意代理，都面临逐渐消亡。

尽管这次经济衰退空前严重，今年广告支出的下降幅度却可能小于2009年金融危机后11.2%的跌幅。研究公司MoffettNathanson认为，2001和2009年经济衰退期间流失的大部分广告支出始终都没有恢复，而这一次却可能最早在明年就回升到疫情前的水平（见图表1）。为什么会这样？一个词：互联网。

在2001年，谷歌才创办不久，扎克伯格还在读高中，数字广告只占美国广告组合的5%（见图表2）。2010年，人们花在电脑和智能手机上的时间已经超过了杂志或收音机，而广告主在平面和广播上的广告投入仍然两倍于线上。企业在这几次经济低迷时期撤下广播和平面广告之后，最终意识到

它们其实可有可无。

相比之下，它们更不愿意减少线上广告。传统广告媒介今年将继续受挫——另一家大型广告公司埃培智集团（Interpublic）的研究部门MAGNA预计平面广告将减少32%。而数字广告将持平甚至略有增加。互联网吸引了新的广告主，同时也说服了现有广告主投入更多。无力负担昂贵电视广告的小公司也承受得起试验线上推广。美国电视网最大的100家广告主占了广告销售额的70%以上，而在搜索平台和Facebook上前100家的份额分别只有26%和20%。企业也在把“线下”营销预算（例如直邮和店内促销等）转移到线上。科技巨头提供的数据分析鼓励买家持续投放广告，直到投资回报率显现下降的迹象为止。越来越多公司已经完全在线上开展业务，它们无法轻易削减线上广告。研究公司盛博的马克·史穆里克（Mark Shmulik）表示，数字广告对于这些公司来说就是“新的租金”。线上零售商省掉了实体店面的费用，但无论经济衰退与否，它们都必须保持自己在虚拟世界中的可见度。

与此同时，所有人都受到近乎双头垄断的支配。谷歌和Facebook这两个“房东”掌控了全球60%的数字广告地产。投资者期盼着谷歌能在其地图应用中引入广告。研究公司eMarketer称，谷歌今年在美国的广告净收入预计将下滑4%，因此这种呼声可能会变得更高。Facebook也可以加大Instagram上的广告投放。盛博表示，同属Facebook旗下的WhatsApp是“当前变现最不足的应用”。

| 撮合者

数字广告支出如此抗跌还有最后一个、也是至关重要的原因。投资公司Bond Capital的玛丽·米克尔（Mary Meeker）指出，十年前数字广告与人们实际使用媒体的习惯无甚关联，如今却与人们打发时间的方式密切相关（见图表3）。

这些习惯的进一步演变也有将利于数字广告业务。各种移动屏幕已经取代电视机成为注意力的头号焦点。即使在疫情发生前，解除有线电视合约的美国人就在逐年增多。现在，手头拮据的消费者更是大规模转向更便宜的

流媒体服务，例如奈飞（Netflix）。MoffettNathanson预测，电视广告目前维持得还不错，但未来的几年里“将最终开始溃败”。

盛博表示，随着越来越多广告资金转到线上，向谷歌和Facebook的集中将进一步加剧，去年它们已经抢占了线上新增广告支出的90%。几年内这两家公司占全球数字广告市场的份额有望提升至70%左右，而且仍有充足空间去展示更多广告（见图表4）。

然而，eMarketer的安德鲁·利普斯曼（Andrew Lipsman）提醒道，如果线上广告的支出继续激增，目前的数字广告空间可能会达到“饱和点”。届时广告将蔓延到其他数字媒体上。

其中之一是游戏，自1993年艺电（Electronic Arts）开始在其首款《FIFA》足球游戏中展示场边广告以来，游戏广告已经取得长足发展。去年，制作《糖果传奇》（Candy Crush）系列游戏的King获得了1.5亿美元的网络广告预定。如今，游戏公司还设法让广告变得更加吸引人，比如让玩家观看广告来换取威力升级。King宣称，与使用流媒体或社交媒体时看到的广告相比，消费者记住《糖果传奇》中广告的可能性要高出18%。King的母公司动视暴雪（Activision Blizzard）的营销总监乔纳森·斯特林菲尔德（Jonathan Stringfield）回忆说，六七年前自己在Facebook工作时，还得费劲说服心怀疑虑的广告主相信Facebook是一个可以正经营销品牌的地方。“现在真的感觉到历史在（游戏上）重演。”他说。

说起来，视频流媒体的发财机会看起来还要更大。奈飞坚称决不会播放商业广告。但包括迪士尼控股的Hulu和NBC环球（NBCUniversal）的Peacock在内的其他流媒体则已经得到广告加持。随着流媒体大战升级，那些基于订阅的服务可能会决定销售商业广告来为新内容筹资。

再者还有亚马逊。这个电子帝国在数字广告领域仍远远落后于走在前头的两家，但正在迅猛扩张。它已经夺走了谷歌搜索业务中的一大块：现在超过半数的线上产品搜索都在亚马逊网站上完成。它的广告也尤其有效：购物者来到网站时已有买东西的打算，而亚马逊可以根据其购物历史数据做

精准营销。目前亚马逊还没有在视频服务Prime Video上投放广告，但利普斯曼认为，一旦它决定这么做，广告资金就会源源涌入。用户在亚马逊app上看到某个广告时，无需离开app即可下单购买商品——或者通过语音控制下单的话，甚至连手指头都不用抬一下。利普斯曼预计亚马逊将在两到三年内开始在Prime Video上销售广告。它的两大科技对手希望分别通过Facebook Shops和Google Shopping，赶在亚马逊大举扩张广告业务之前在零售业务上打开局面。

科技巨头让广告主能轻松地独立制作广告，这也在蚕食广告人的业务。研究公司恩德斯分析（Enders Analysis）称，在英国，五家最大的广告公司包办了大部分电视广告，但只有13%的线上搜索广告和44%的线上展示广告由它们经手。WPP（群邑集团的母公司）、宏盟集团（Omnicom）、阳狮集团、埃培智集团和电通集团（Dentsu）这五大广告公司的股价已经至少三年时间保持横盘或下滑；在这次疫情中更是全部大幅下挫。

广告公司正在反击，提供更多数据分析服务并将自己定位为更广义的品牌顾问。自2006年以来，阳狮集团已斥资150亿美元收购咨询领域的专业公司。托巴科瓦拉估计该集团现在的业务只有35%到40%属于传统广告。咨询公司的扩张方向正好相反：埃森哲（Accenture）在过去十年已经收购了20多家广告公司。托巴科瓦拉认为他所在的行业可以躲过小行星的撞击。“广告公司像蟑螂，不像恐龙，”他说，“我们会四散奔走，我们会探索新世界。”今时今日，这种说法可说是乐观了。■



Free exchange

Changing room

New research casts light on the pandemic's effects on resource allocation

AS COVID-19 SPREAD around the world, many governments prescribed the economic equivalent of a medically induced coma. Halting the transmission of the disease meant shutting down economic activity. But to restore economies to health quickly, connections between workers and firms needed to be maintained, so that activity could pick up from where it had left off. It seems increasingly clear, though, that not everything will return to normal once covid-19 is eventually beaten. As economies adjust, there is likely to be a substantial reallocation of people and resources.

Flexible economies that can nimbly reallocate resources ought to have an easier time weathering shocks and unlocking the productivity-boosting benefits of new technologies and business models. As the pandemic spread it induced a sudden, violent shock across the economy. While millions of workers and machines were idled, demand for some skills and products soared. Much of this is almost certain to prove temporary. The production of ventilators rose sharply in the first half of 2020, but might eventually fall back to, or below, pre-pandemic levels, as hospitals find they have more than they need in normal times. Other shifts are likely to persist. In March and April Amazon hired 175,000 workers to manage a surge in online shopping. Firms offering products to facilitate telemedicine and online learning also took on scores of new employees. Many of these will stay, just as many pandemic-linked lay-offs will become permanent.

In a paper published in May Jose Maria Barrero of the Instituto Tecnológico Autónomo de México, Nicholas Bloom of Stanford University and Steven Davis of the University of Chicago analysed a monthly survey of business uncertainty, which assesses firms' expectations for sales, hiring and

investment over the next year. The authors found a surge in expected job reallocation from January to April, and conclude that 42% of lay-offs linked to the pandemic are likely to prove permanent. Similarly, recent analysis produced by Adam Ozimek, the chief economist at Upwork, an online labour exchange, suggests that the shift to remote work prompted by covid-19 will leave a lasting impression. Of the hiring managers surveyed by Upwork, 62% say their workforce will be more remote than before the pandemic.

Capital markets, too, are signalling that lasting change is in the works. Messrs Barrero, Bloom and Davis analyse the dispersion of equity returns, surges in which are often treated as an indicator of a reallocation shock. The authors note that dispersion soared in March to levels last seen during the dotcom bust and the global financial crisis. In a recent paper Marco Pagano of the University of Naples Federico II and Christian Wagner and Josef Zechner of the Vienna University of Economics and Business compare the stock performance of businesses that are “pandemic-resilient” (eg, makers of computer-related products and pizza-delivery firms) with those of highly vulnerable ones (eg, mining firms). The former group outperformed the latter by 10% in February-March. Adjusting for risk and other factors only reinforces the point. The cumulative risk-adjusted returns of a high-resilience portfolio were roughly 25% higher than a low-resilience one in the same period. Differential movements in share prices provide a gauge of market sentiment about firms’ prospects. As a higher stock price makes it easier for companies to raise funds in order to expand, they also represent a mechanism by which capital flows from endangered firms to flourishing ones.

The authors extend their analysis back in time and come to the rather striking conclusion that the outperformance of less vulnerable firms predates the pandemic. They detect that returns began steadily diverging in 2014, before widening further in the second half of 2019, and then

exploding early this year. This does not imply that markets foresaw the pandemic. It is owed, in part, to a boom in the price of technology stocks. Yet it helps illustrate why much of the reallocation now under way is very likely to stick—because it represents a continuation of trends that were long blessed by capital markets. Investors seem to have become steadily more cognisant of the risk of disasters. Options prices imply that over the next two years investors require a far higher expected return in order to accept exposure to vulnerable firms than to more disaster-resilient ones. The premium was rising before covid-19 but it has since rocketed, as the shock of the pandemic reinforced the tendency. In a similar way, the reallocation of resources now taking place in retail, health and education may in fact represent an acceleration of trends already established before the outbreak of the coronavirus.

| *There's no turning back*

If in fact covid-19 is engineering structural economic change, this complicates the already difficult decision of whether or not to keep struggling companies and jobs afloat. Compared with the rest of the rich world, America appears to have done less to freeze its economy in place. The number of corporate filings for bankruptcy in March and April was 22% above that in the same period in 2019; by contrast, bankruptcy filings in Germany were no higher. Unlike other rich countries, America has prioritised temporarily increasing the generosity of unemployment benefits (until the end of July) over using government support to help prevent job losses in the first place. Unemployment has consequently risen much more than it has in Europe.

The choice ahead is tricky. Messrs Barrero, Bloom and Davis warn that generous support could prove counterproductive, since it might discourage workers from seeking new jobs in expanding sectors. But withdraw stimulus too soon and the economy could remain mired in a slump,

retarding the growth of frontier industries. Keep it going for just long enough, though, and the decision to allow the pandemic to destroy some jobs and companies, the better to let more robust and productive ones rise in their place, might one day be seen as remarkably fortuitous. ■



自由交流

移形换位

新研究阐明新冠疫情对资源配置的影响

随着新冠肺炎在全球蔓延，多国政府开出了让经济陷入“诱导昏迷”的处方。要阻止病毒传播就需要停止经济活动。但要想让经济迅速恢复健康，就需要维持员工和公司之间的联系，这样企业活动就能从暂停的地方直接重启。但是，有一点似乎越来越清楚——不是所有事情都会在疫情最终得到控制后恢复正常。随着经济的调整，很可能会出现大规模的人员和资源的再配置。

那些能敏捷实现资源再配置的灵活的经济体应该会更经得起冲击，也更容易实现新技术和新商业模式对生产率的提升。随着疫情的蔓延，整个经济都遭受到突如其来的严重冲击。大量劳动力和机器闲置，而对某些技术和产品的需求猛增。这些需求的很大一部分几乎肯定会是昙花一现。今年上半年，呼吸机的产量大增，但最终可能回落到甚至跌破疫情爆发前的水平，因为医院发现自己拥有的呼吸机超出了正常时期的需求。其他的变化可能会持续下去。3、4月间，为应对网购激增，亚马逊雇用了17.5万名员工。为远程医疗和在线教学提供辅助产品的公司也增聘了大量员工。这些员工很多会留下来，正如很多与疫情相关的裁员将是永久性的。

在5月发表的一篇论文中，墨西哥自治技术研究院（Instituto Tecnológico Autónomo de México）的何塞·玛利亚·巴雷罗（Jose Maria Barrero）、斯坦福大学的尼古拉斯·布洛姆（Nicholas Bloom）以及芝加哥大学的史蒂文·戴维斯（Steven Davis）分析了一项有关企业经营不确定性的问卷。该问卷每月一次，评估企业对来年销售、招聘和投资的预期。作者发现，从1月到4月，企业对劳动力再分配的预期激增。他们推断，因疫情导致的裁员有42%很可能会是永久性的。同样，在线人力市场Upwork的首席经济学家亚当·欧奇麦克（Adam Ozimek）近期的分析显示，新冠肺炎带来的向远程办公的转变将留下长久的影响。在Upwork调查的招聘经理中，有62%表示自己公司的员工远程办公的比例会高于疫情之前。

资本市场也显示出一轮持久的变化正在发生。巴雷罗、布洛姆和戴维斯分析了股本收益率离散度，它的飙升常被视为一场再分配冲击的信号。作者指出，3月份的离散度飙升到了互联网泡沫破裂和全球金融危机时期的水平。在最近的一篇论文中，那不勒斯费德里克二世大学（University of Naples Federico II）的马尔科·帕加诺（Marco Pagano）、维也纳经济大学（Vienna University of Economics and Business）的克里斯蒂安·瓦格纳（Christian Wagner）和约瑟夫·策希纳（Josef Zechner）对比了“可从疫情中迅速复原的”公司（如计算机相关产品的制造商和披萨外卖公司）与抗风险能力很弱的公司（如采矿公司）的股价走势。2月至3月，前者比后者高出10%。如果再经过风险和其他因素的调整，差距只会更大。在同一时期，高复原力的投资组合经风险调整后的累积收益率比低复原力的高出约25%。股价的不同走势显示了市场对公司前景的看法。由于股价较高的公司更容易为扩张募集到资金，这种不同的走势也是一种机制，把资本从濒危的公司导向红火的公司。

作者们把这项分析的时间跨度拉长，进一步往回追溯，得出了一个相当惊人的结论：抗风险能力较强的公司在疫情爆发之前就已经表现更好。他们发现，股票收益率在2014年开始持续分化，而后差距在2019年下半年进一步扩大，并在今年年初急剧拉开。这并不表示市场预见了这场病毒大流行。这在一定程度上要归因于科技股的暴涨。不过这也有助于说明为什么目前正在进行的再配置大部分很可能会持续下去——因为这代表着长期以来受到资本市场支撑的那些趋势的延续。投资者似乎越发认识到各种灾难构成的风险。期权价格表明，未来两年，相比投资于复原力强的公司，投资者需要看到高得多的预期收益才会去投资抗风险能力差的公司。疫情爆发之前这种溢价就在上升，疫情的冲击强化了这一趋势，更是令溢价一飞冲天。同样，目前在零售、健康、教育等领域进行的资源再配置也许实际上就是那些在疫情爆发之前业已存在的趋势在加速。

| 开弓没有回头箭

如果说新冠肺炎实际上是在推动结构性的经济变革，那么这就让一个本就艰难的抉择变得更复杂了。那就是到底要不要拯救那些在困境中挣扎的企

业和工作岗位。在保持经济形态稳定方面，美国似乎比其他富裕国家更少作为。3月和4月，美国申请破产的企业数量比去年同期增加了22%，相比之下德国的这一数字并不比去年同期高。有别于其他富裕国家，美国优先考虑的是临时加大失业救济力度（到7月底），而不是通过政府援助来首先帮助防止失业。因此，美国失业率的增幅远远高于欧洲。

往后的选择很棘手。布雷罗、布洛姆和戴维斯警告称，慷慨的援助也许会适得其反，因为它可能打消劳动者在那些扩张的行业中寻找新工作的积极性。但如果过早取消刺激措施，经济可能就会继续陷于不景气的泥潭，进而阻碍前沿产业的发展。不过，如果经济刺激持续的时间刚刚好，那么，让疫情淘汰一些岗位和公司，以便让更有活力和效率的岗位和公司取而代之的决定某天可能会被视为是极其幸运的。■



Chinese manufacturing

The world's factory

Meet the planet's most prodigious exporters. They have some new tricks

NORMALLY 200,000 buyers, hailing from just about every country, would have flocked to the Canton Fair, the world's biggest trade show. This year, because of the pandemic, it was conducted entirely online, running for ten days and ending on June 24th. Although no substitute for meetings in the flesh, the virtual fair was testament to China's manufacturing muscle. Some 25,000 exhibitors hosted live-streams, often from their factories, chatting to anyone interested in their products.

Among them Wen Li, a young product manager, demonstrated Z-Green's self-propelled lawnmowers, to the background clang of the shop floor. Sherry, a manager with My Dinosaurs, stepped around fake bones as she introduced her company's animatronic beasts, pausing to insert a tongue into the gaping mouth of a brachiosaurus. Joy, a saleswoman with PK Cell, sat behind an array of rechargeable lithium batteries, explaining the workings of the firm's 23 automated production lines.

On it went. There were companies making motorbikes and electric cars, coffee machines and milk-frothers, dog toys and hummingbird-feeders. Even if the live-streams were amateurish, in halting English with poor lighting, the overall effect was powerful. Here, the fair proclaimed, is China: home to 28% of the world's manufacturing—nearly as much as America, Japan and Germany combined—and, despite the coronavirus, still going strong.

China has two big advantages as a manufacturing power. First, its industrial base has unparalleled depth and has only grown more competitive. In 2005, 26% of the value of China's exports was added abroad;

by 2016 that was down to 17%, according to the OECD. In other words, more of the bits and bobs that end up in Chinese gadgets are themselves made in China.

The second advantage is China's own vast market. This is why many American firms want the Trump administration to go only so far in its tussles with China, applying enough pressure to free up space for them, but not so much as to kill their opportunities. By one measure global firms look even more wedded to China, despite the trade war: over the past 18 months the value of foreign mergers and acquisitions in China reached its highest in a decade, reckons Rhodium Group, a research firm.

As is to be expected, the global downturn is hurting Chinese firms. Their exports fell by 8% in the first five months of 2020 compared with a year earlier. Yet they are in better shape than most elsewhere, thanks to the country's success in slowing the virus. China's earlier resumption of industrial activity has allowed exporters to gain market share. In Japan, Chinese goods accounted for a record 30% of imports in May. In Europe, they made up 24% of imports in April, also a record.

Yet this may be the high-water mark. Other countries are only too well aware of China's manufacturing prowess—and that it leaves them vulnerable to critical shortages. That point hit home earlier this year, as they scrambled to buy ventilators and masks from China. From India to Taiwan, governments are offering loans, land and other perks to lure investors.

Such inducements have rarely worked in the past, but they stand a better chance now, for three reasons. First, China's climb up the value chain is squeezing out low-end firms. Many garment-makers have already shifted, in part, to South-East Asia. Second, tensions with America have left companies twitchy. Apple still makes most of its iPhones in China, but has

encouraged its suppliers to expand elsewhere. Third, the rolling shutdowns of factories during the pandemic have underscored the danger of being over-exposed to any one country.

Evidence of the shifting tide can be found in surveys of big companies conducted by UBS, a bank. Among its 1,000-plus respondents, 76% of firms from America, 85% from north Asia (eg, Japan and South Korea) and even 60% from China say they have already moved or plan to move some production away from China. Keith Parker of UBS estimates that companies might shift between 20% and 30% of their Chinese manufacturing capacity. That will not happen overnight, but it will chip away at China's dominance in manufacturing.

In the meantime, Chinese businesses retain a well-honed ability to adapt. Take Sowind, a maker of household-cleaning tools—one of the companies at the virtual Canton Fair. It was promoting motion-activated, battery-powered soap dispensers for home use. In a live-stream, Ivy, a young saleswoman, tailored her pitch to the grim viral reality: “You don't need to touch the soap dispenser, so you can avoid cross-infections.” Contacted after her broadcast, Ivy said that customers in Europe and America were buying thousands. As for the online migration of the world's biggest trade show, she was upbeat. “It takes time to get used to a new technique, but it's gone better than I had expected.” ■



中国制造业 世界工厂

会是地球上最厉害的出口商，它们有了新花样

正常情况下，今年本应有20万来自几乎所有国家和地区的客商齐聚广州，参加全球最大的贸易展览会广交会。而由于新冠疫情，这届广交会完全在线上进行，为期十天，于6月24日结束。尽管不能完全替代线下交易会，但虚拟广交会仍显现了中国制造业的实力。约2.5万家企业直播带货，很多是在自家工厂里进行，和对其产品感兴趣的任何人在线上交流。

年轻的产品经理李文（音译）展示了绿友机械集团的自走式割草机，视频背景传来生产车间里的叮咛声。龙晨时代的经理雪莉（音译）在仿真骨骼间小心穿行，介绍公司的电动仿真巨兽。她在一个腕龙模型前停下来，把一条仿真舌头插进它张开的大嘴中。比苛电池的女销售员乔伊（音译）面前摆着一排充电锂电池，向大家解释公司23条自动化生产线的运作方式。

这样的场景不胜枚举。有些公司生产摩托车和电动汽车，有些做咖啡机和奶泡器，有些制造宠物狗玩具和蜂鸟喂食器.....尽管直播间光线不佳，主播的英语磕磕巴巴，直播水平略显业余，但总体效果显著。广交会称，这就是中国：全球制造业28%的所在——几乎是美国、日本和德国的总和。而尽管受到疫情影响，势头依然强劲。

中国作为制造业大国，有两大优势。首先，它的工业基础之深厚无与伦比，竞争力也有增无减。2005年，中国出口产品的价值中，国外附加值占26%。根据经合组织的数据，到2016年，这一比例下降至17%。换句话说，中国生产的产品中，中国制零配件的比重增加了。

第二个优势是中国广阔的国内市场。所以许多美国公司希望特朗普政府与中国的摩擦别太过头，要施加足够的压力来为它们释放更多市场空间，但又不能施加过度以至于扼杀了它们的机会。尽管有贸易战，但从一个指标来看，全球公司与中国的联系似乎更紧密了：研究公司荣鼎咨询

（Rhodium Group）估计，过去18个月，外资在华并购金额达到十年来最高。

可以想见，全球经济下滑正令中国企业受损。今年前五个月，中国企业出口同比下降了8%。但是，由于中国成功控制了疫情，它们的状况比大多数其他地区的企业都要好。中国较早开始复工复产，这让它的出口企业获得了市场份额。日本5月的进口商品中30%产自中国，创下历史新高。欧洲4月的进口商品中，中国商品占了24%，同样创下纪录。

但这可能已经触顶了。其他国家对中国制造业实力太过清楚，也明白这让自己容易受到严重物资短缺的影响。前几个月当它们争相从中国购买呼吸机和口罩时，对此深有感触。从印度到台湾的各国和地区政府都在提供贷款、土地和其他优惠政策以吸引投资者。

过去，这些激励措施很少奏效，但现在奏效的可能性增大了，有三个原因。首先，中国在价值链上的升级正在挤走低端企业。许多服装生产商已经转移，一部分转移到了东南亚。其次，与美国的紧张关系令企业焦虑不安。苹果仍然在中国生产大部分的iPhone，但也鼓励供应商向其他地方扩展。第三，疫情期间工厂接二连三地停产，突显出过度依赖任何一个国家的危险。

这种变化趋势可以在瑞银对大公司的调查中找到证据。在1000多家受访公司中，有76%的美国公司、85%的北亚（例如日本和韩国）公司、甚至60%的中国公司表示，它们已经或计划将部分生产转出中国。瑞银的基思·帕克（Keith Parker）估计，这些公司可能会把中国产能的20%至30%转移出去。这虽然不会在一夜间发生，但将削弱中国在制造业中的主导地位。

与此同时，中国企业保持了良好的适应能力。以线上广交会参展商之一、制造家用清洁工具的宁波思维公司为例。这家公司在广交会上推广由电池供电的能感应动作的家用皂液器。在一场直播中，年轻的女销售员艾薇（音译）的推介词应景地契合了严峻的疫情：“您无需触摸皂液器，因此

可以避免交叉感染。”艾薇在直播后接受采访时说，欧美的客户正在大批量下单。对于世界上最大的贸易展会迁移到线上，她很乐观。“得花些时间去适应一门新技能，但效果比我预期的要好。”■



Doom and zoom

The IMF's grim outlook

High debts and high asset prices worry Washington wonks

ON JUNE 24TH the IMF said that the economic slump caused by the covid-19 pandemic would be worse than it forecast in April, and that governments would be left more indebted as a result. The fund thinks that advanced economies' combined GDP at the end of 2021 will still be lower than it was in the first quarter of 2019. But it warned of an unusual degree of uncertainty surrounding the numbers, which assume persistent social distancing, lower productivity and widespread economic scarring. The fund also pointed out the “disconnect” between this grim outlook and high asset prices. ■



更加暗淡

IMF的严峻预测

高负债和高资产价格令华盛顿的经济专家担忧

国际货币基金组织6月24日表示，新冠疫情引发的经济衰退将比它在4月时所做的预测更严重，据此各国政府将背上更沉重的债务。该组织认为，发达经济体到2021年底的总GDP仍将低于2019年第一季度的水平。但它也提醒，这些数字是在假定社交隔离持续、生产率下降和经济广泛受创的情况下得出的，存在很大的不确定性。它也指出这一悲观预测与目前的高资产价格相“脱节”。■



Rethinking capitalism

Free but fair

Two authors wrestle with the spectre of inequality and the dangers of populism

BEFORE COVID-19 struck, the rich world's economies were in a paradoxical state. In many countries jobs were as plentiful as they had ever been. On many measures inequality had not risen much over the preceding decade, or had risen more slowly than in past economic expansions. And yet political systems were gripped by a populist backlash which, at least in part, reflected an indignant reaction against perceived economic injustice. The liberals who had constructed the old order were suffering a crisis of confidence.

The establishment's ideas factories were whirring. How, exactly, should populists be disarmed—and which of their complaints had merit? The results are now being rebranded as ways to rebuild economies after the pandemic. Two new books fall into this category. In “The Economics of Belonging” Martin Sandbu, a columnist at the *Financial Times*, excoriates policymakers for unforced errors over recent decades and sets out an agenda for correcting course. In “Economic Dignity” Gene Sperling, a former top economic adviser to Presidents Bill Clinton and Barack Obama, argues for a new value system to underpin American economic policy.

Mr Sandbu's book is in some respects the more optimistic of the two. He rejects the fatalistic argument that populism is a straightforward revolt against immigration and progressive cultural attitudes. Economic insecurity always triggers angst about culture and suspicion of outsiders, he points out. Fixing the economy, in other words, will heal cultural divides. The key is to get the economic diagnosis right. Trade, immigration and globalisation more broadly are easy scapegoats for lost manufacturing jobs and growing geographical inequality. But it is technological change

that has really caused the rise of a service- and knowledge-based economy. The solution, thinks Mr Sandbu, is for governments to forge social contracts fit for technologically advancing economies, not to try to turn back the clock.

Yet his policy proposals do not reflect the “compensate the losers” redistribution for which economists frequently reach. Instead, he favours increasing workers’ productivity and bargaining power so that they are never too dependent on a single employer. To that end, monetary policy must put greater emphasis on keeping labour markets running hot, so that firms compete for workers rather than workers for jobs. Tax-free earnings allowances should be replaced with a small universal basic income, to reinforce safety-nets without laying poverty traps. And governments should direct investments in the knowledge economy, such as publicly funded research, towards places that have been left behind.

Mr Sandbu claims this agenda is not left-wing, and does not require an increase in government spending as a share of GDP. But it does require a recognition that individuals must not completely lose control over their economic fate to market forces. Otherwise, as they endeavour to wrench it back, they may be swayed by extremists.

| *Darkness visible*

Mr Sperling’s book is—perhaps unsurprisingly—more partisan. For him, policy failures have been the fault of small-government fundamentalists, chiefly in the Republican Party, who have failed to appreciate that there is more to life than GDP and the free market. He argues for what political philosophers might call a “sufficientarian” approach to economic policymaking, whereby everyone is entitled to a basic minimum. This is not calibrated in dollars, as advocates of a universal basic income might recommend. Instead it is measured in “economic dignity”, which includes sufficiently high pay, time to spend with family members (or take care of

them), and the peace of mind that comes from adequate health care and a strong safety-net.

The notion that some spheres of life should be beyond the reach of the economy or the state is a powerful one with a rich heritage. It motivates the concept of rights, which are usually considered immune both to utilitarian calculus—what Mr Sperling calls “aloof welfare economics”—and even to some individual choices. Most people agree, for example, that no one should be able to sell themselves into slavery, or bargain away their right to a free trial. But Mr Sperling mostly dodges the hardest parts of establishing such a philosophy: defining its boundaries and proving that it is feasible to organise society in a way that protects the dignity of everyone simultaneously. Save for one inconclusive chapter on whether it is in fact possible for all work to have true meaning, Mr Sperling tends to intuit the answer to these questions, while pouring scorn on those who cast doubt.

As a result it can seem as if he has taken a Democratic wish-list of ideas and bolted on the dignity justification. Some of these ideas are sensible. He might have used any number of values, including fairness, justice and efficiency, to argue for reform of American health care, or to object to the exploitative practices of for-profit colleges. Others, such as a disdain for stock buy-backs and a desire for more barriers to entry for careworkers, are less appealing—and not helped much by invoking dignity.

Mr Sandbu is more interested in justifying his proposals from several angles. Like Mr Sperling, he wants a higher minimum wage. But not just on distributive grounds—he says it would spur firms to invest in training their workers (the sort of argument that sounds plausible but needs proof to be convincing). Sometimes his economic logic ties him in knots, as with his discussion of wealth taxes. Mr Sandbu supports them on grounds of efficiency as well as fairness, arguing that they will encourage the rich to take entrepreneurial risks. But he hurries over the fact that the paper he

cites in support of this view imagines a world in which wealth taxes replace all other taxes on capital—including the corporate taxes which a few pages later he wants to raise, too.

On a fundamental level, these books are similar in attitude. Messrs Sandbu and Sperling both combine a basic support for free markets with a fear of their power. It is precisely because incentives are so potent that competitive forces must not be allowed to go haywire, as when firms gain an edge by reclassifying their workers as contractors, or by moving to tax havens. Such races-to-the-bottom define many of the policy failures of recent history.

And both books highlight the moral blind spots that many liberals and economists think have been exposed by the era of globalisation (and perhaps by the pandemic, too). Clarifying those problems, and finding solutions that avoid compromising too much on freedom and free markets, is crucial work. ■



反思资本主义

自由但公平

两位作者与不平等的幽灵和民粹主义的危险搏斗【《归属经济学》、《经济尊严》书评】

新冠疫情爆发之前，富裕世界的经济体处于一种矛盾的状态。许多国家的就业机会一如既往地充足。从很多指标来看，过去十年里不平等程度也并未显著上升，或者升幅比以往的经济扩张期要慢。但它们的政治体系却深受民粹主义抵制潮的困扰，这至少在一定程度上反映出人们在感到经济不公后的忿忿不平。建立了旧秩序的自由主义者正遭遇信任危机。

建制派的智库为此苦思冥想。究竟如何才能解除民粹主义者的威胁——而他们又有哪些抱怨值得一听？这些思考的成果正以疫情后重建经济的方法之名被提出来。有两本新书属于此类。在《归属经济学》（The Economics of Belonging）中，《金融时报》的专栏作者马丁·桑德布（Martin Sandbu）严厉批评政策制定者近几十年来自乱阵脚的种种失误，并提出了修正方向的计划。而在《经济尊严》（Economic Dignity）中，克林顿和奥巴马的前首席经济顾问吉恩·斯珀林（Gene Sperling）主张建立一套新的价值体系来支撑美国的经济政策。

在某些方面，桑德布的书更乐观些。他反对宿命论观点认为民粹主义是对移民和进步文化态度的直接反抗。他指出，经济上的不安全感总会激起对文化的焦虑和对外来者的猜疑。换言之，解决好经济问题就会弥合文化上的分歧。关键是对经济做出准确的诊断。面对制造业岗位流失和地域不平等加剧的问题，更广泛层面的贸易、移民和全球化很容易成为替罪羊。但真正推动了服务经济和知识经济兴起的是技术变革。桑德布认为，解决之道在于各国政府缔结适合技术进步型经济体的社会契约，而不是试图让时光倒流。

但他的政策建议并不是经济学家常常诉诸的“补偿输家”的再分配。相反，他倾向于提高劳动者的生产率和议价能力，这样他们就不会过度依赖某一

个雇主。为此，货币政策必须要花更多力气来保持劳动力市场一直吃紧，让企业去争夺劳动者，而不是让劳动者去竞争岗位。应该用小额的全民基本收入取代收入免税额度，从而在强化安全网的同时避免设下贫穷的陷阱。政府还应该把公共资助科研等知识经济领域里的投资导向落后地区。

桑德布声称，这个计划并不算左倾，不需要扩大政府支出占GDP的比例。但它确实要求社会认识到，个人绝不能完全放弃对自己经济命运的掌控而将之完全交予市场力量。否则，当他们努力重新把握自己的命运时，就可能受到极端分子的鼓动。

| 可见的黑暗

斯珀林的书更具有党派倾向，这也许并不让人意外。在他看来，政策失败是小政府原教旨主义者的错，主要是共和党人，他们没有意识到生活中还有比GDP和自由市场更重要的东西。他提议的经济决策方式可能属于政治哲学家口中的“充足主义”（sufficientarian），即每个人都有权享有基本的最低保障。与全民基本收入的倡导者所建议的不同，这并非以美元来衡量。其标准是“经济尊严”，包括足够高的工资、与家人相处（或照顾家人）的时间，以及由充足的医疗保健和牢靠的安全网带来的平和心态。

生活的某些层面应该超越经济或政府影响力的范畴，这个有力的观念由来已久。它激发了权利的概念，人们通常认为权利不受制于功利计算——斯珀林称之为“超然福利经济学”——甚至也不受制于某些个人选择。例如，多数人都同意，任何人都不应该有机会将自己卖身为奴，或者贱卖自己获得自由审判的权利。但是，斯珀林在提出这种理念时，基本上回避了其中最困难的部分：定义其边界，并证明它在用同时保障每个人的尊严的方式组织社会这一点上切实可行。除了在一个章节里语焉不详地讲到实际上是否有可能让所有工作都具有真正的意义，斯珀林往往凭直觉来回答这些问题，同时对质疑者不屑一顾。

因此，看起来他像是拿来了一份民主党的愿望清单，给它添加了尊严的证词。其中有些想法合情合理。他大可以采用任何其他价值观——包括公平、公正和效率——来证明为何要改革美国医疗，或者为何要反对营利性

大学对学生的剥削。其他一些想法就不那么吸引人了，例如对公司股票回购的鄙视，以及希望提高护理人员的入行壁垒——而且尊严论对这些观点也没什么帮助。

桑德布更想从多个角度来为自己的提议辩护。和斯珀林一样，他也希望提高最低工资。但并不仅仅是出于分配的考虑——他说这将刺激企业投资于员工培训（这类说法听起来有道理，但还需要证据才能让人信服）。有时他的经济逻辑陷入自我混乱，比如他对财产税的论述。他以效率和公平为由支持征收财产税，称这将鼓励富人冒险创业。但是他为支持这一观点所引用的文章中设想了用财产税取代所有其他资本税，包括公司税。对此他匆匆略过，而几页之后他又提出要提高公司税。

从根本层面看，这两本书的态度是相似的。桑德布和斯珀林都基本支持自由市场，又对其力量心怀恐惧。正是由于推动市场的利益动力如此强大，所以绝不能放任竞争力量为所欲为，比如企业通过将工人重新归类为承包商、或者转移到避税天堂来获得竞争优势。这样的逐底竞争导致了近代历史上许多政策失灵。

此外，两本书都强调了许多自由主义者和经济学家认为在全球化时代（或许还有在这次疫情中）暴露出来的道德盲点。澄清这些问题，并且找到不会过度牺牲自由以及自由市场的解决方案，正是当下要务。■



Buttonwood

The detail on retail

Look to China—and to history—to understand the new wave of small investors

THERE IS NOTHING new on Wall Street. Speculation is as old as the hills. So says the protagonist of “Reminiscences of a Stock Operator”, published in 1923. Quite so—but you can count on some new variations. Take the case of Nikola Corporation, which makes trucks powered by green energy. On June 8th its stock price doubled. It was then worth more than Ford. Yet it has sold no vehicles. “Sympathetic magic”, explains a seasoned investor. Nikola is named after Nikola Tesla; as is Tesla, the leading electric-vehicles firm. That is enough of a buy signal.

Enough, that is, for a new army of retail speculators, which is blamed for a lot of strange moves in stock prices. Since March, no-cost brokerages that cater to small investors report a dramatic surge in new accounts and trading volumes. A noisy gaggle of social-media and chat-room pundits has emerged. David Portnoy, a sports-betting media-mogul reinvented as “Davey Day Trader” is perhaps the most prominent. The retail army has marched into America’s evergreen tech stocks. Less predictably they are also keen buyers of grounded airlines, of beached cruise liners and, strangest of all, of Hertz, a car-rental firm that has filed for bankruptcy.

Some of this recalls the era of Jesse Livermore, whose exploits are fictionalised in “Reminiscences”, with its bucket shops, tipsters and crazy buying of A.O.T. (Any Old Thing). There are strong parallels with the day traders and chat-room herds of America’s dotcom mania in the late 1990s. But you don’t have to go back even that far. A lot of the archetypes are found more recently in China.

There are striking resemblances between America in 2020 and China’s

stockmarket fever of 2015. The economy was in a tough spot. The real returns on bank deposits were negative. There were plenty of liquid funds to lubricate trading. Brokers and shadow banks were lending freely to retail speculators. The retail wave in America differs in the sources of economic trouble and liquidity. Much of the money going into new trading accounts is from government transfers to workers idled by covid-19. With free time, free money and free trading—plus no sports—why not take a punt on the markets?

Rumour, connections (real or imagined) and tips have always played a big role in determining what stocks retail speculators buy. In Livermore's day, every bucket-shop punter kept his ear open for a tip to get aboard Burlington or Northern Pacific. What has changed is the speed at which tips spread and so how synchronised retail buying has become. The result is a rapid succession of fads: first tech darlings; then bombed-out stocks; then something else. This rotation of investment themes is a recurring pattern in China's market, says Adam Levinson of Graticule, a Singapore-based asset-manager.

As noisy as Mr Portnoy and his ilk are, they have been almost drowned out by the tut-tutting of jowly investors. The pros are shocked—shocked, they tell you—to find that there is gambling going on. Much of their ire is directed at the million-plus users of r/wallstreetbets, a Reddit forum where frat-boy argot is mixed with trading jargon. Its devotees are not the type to buy a stock based on a model of discounted cash flows. Instead they favour buying call options. A certain kind of call option—deeply out-of-the-money and close to expiry—is much like buying a lottery ticket or making a long-odds sports bet. They can pay off spectacularly for a relatively small outlay if the stock price suddenly surges. And, like bucket-shop bets, they are self-expiring.

Put aside the harrumphing for a moment. There is something to cheer in all

this. Academics have puzzled over why more people do not participate in the stockmarket. The literature suggests peers have an influence. A paper in 2002 by Esther Duflo and Emmanuel Saez, for instance, finds that the pension choices of university librarians were swayed by their colleagues. That does not mean there is nothing to worry about. Outside of their pension plans, even experienced retail investors have a habit of over-trading—to the detriment of returns. The tendency to churn portfolios is higher in men than women. It is linked to over-confidence and thrill-seeking.

The Stock Operator knew the type. There is a higher grade of speculator, he said, who knows enough to avoid the trading mistakes beginners make. This kind loves to buy on stock declines and to quote wise-sounding aphorisms. The bucket shops and brokerages love him. For it is this sort of speculator, the “semi-sucker”, that keeps them in business. ■



梧桐

细看散户

看看中国，看看历史，了解新一波小投资者

华尔街上无新事，投机活动由来已久——1923年出版的《股票作手回忆录》（Reminiscences of a Stock Operator）的主人公如是说。说得没错，不过你一定可以看到一些新的变体。看看生产绿色能源卡车的尼古拉公司（Nikola Corporation）。6月8日它的股价翻了一番，市值比福特还高。但它却一辆车都还没卖出去过。一位投资老手解释说，这叫“交感巫术”。尼古拉这个名字取自尼古拉·特斯拉（Nikola Tesla）——电动汽车巨头特斯拉的名字也是从这里来的。这足够成为一个买进的信号了。

那是说对新一批散户投机者足够了。他们被指责为近期股价频繁异动的罪魁祸首。面向小投资者的免手续费券商称，自3月以来，新开户数量和交易量飙升。社交媒体上、聊天室里冒出了一群吵吵闹闹的专家。从体育博彩媒体名人改头换面成了“日间交易员大卫”的大卫·波特诺伊（David Portnoy）也许是其中最著名的一位。散户大军已经进驻美国的常青科技股。不大想得到的是，他们还热衷于买进停飞的航空公司、靠岸的邮轮，还有最奇怪的——已经申请破产的汽车租赁公司赫兹（Hertz）。

有些情景让人想起杰西·利弗莫尔（Jesse Livermore）的时代：对赌行、内幕贩子、疯狂买进A.O.T.（Any Old Thing，任何旧东西）。《股票作手回忆录》以半虚构的方式记述了利弗莫尔的投机传奇。你也很容易想到上世纪90年代末美国互联网热潮时期的日间交易员和拥挤的聊天室。但你甚至都不用追溯到那么远。在更近期的中国就能找到很多原型。

美国2020年的股市热潮和中国2015年的大牛市有着惊人的相似之处。经济处于困境。银行存款的实际回报率为负数。有大量流动资金来润滑交易。经纪公司和影子银行向散户投机者大量放贷。但美国的散户投资潮在经济问题和流动性的根源上有所不同。进入新交易账户的大部分资金是政府对因新冠肺炎失业的劳动者的转移支付。有了大把时间、意外之财、免费交

易，又没有体育赛事可看，为何不到股市赌一把？

在散户投机者选股票时，传言、关联（真实的或想象的）和小道消息一直都发挥着重要作用。在利弗莫尔的年代，对赌行的每个顾客都竖起耳朵听，想知道怎么能买到伯灵顿公司或北太平洋公司的股票。与那时不同的是，消息传播的速度已经大大加快，以至于大批散户在同一时间买入。结果是接二连三涌现的风潮：先是受热捧的科技股，再是此前被“击沉”的股票，很快又有别的。这种投资主题的轮转在中国的股市很常见，总部位于新加坡的资产管理公司Graticule的亚当·莱文森（Adam Levinson）说。

虽然波特诺伊这类人话挺多，但他们的声音几乎被那些脸颊松垮的投资者不耐烦的啧啧声淹没了。专业人士很震惊地（是的，他们用的词是“震惊”）发现有人在赌博。他们的大部分怒火都指向了Reddit论坛“r/wallstreetbets”上，那里有上百万个用户，如兄弟会般闹腾傻气的小圈子用语和交易术语混杂在一起。这些信徒不是那种根据现金流折现模型买股票的人，而是倾向于购买看涨期权。有种看涨期权——实实在在的价外且快要到期——很像是买彩票或是对体育比赛的冷门下注。如果股价突然飙升，他们可以用相对较小的支出获得可观的回报。而且，就像对赌行里的赌注一样，它们会自动失效。

先把震惊放一边。这里头也有值得高兴的地方。学术界过去一直想不明白为什么没有更多人参与股市。文献表明周围的人会产生影响。例如，埃斯特·迪弗洛（Esther Duflo）和伊曼纽尔·塞斯（Emmanuel Saez）在2002年的一篇论文中指出，大学图书馆员对养老金的选择会受到同事的影响。但也不是说就没什么可担心的。撇开养老金计划不说，即使是经验丰富的散户投资者也有过度交易的习惯，以致损害了收益。男性比女性更可能频繁地对投资组合做大改动，这和过度自信和寻求刺激有关。

“股票作手”知道这个类型。他说，有一种更高级别的投机者，他懂的东西足够避免新手在交易时常犯的错误。这类人喜欢股价下跌时买进，爱引用听上去充满智慧的格言警句。对赌行和券商都爱他。正因为有这类“半根韭菜”式的投机者，它们的生意才做得下去。■



Jeff Bezos

The genius of Amazon

The pandemic has shown just how essential his firm has become—and that it has vulnerabilities

IN THE SUMMER of 1995 Jeff Bezos was a skinny obsessive working in a basement alongside his wife, packing paperbacks into boxes. Today, 25 years on, he is perhaps the 21st century's most important tycoon: a muscle-ripped divorcé who finances space missions and newspapers for fun, and who receives adulation from Warren Buffett and abuse from Donald Trump. Amazon, his firm, is no longer just a bookseller but a digital conglomerate worth \$1.3trn that consumers love, politicians love to hate, and investors and rivals have learned never to bet against. Now the pandemic has fuelled a digital surge that shows how important Amazon is to ordinary life in America and Europe, because of its crucial role in e-commerce, logistics and cloud computing. In response to the crisis, Mr Bezos has put aside his side-hustles and returned to day-to-day management. Superficially it could not be a better time, but the world's fourth-most-valuable firm faces problems: a fraying social contract, financial bloating and re-energised competition.

The digital surge began with online “pantry-loading” as consumers bulk-ordered toilet rolls and pasta. Amazon's first-quarter sales rose by 26% year on year. When stimulus cheques arrived in mid-April Americans let rip on a broader range of goods. Two rivals, eBay and Costco, say online activity accelerated in May. There has been a scramble to meet demand, with Mr Bezos doing daily inventory checks once again. Amazon has hired 175,000 staff, equipped its people with 34m gloves, and leased 12 new cargo aircraft, bringing its fleet to 82. Undergirding the e-commerce surge is an infrastructure of cloud computing and payments systems. Amazon owns a chunk of that, too, through AWS, its cloud arm, which saw first-quarter

sales rise by 33%.

One question is whether the digital surge will subside. Shops are reopening, even if customers have to pay at tills shielded by Perspex. Yet the signs are that some of the boom will last, because it has involved not just the same people doing more of the same. A new cohort has taken to shopping online. In America “silver” customers in their 60s have set up digital-payment accounts. Many physical retailers have suffered fatal damage. Dozens have defaulted or are on the brink, including J Crew and Neiman Marcus. In the past year the shares of warehousing firms, which thrive on e-commerce, have outperformed those of shopping-mall landlords by 48 percentage points.

All this might appear to fit the script Mr Bezos has written over the years in his letters to shareholders, which are now pored over by investors as meticulously as those of Mr Buffett. He argues that Amazon is in a perpetual virtuous circle in which it spends money to win market share and expands into adjacent industries. From books it leapt to e-commerce, then opened its cloud and logistics arms to third-party retailers, making them vast new businesses in their own right. Customers are kept loyal by perks such as Prime, a subscription service, and Alexa, a voice-assistant. By this account, the new digital surge confirms Amazon’s inexorable rise. That is the view on Wall Street, where Amazon’s shares reached an all-time high on June 17th.

Yet from his ranch in west Texas, Mr Bezos has to wrestle with those tricky problems. Start with the fraying social contract. Some common criticisms of Amazon are simply misguided. Unlike, say, Google in search, it is not a monopoly. Last year Amazon had a 40% share of American e-commerce and 6% of all retail sales. There is little evidence that it kills jobs. Studies of the “Amazon effect” suggest that new warehouse and delivery jobs offset the decline in shop assistants, and the firm’s minimum hourly wage of \$15

in America is above the median for the retail trade.

But Amazon's strategy does imply huge creative disruption in the jobs market even as the economy reels. In addition, viral outbreaks at its warehouses have reignited fears about working conditions: 13 American state attorneys-general have voiced concern. And Amazon's role as a digital jack-of-all-trades creates conflicts of interest. Does its platform, for example, treat third-party sellers on equal terms with its own products? Congress and the EU are investigating this. And how comfortable should other firms be about giving their sensitive data to AWS given that it is part of a larger conglomerate which competes with them?

Amazon's second problem is bloating. As Mr Bezos has expanded into industry after industry, his firm has gone from being asset-light to having a balance-sheet heavier than a Soviet tractor factory. Today it has \$104bn of plant, including leased assets, not far off the \$119bn of its old-economy rival, Walmart. As a result, returns excluding AWS are puny and the pandemic is squeezing margins in e-commerce further. Mr Bezos says the firm can become more than the sum of its parts by harvesting data and selling ads and subscriptions. So far investors have taken this on trust. But the weak e-commerce margins make it harder for Amazon to spin off AWS. This would get regulators off its back and liberate AWS, but would deprive Amazon of the money-machine that funds everything else.

Mr Bezos's last worry is competition. He has long said that he watches customers, not competitors, but he must have noticed how his rivals have been energised by the pandemic. Digital sales at Walmart, Target and Costco probably doubled or more in April, year on year. Independent digital firms are thriving. If you create a stockmarket clone of Amazon lookalikes, including Shopify, Netflix and UPS, it has outperformed Amazon this year. In much of the world regional competitors rule, not Amazon; among them are MercadoLibre in Latin America, Jio in India and Shopee in South-East

Asia. China is dominated by Alibaba, JD.com and brash new contenders like Pinduoduo.

| *Imitation is the sincerest form of capitalism*

The world's most admired business is thus left having to solve several puzzles. If Amazon raises wages to placate politicians in a populist era, it will lose its low-cost edge. If it spins off AWS to please regulators, the rump will be financially fragile. And if it raises prices to satisfy shareholders its new competitors will win market share. Twenty-five years on, Mr Bezos's vision of a world that shops, watches and reads online is coming true faster than ever. But the job of running Amazon has become no easier, even if it no longer involves packing boxes. ■



【首文】杰夫·贝佐斯

亚马逊奇才

这场疫情证明了他的公司无比重要，也暴露出它的软肋

一九九五年夏天，贝佐斯还是个有强迫症的瘦子，和妻子一起在地下室把平装书打包装箱。25年过去了，如今的他或许是21世纪最显赫的大亨：一个肌肉发达的离异人士，以资助太空任务和报纸为乐，巴菲特热情赞美他，特朗普多次炮轰他。他的公司亚马逊已不再只是个网上书店，而是一个价值1.3万亿美元的数字企业集团，成了消费者的心头好、政客的眼中钉，而投资者和竞争对手也长了记性，不敢再看扁它。新冠疫情推动了数字化浪潮进一步高涨，突显了亚马逊在欧美社会日常生活中的重要地位，因为它在电子商务、物流和云计算领域都发挥着至关重要的作用。为了应对这场危机，贝佐斯放下了副业，回归公司的日常管理。表面上看，这可能是一个再好不过的时机，但这家全球市值第四高的公司仍面临一些问题：破损的社会契约、臃肿的财务，以及再次加剧的竞争。

这轮数字化浪潮始于线上“宅家囤货”——消费者大量订购厕纸和意大利面。亚马逊第一季销售额同比增长了26%。到4月中旬，美国人陆续收到刺激经济计划的支票后，开始大肆抢购更多种类的商品。eBay和开市客（Costco）这两个竞争对手均表示5月份线上消费加速上升。商家争相满足顾客需求，贝佐斯又一次开始每日盘点库存。亚马逊招聘了17.5万名员工，为他们配备了3400万副手套，并新租用了12架货机，使机队规模达到82架。云计算和支付系统等基础设施支撑起了此轮电子商务浪潮。凭借自家的云计算部门AWS，亚马逊在这方面也占据了相当大的份额。AWS第一季度的销售额增长了33%。

一个问题是这轮数字化浪潮会否退去。商店正在重新开门迎客，尽管顾客必须隔着一块有机玻璃挡板付款。但有迹象表明，这一轮繁荣中有一部分会持续下去，因为它已不仅仅是同一批人在买更多东西。一个新的群体也开始了网购。在美国，60多岁的“银发族”顾客已开通了数字支付账户。许多实体零售商遭受了致命打击。有几十家已经或者濒临违约，包括J Crew

和尼曼（Neiman Marcus）。电子商务助推了仓储公司蓬勃发展，过去一年里，其股价表现已经抛离购物中心业主48个百分点。

所有这一切似乎都在按贝佐斯这些年在致股东信中写下的脚本走——如今投资者像研究巴菲特的信那样仔细研读这些信。他说，亚马逊现在处于长久的良性循环中，公司砸钱赢得市场份额，然后扩展到邻近的其他行业。它从图书业务一跃而入全面的电子商务，然后向第三方零售商开放它的云和物流平台，这些平台自身又成为规模庞大的新业务。Prime会员订阅服务和语音助手Alexa等福利确保了顾客的忠诚度。根据这种说法，新一轮数字浪潮证实了亚马逊的崛起不可阻挡。这正是华尔街的看法。6月17日该公司股价创下历史新高。

然而，目前待在他位于西德州的牧场里的贝佐斯不得不对付一些棘手的问题。首先是破损的社会契约。一些针对亚马逊的常见批评纯属误导。与搜索领域的谷歌不同，它并非垄断者。去年，亚马逊在美国电子商务的份额为40%，在整体零售中的占比为6%。没有什么证据表明它扼杀了就业。对“亚马逊效应”的研究表明，仓库和送货的新增就业抵消了实体店售货员岗位的减少，而该公司在美国15美元的最低时薪也高于零售业的中位数。

但亚马逊的策略确实会给就业市场带来巨大的创造性破坏，即使是在经济动荡之时。此外，该公司仓库爆发疫情，再次引发了对其工作环境的忧虑：美国13个州的检察长已经表达了担忧。而亚马逊在数字领域里遍地开花也造成了利益冲突。例如，它的平台对第三方卖家和自营产品是否一视同仁？美国国会和欧盟正在对此展开调查。既然其他公司与亚马逊这个规模更大的企业集团有竞争关系，而AWS又归属它旗下，那么它们能否放心地将敏感数据交给AWS？

亚马逊的第二个问题是体量膨胀。随着贝佐斯进军一个又一个行业，他的公司已不再是轻资产模式，现在的资产负债表甚至比苏联的拖拉机厂还要沉重。如今亚马逊拥有1040亿美元的厂房（含租赁资产），与采用旧经济模式的手对手沃尔玛1190亿美元的资产规模相差无几。这样一来，除AWS以外的资产回报微薄，而这次疫情还在进一步挤压电子商务的利润。贝佐斯

表示，通过收集数据、销售广告和订阅服务，公司的价值可以大于各业务部门之和。到目前为止，投资者对此深信不疑。但电商利润疲软使得亚马逊更难把AWS剥离出去。剥离可以摆脱监管机构的纠缠，也会解放AWS，但也会使亚马逊失去这个为所有其他业务提供资金的赚钱机器。

最后，贝佐斯还要提防竞争。他一直说自己关注的是顾客而非竞争对手，但他肯定已经注意到这次疫情为竞争对手注入了活力。沃尔玛、塔吉特（Target）和开市客4月的线上销售额可能已经同比增长了一倍或更多。独立的数字化公司也在迅猛发展。如果在股市里创建一个由Shopify、奈飞（Netflix）和UPS等亚马逊同类公司所组成的克隆体，今年其股价表现已经超过了亚马逊。在世界大部分地区，占据统治地位的不是亚马逊，而是它在当地的竞争对手，其中包括拉丁美洲的MercadoLibre、印度的Jio和东南亚的虾皮购物（Shopee）。主导中国市场的是阿里巴巴、京东，以及拼多多等势头正猛的新锐。

| 模仿是最真诚的资本主义

因此，世界上最受推崇的企业必须解决几个难题。如果亚马逊通过提高工资来平息民粹主义时代政客的怒气，它将失去低成本优势。如果为了取悦监管者而剥离AWS，剩下的业务将陷入财务困境。如果它提高价格来满足股东的要求，将被新竞争对手夺走市场份额。25年过去了，贝佐斯对一个在网上购物、观看和阅读的世界的展望正以空前的速度成为现实。虽然他不再需要辛苦地装箱，但经营亚马逊的工作却丝毫没有变得更轻松些。■



Brain scan

An AI for an eye

A pioneering ophthalmologist highlights the potential, and the pitfalls, of medical AI

THE BOOKS strewn around Pearse Keane's office at Moorfields Eye Hospital in London are an unusual selection for a medic. "The Information", a 500-page doorstop by James Gleick on the mathematical roots of computer science, sits next to Neal Stephenson's even heftier "Cryptonomicon", an alt-history novel full of cryptography and prime numbers. Nearby is "The Player of Games" by the late Iain M. Banks, whose sci-fi novels describe a utopian civilisation in which AI has abolished work.

Dr Keane is an ophthalmologist by training. But "if I could have taken a year or two from my medical training to do a computer-science degree, I would have," he says. These days he is closer to the subject than any university student. In 2016 he began a collaboration with DeepMind, an AI firm owned by Google, to apply AI to ophthalmology.

In Britain the number of ophthalmologists is not keeping up with the falling cost of eye scans (about £20, or \$25, from high-street opticians) and growing demand from an ageing population. In theory, computers can help. In 2018 Moorfields and DeepMind published a paper describing an AI that, given a retina scan, could make correct referral decisions 94% of the time, matching human experts. A more recent paper described a system that can predict the onset of age-related macular degeneration, a progressive disease that causes blindness, up to six months in advance.

But Dr Keane cautions that in practice, moving from a lab demonstration to a real system takes time: the technology is not yet being used on real patients. His work highlights three thorny problems that must be overcome if AI is to be rolled out more quickly, in medicine and elsewhere.

The first is about getting data into a coherent, usable format. “We often hear from medics saying they have a big dataset on one disease or another,” says Dr Keane. “But when you ask basic questions about what format the data is in, we never hear from them again.”

Then there are the challenges of privacy and regulation. Laws guarding medical records tend to be fierce, and regulators are still wrestling with the question of how exactly to subject AI systems to clinical trials.

Finally there is the question of “explainability”. Because AI systems learn from examples rather than following explicit rules, working out why they reach particular conclusions can be tricky. Researchers call this the “black box” problem. As AI spreads into areas such as medicine and law, solving it is becoming increasingly important.

One approach is to highlight which features in the model’s input most strongly affect its output. Another is to boil models down into simplified flow-charts, or let users question them (“would moving this blob change the diagnosis?”). To further complicate matters, notes Dr Keane, techies building a system may prefer one kind of explainability for testing purposes, while medics using it might want something closer to clinical reasoning. Solving this problem, he says, will be important both to mollify regulators and to give doctors confidence in the machines’ opinions.

But even when it is widely deployed, AI will remain a backroom tool, not a drop-in replacement for human medics, he predicts: “I can’t foresee a scenario in which a pop-up on your iPhone tells you you’ve got cancer.” There is more to being a doctor than accurate diagnosis. ■



人物

眼科AI

一位勇于创新的眼科医生指出了医疗AI的潜力和困境【技术季刊《AI及其局限：比预期更陡峭》系列之四】

皮尔斯·基恩（Pearse Keane）位于伦敦摩菲尔茨眼科医院（Moorfields Eye Hospital）的办公室里散落着一些书，看起来不像是一个医生会读的。詹姆斯·格雷克（James Gleick）500页厚的《信息简史》（the Information）追溯计算机科学的数学根基。旁边放着尼尔·斯蒂芬森（Neal Stephenson）的《编码宝典》（Cryptonomicon），一本更大部头的、充斥着密码学和质数的另类历史小说。附近有一本《游戏玩家》（The Player of Games），已故作家伊恩·班克斯（Iain M. Banks）的这部科幻小说描述了一个被AI消灭了工作岗位的乌托邦文明。

基恩是科班出身的眼科医生。但他说，“如果我当年能从学医的时间里划出一两年来拿个计算机学位，我会的。”如今，他和计算机科学的密切接触超过了任何在校大学生。2016年，他开始和谷歌旗下的AI公司DeepMind合作，把AI应用到眼科。

在英国，眼球扫描的价格不断下跌（商业大街上的眼镜店标价在20英镑或25美元左右），同时人口老龄化导致了需求不断增长，但眼科医生的数量跟不上这些变化。从理论上讲，计算机可以提供帮助。2018年，摩菲尔茨眼科医院和DeepMind发表了一篇论文，描述一种AI在收到视网膜扫描后做出正确转诊决定的几率达94%，和人类专家相当。更新近的一篇论文介绍的一个系统可以提前最多半年预测出老年性黄斑变性，一种会导致失明的进行性疾病。

但基恩提醒道，在实践中，从实验室演示发展成真正可用的系统需要时间，因而这项技术尚未在真实的患者身上使用。他的研究强调，要想在医学和其他领域加速推广AI，必须克服三个棘手问题。

首先是把数据变成统一的、可用的格式。“我们常听医生说，他们手头有这种或那种病的大数据集，”基恩说，“但当你问起这些数据是什么格式之类的基本问题，就再没有下文了。”

其次是隐私和监管方面的挑战。保护病历的法规往往都很严苛，而监管机构还在为到底该如何制定AI系统的临床试验要求的问题斗争。

最后是“可解释性”的问题。因为AI系统是从样本中学习，而不是遵循明确的规则，所以要搞明白它们何以得出特定的结论可能很难。研究人员把这称为“黑匣子”问题。随着AI扩展到医学和法律等领域，解决这个问题变得越来越重要。

一种解决方法是突出显示模型输入中哪些特征对输出的影响最大。另一个是将模型浓缩为简易的流程图，或让用户对它们提出质疑（“移动这个斑点是否会改变诊断？”）基恩指出，让事情变得更复杂的是，构建AI系统的技术人员可能在测试中倾向于某种可解释性，而使用系统的医务人员可能想要某种更接近于临床推理的东西。他说，解决这个问题对于让监管机构放心和让医生对机器的意见有信心都很重要。

但是他预测，即使被广泛部署，AI仍将只是一种后台工具，而不是医务人员的直接替代品。“我无法想象你的iPhone上弹出一个窗口，告诉你你得了癌症。”当医生不仅仅是要做出准确的诊断。■



Buttonwood

Darcy and debt

The old-world charms of perpetual bonds

EVERYBODY AGREES that Jane Austen's "Pride and Prejudice" is a love story. A truth less universally acknowledged is that it is also about money. When Mr Darcy first enters the Meryton assembly, the stir he causes owes something to his looks and bearing. But it owes a lot more to the fast-circulating report of his £10,000 a year. Darcy's money is old money. It comes neither from commerce nor the professions, but from Pemberley, the family pile in Derbyshire.

In Jane Austen's day, wealth was measured by the yearly income it provided. The reckoning for sovereign debt was similar. Britain financed the Napoleonic wars by issuing "consols"—bonds that could not be redeemed but which, like Darcy's estate, promised payments in perpetuity. There are now demands for consols to be revived as a means to manage the escalating fiscal costs of the coronavirus. Francesco Giavazzi and Guido Tabellini of Bocconi University have called for a perpetual-bond issue to be jointly backed by euro-zone countries. George Soros has echoed this.

Any scheme that adds to fiscal firepower without adding to the measured stock of debt might be especially welcome in euroland. But it is quite wrong to view consols as a means to circumvent fiscal discipline. Perpetual bonds are an ideal form of debt. Many bondholders care far more about how much income a bond pays than its capital value. You might call this the Darcy doctrine.

To understand it, consider the goals of public-debt management. One is to finance budget deficits at the least cost consistent with steady taxes and spending. Another is to supply safe and liquid financial assets. The more

able governments are to meet the demand for securities, the lower and more stable is the long-run cost to the taxpayer. The need to keep costs down leads them to issue short-term bills, which are usually in high demand and carry the lowest interest rates. The need to keep costs stable and predictable leads them to issue long-term bonds.

These goals can be met at least as well by issuing consols. In a thought-provoking paper in 2015*, John Cochrane of the University of Chicago proposed that the entire stock of American public debt should be made up of two securities. The first would have a fixed value of \$1 forever and a coupon payment that is set in line with overnight interest rates. The second would have a fixed coupon payment of \$1 forever and a price that is determined by market forces. The fixed-value, floating-rate bond would meet the need for a safe, trusted and highly liquid security. It would have the same qualities as a Treasury bill. The fixed-coupon security would have the character of long-term debt.

Perpetual bonds have several advantages. A big one is liquidity. America's sovereign debt is currently divided up into hundreds of distinct securities with different maturities. A 30-year bond that is issued in one year becomes a 29-year bond the next. The more individual bond issues there are, the less liquid each one is. By contrast, perpetual bonds are identical. A consol issued today is the same as a consol issued last year. And there is never the need to roll it over.

There are advantages for bondholders, too. A floating-rate perpetual would be a super-liquid, super-safe asset. A fixed-rate perpetual, meanwhile, would be in high demand from pension funds with promises to retirees that stretch into the indefinite future. Ideally the coupon would be inflation-protected.

A bond that pays the same in real terms for many years is the quintessential

Darcy asset, say Victor Haghani and James White of Elm Partners, a fund-management firm.** Much of people's wealth—their human capital; their pension benefits; their homes—is akin to an inflation-protected long-lived bond. It is judged by income, just as Austen saw it.

Why, then, is so much debt made up of bonds with a principal that is paid back at a relatively short, set maturity? Credit risk is part of the explanation. In a company bankruptcy or when a country defaults on its foreign-currency debt, bondholders are paid back some fraction of the principal value of the bonds. But consols have no principal. Only countries with pristine reputations might be trusted to stand behind them.

Prejudice is a potential barrier to perpetual bonds. But they should be judged on how well they meet debt-management goals. On that basis, they are useful tools. Why not use them?

* "A New Structure of U.S. Federal Debt" (May 2015).

** "Reviving a 19th Century Perspective on Financial Well-Being" (May 2020). ■



梧桐

达西与债务

永续债券的古老魔力

地球人都会同意，简·奥斯汀的《傲慢与偏见》是一部爱情小说。而一个不那么被公认的事实是，它也是一部关于财富的小说。达西第一次在麦里屯舞会上亮相时，他引起的骚动和他的相貌风度有一些关系，但一个重要得多的原因是他年收入一万英镑的传言不胫而走。达西的财富源自家产继承。它既非经商所得，也非职业收入，而是源自德比郡的彭伯里庄园这一家族地产。

在简·奥斯汀那个时代，财富的多少是以它每年带来的收入衡量的。主权债务也用了同样一本账。英国发行了“统一公债”为拿破仑战争筹集资金——这种债券不可赎回，但正如达西的财产一样，承诺永久付息。现在有人呼吁恢复发行统一公债，以应对因疫情导致的财政成本不断攀升。博科尼大学（Bocconi University）的弗朗西斯科·贾瓦齐（Francesco Giavazzi）和吉多·塔贝利尼（Guido Tabellini）主张发行欧元区国家联合担保的永续债券。乔治·索罗斯表达了支持。

任何能够增强财力而又不增加债务规模的计划在欧元区可能尤其受欢迎。但若把统一公债视为规避财政纪律的手段，就大错特错了。永续债券是一种理想的债务形式。许多债券持有人对债券能带来多少收入的关心远远超过对债券本身资本价值的关心。我们可以称之为达西主义。

要理解这种形式，来看看公共债务管理的目标。一是在税收和支出保持稳定的前提下，以最低的融资成本为预算赤字筹措资金。另一个是提供安全、流动的金融资产。政府越有能力满足对证券的需求，纳税人付出的长期成本就越低也越稳定。为了保持低成本，政府会发行短期票据，这些票据通常需求巨大，利率最低。而为了保持成本的稳定和可预测性，政府就会发行长期债券。

发行统一公债也可以实现这些目标，而且效果毫不逊色。芝加哥大学的约翰·科克伦（John Cochrane）在2015年发表的一篇发人深省的论文*中提出，美国应该只发行两种公共债务。第一种价值固定，永远为1美元，但支付的息票根据隔夜利率浮动。第二种息票固定，永远付息1美元，但其价格由市场力量决定。固定价值、浮动利率的债券将满足对安全、可靠及高流动性证券的需求，具有和短期国债一样的性质。而定息证券则会具备长期债券的特征。

永续债券具有几大优势。流动性是一大优点。美国国债现在分成了成百上千种期限各异的独立债券。某一年度发行的30年期债券到了下一年就变成了29年期债券。单独发行的债券数量越多，每支债券的流动性就越低。相比之下，永续债券都是完全相同的。今天发行的统一公债与去年发行的一样。而且永远不需要展期。

对于债券持有人而言也有好处。浮动利率的永续债券将是一种超高流动性、超级安全的资产。与此同时，固定利率的永续债券会受到养老基金的追捧，因为它为退休者提供了在未来无限期付息的承诺。理想情况下，息票还会有抗通胀的功能。

基金管理公司Elm Partners的维克多·哈冈尼（Victor Haghani）和詹姆斯·怀特（James White）表示，长年支付按实值计算固定的利息的债券就是典型的达西资产。**人们大部分的财富——他们的人力资本、养老金、住房——都类似于一种抗通胀的长期债券。正如奥斯汀的看法，衡量标准是它带来的收益。

那么，为什么现在大量的债务都是由在相对较短的固定期限内偿还本金的债券组成呢？原因之一是信用风险。在公司破产或者国家外币债务违约时，债券持有人可以收回一定比例的债券本金价值。但统一公债并无本金。只有那些信誉卓著的国家才有可能获得信任来为这种债券提供担保。

偏见可能是永续债券面对的一大障碍。但应该从实现债务管理目标的角度来评价它们。而从这一点上看，它们是有益的工具。为什么不用呢？

* 《美国联邦债务的新结构》（2015年5月）

** 《重拾19世纪的财务健康观念》（2020年5月） ■



Data storage

Plans within plans

DNA could be used to embed useful information into everyday objects

A HARD DRIVE is a miracle of modern technology. For \$50 anyone can buy a machine that can comfortably store the contents of, say, the Bodleian Library in Oxford as a series of tiny magnetic ripples on a spinning disk of cobalt alloy. But, as is often the case, natural selection knocks humanity's best efforts into a cocked hat. DNA, the information-storage technology preferred by biology, can cram up to 215 petabytes of data into a single gram. That is 10m times what the best modern hard drives can manage.

And DNA storage is robust. While hard-drive warranties rarely exceed five years, DNA is routinely recovered from bones that are thousands of years old (the record stands at 700,000 years, for a genome belonging to an ancestor of the modern horse). For those reasons, technologists have long wondered whether DNA could be harnessed to store data commercially. Archival storage is one idea, for it minimises DNA's disadvantages—which are that, compared with hard drives, reading and writing it is fiddly and slow.

Now, though, a team led by Yaniv Erlich of Erlich Lab, an Israeli company, and Robert Grass, a chemist at the Swiss Federal Institute of Technology, in Zurich, have had another idea. As they describe in a paper in *Nature Biotechnology*, they want to use DNA data storage to give all manner of ordinary objects a memory of their own.

The researchers describe a test run in which they encoded the Stanford bunny—a standard test image in computer graphics—into chunks of DNA. Those chunks were then given a protective sheath of silica nanoparticles. That served to protect them for the next stage, in which they were mixed

with plastic and used as feedstock in a 3D printer, which printed a model of the bunny. The result was an object that contained, encoded throughout its structure, the blueprints necessary to produce more copies of itself. By clipping a tiny fragment of plastic from the finished bunny's ear and running the DNA within through a sequencer, the researchers were able to recover those blueprints and use them to make further generations of DNA-infused bunnies.

Satisfied with their proof of concept, they then repeated the trick by encoding a short video in DNA and fusing it in plexiglass, a transparent plastic. They used the plexiglass to make a lens for a pair of spectacles. Once again, clipping a tiny sliver from the lens and dissolving the plastic away was able to liberate the DNA, which could be used to recover the video.

The cost of both producing and reading DNA is falling precipitously. The price of reading a million letters of the genetic alphabet has fallen roughly a million-fold since the start of the millennium. For that reason, Drs Erlich and Grass hope their idea might one day have all sorts of uses. One, they think, could be to embed relevant information into manufactured goods. They give the example of custom-fitted medical implants that contain a patient's medical records and the precise measurements needed to make another implant.

A second use, for the privacy-minded, could be steganography—the art of concealing information within something apparently innocuous (this was the idea behind the DNA-infused spectacles). Their most futuristic idea is an entire world full of objects which, like biological life, contain all the information needed to make copies of themselves in every part of their structure. Drs Erlich and Grass have dubbed their technology the “DNA of things”, and it is certainly a clever idea. But the next job might be to come up with a snappier name. ■



数据存储

图中图

可以使用DNA把有用信息嵌入日常物品

硬盘是一个现代技术奇迹。只需50美元，任何人都可以买到这么一台设备，轻松地把牛津大学博德利图书馆的馆藏转化为一系列微小的磁性波纹，存储在可旋转的钴合金盘片上。但事情往往是，人类穷尽机巧也难敌自然造化之工。作为自然生理选择的信息存储技术，DNA可将多达215 PB的数据塞进仅一克的物质中，是最先进的现代硬盘存储量的1000万倍。

而且DNA存储相当可靠。硬盘的保修期很少超过五年，但DNA常常从几千年前的骨头中提取复原（最高纪录是复原了现代马70万年前的祖先身上的一个基因组）。出于这些原因，技术人员一直在考虑是否可以利用DNA来做商业化数据存储。其中一个想法是归档存储，因为这可以最大程度地避免DNA的缺点——数据的读取和写入比硬盘驱动器麻烦且缓慢。

不过现在，以色列公司埃利希实验室（Erlich Lab）的雅尼夫·埃利希（Yaniv Erlich）带领的一个团队以及苏黎世瑞士联邦理工学院（Swiss Federal Institute of Technology）的 chemist 罗伯特·格拉斯（Robert Grass）有了另一个想法。正如他们在《自然-生物技术》（Nature Biotechnology）上的一篇文章中所描述的，他们希望运用DNA数据存储技术让各式普通物体拥有自体记忆。

研究人员描述了一项实验，他们将斯坦福兔子（计算机图形学中的标准测试图像）编码进DNA片段中，再用一个二氧化硅纳米颗粒层覆盖这些片段，在下个阶段保护它们。接下来，这些DNA片段与塑料混合，用作3D打印机中的打印原料，打印出一个斯坦福兔子模型。该模型通体包含编码，含有复制自身所必需的蓝图。从成品兔子的“耳朵”上剪下一小片塑料并使用测序仪作DNA测序，研究人员能复原这些蓝图，并用其制造出更多包含DNA的“兔子”后代。

对概念验证感到满意的他们接下来如法炮制，把一段短视频编码进DNA，然后将其融入树脂玻璃（一种透明塑料）。他们用这种树脂玻璃制作了一副眼镜。同样，只需从镜片上刮下一小片细屑并把塑料溶解就可以释放DNA，再从中复原视频。

制造和读取DNA的成本正在急剧下降。自本世纪初以来，读取100万个碱基的价格已降至原来的百万分之一左右。因此，埃利希和格拉斯希望他们的想法有一天能发展出广泛的用途。他们认为，一个用途可能是将相关信息嵌入制成品中。他们举例说，通过该技术，可以在定制医疗植入物中嵌入患者病历和再造一个植入物所需的精确尺寸。

第二种用途可供注重隐私的人们使用，即将信息隐藏在不起眼物件中的隐写术（上述含有DNA的镜片就是这种用途的体现）。他们最具未来主义的想法是整个世界将到处都是包含DNA的物件，就像生物体那样通体包含进行自我复制所需的一切信息。埃利希和格拉斯将此技术称为“万物DNA”（DNA of things），这无疑是个聪明点子。但下一步可能是为它想一个更酷的名字。 ■



Automobiles

Road block

Driverless cars illustrate the limits of today's AI

IN MARCH Starsky Robotics, a self-driving lorry firm based in San Francisco, closed down. Stefan Seltz-Axmacher, its founder, gave several reasons for its failure. Investors' interest was already cooling, owing to a run of poorly performing tech-sector IPOs and a recession in the trucking business. His firm's focus on safety, he wrote, did not go down well with impatient funders, who preferred to see a steady stream of whizzy new features. But the biggest problem was that the technology was simply not up to the job. "Supervised machine learning doesn't live up to the hype. It isn't actual artificial intelligence akin to c-3PO [a humanoid robot from the "Star Wars" films]. It's a sophisticated pattern-matching tool."

Policing social media, detecting fraud and defeating humans at ancient games are all very well. But building a vehicle that can drive itself on ordinary roads is—along with getting computers to conduct plausible conversations—one of the grand ambitions of modern AI. Some imagined driverless cars could do away with the need for car ownership by letting people summon robotaxis at will. They believe they would be safer, too. Computers never tire, and their attention never wanders. According to the WHO, over a million people a year die in car accidents caused by fallible human drivers. Advocates hoped to cut those numbers drastically.

And they would do it soon. In 2015 Elon Musk, the boss of Tesla, an electric-car maker, predicted the arrival of "complete autonomy" by 2018. Cruise, a self-driving firm acquired by General Motors in 2016, had planned to launch self-driving taxis in San Francisco by 2019. Chris Urmson, then the boss of Waymo, a Google subsidiary widely seen as the market leader, said in 2015 that he hoped his son, then 11 years old, would never need a driving

licence.

But progress has lagged. In 2018 a self-driving car being tested by Uber, a ride-hailing service, became the first to kill a pedestrian when it hit a woman pushing a bicycle across a road in Arizona. Users of Tesla's "Autopilot" software must, despite its name, keep their hands on the wheel and their eyes on the road (several who seem to have failed to do so have been killed in crashes). The few firms that carry passengers, such as Waymo in America and WeRide in China, are geographically limited and rely on human safety drivers. Mr Urmsen, who has since left Waymo, now thinks that adoption will be slower and more gradual.

| *Black swans and bitter lessons*

Self-driving cars work in the same way as other applications of machine learning. Computers crunch huge piles of data to extract general rules about how driving works. The more data, at least in theory, the better the systems perform. Tesla's cars continuously beam data back to headquarters, where it is used to refine the software. On top of the millions of real-world miles logged by its cars, Waymo claims to have generated well over a billion miles-worth of data using ersatz driving in virtual environments.

The problem, says Rodney Brooks, an Australian roboticist who has long been sceptical of grand self-driving promises, is deep-learning approaches are fundamentally statistical, linking inputs to outputs in ways specified by their training data. That leaves them unable to cope with what engineers call "edge cases"—unusual circumstances that are not common in those training data. Driving is full of such oddities. Some are dramatic: an escaped horse in the road, say, or a light aircraft making an emergency landing on a highway (as happened in Canada in April). Most are trivial, such as a man running out in a chicken suit. Human drivers usually deal with them without thinking. But machines struggle.

One study, for instance, found that computer-vision systems were thrown when snow partly obscured lane markings. Another found that a handful of stickers could cause a car to misidentify a “stop” sign as one showing a speed limit of 45mph. Even unobscured objects can baffle computers when seen in unusual orientations: in one paper a motorbike was classified as a parachute or a bobsled. Fixing such issues has proved extremely difficult, says Mr Seltz-Axmacher. “A lot of people thought that filling in the last 10% would be harder than the first 90%”, he says. “But not that it would be ten thousand times harder.”

Mary “Missy” Cummings, the director of Duke University’s Humans and Autonomy Laboratory, says that humans are better able to cope with such oddities because they can use “top-down” reasoning about the way the world works to guide them in situations where “bottom-up” signals from their senses are ambiguous or incomplete. AI systems mostly lack that capacity and are, in a sense, working with only half a brain. Though they are competent in their comfort zone, even trivial changes can be problematic. In the absence of the capacity to reason and generalise, computers are imprisoned by the same data that make them work in the first place. “These systems are fundamentally brittle,” says Dr Cummings.

This narrow intelligence is visible in areas beyond just self-driving cars. Google’s “Translate” system usually does a decent job at translating between languages. But in 2018 researchers noticed that, when asked to translate 18 repetitions of the word “dog” into Yoruba (a language spoken in parts of Nigeria and Benin) and then back into English, it came up with the following: “Doomsday Clock is at three minutes to twelve. We are experiencing characters and dramatic developments in the world, which indicate that we are increasingly approaching the end times and Jesus’ return.”

Gary Marcus, a professor of psychology at New York University, says that,

besides its comedy value, the mistranslation highlights how Google's system does not understand the basic structure of language. Concepts like verbs or nouns are alien, let alone the notion that nouns refer to physical objects in a real world. Instead, it has constructed statistical rules linking strings of letters in one language with strings of letters in another, without any understanding of the concepts to which those letters refer. Language processing, he says, is therefore still baffled by the sorts of questions a toddler would find trivial.

How much those limitations matter varies from field to field. An automated system does not have to be better than a professional human translator to be useful, after all (Google's system has since been tweaked). But it does set an upper bound on how useful chatbots or personal assistants are likely to become. And for safety-critical applications like self-driving cars, says Dr Cummings, AI's limitations are potentially show-stopping.

Researchers are beginning to ponder what to do about the problem. In a conference talk in December Yoshua Bengio, one of AI's elder statesmen, devoted his keynote address to it. Current machine-learning systems, said Dr Bengio, "learn in a very narrow way, they need much more data to learn a new task than [humans], they need humans to provide high-level concepts through labels, and they still make really stupid mistakes".

| *Beyond deep learning*

Different researchers have different ideas about how to try to improve things. One idea is to widen the scope, rather than the volume, of what machines are taught. Christopher Manning, of Stanford University's AI Lab, points out that biological brains learn from far richer data-sets than machines. Artificial language models are trained solely on large quantities of text or speech. But a baby, he says, can rely on sounds, tone of voice or tracking what its parents are looking at, as well as a rich physical

environment to help it anchor abstract concepts in the real world. This shades into an old idea in AI research called “embodied cognition”, which holds that if minds are to understand the world properly, they need to be fully embodied in it, not confined to an abstracted existence as pulses of electricity in a data-centre.

Biology offers other ideas, too. Dr Brooks argues that the current generation of AI researchers “fetishise” models that begin as blank slates, with no hand-crafted hints built in by their creators. But “all animals are born with structure in their brains,” he says. “That’s where you get instincts from.”

Dr Marcus, for his part, thinks machine-learning techniques should be combined with older, “symbolic AI” approaches. These emphasise formal logic, hierarchical categories and top-down reasoning, and were most popular in the 1980s. Now, with machine-learning approaches in the ascendancy, they are a backwater.

But others argue for persisting with existing approaches. Last year Richard Sutton, an AI researcher at the University of Alberta and DeepMind, published an essay called “The Bitter Lesson”, arguing that the history of AI shows that attempts to build human understanding into computers rarely work. Instead most of the field’s progress has come courtesy of Moore’s law, and the ability to bring ever more brute computational force to bear on a problem. The “bitter lesson” is that “the actual contents of [human] minds are tremendously, irredeemably complex...They are not what should be built in [to machines].”

Away from the research labs, expectations around driverless cars are cooling. Some Chinese firms are experimenting with building digital guide rails into urban infrastructure, in an attempt to lighten the cognitive burden on the cars themselves. Incumbent carmakers, meanwhile, now prefer to talk about “driver-assistance” tools such as automatic lane-

keeping or parking systems, rather than full-blown autonomous cars. A new wave of startups has deliberately smaller ambitions, hoping to build cars that drive around small, limited areas such as airports or retirement villages, or vehicles which trundle slowly along pavements, delivering packages under remote human supervision. “There’s a scientific reason we’re not going to get to full self-driving with our current technology,” says Dr Cummings. “This less ambitious stuff—I think that’s much more realistic.” ■



汽车 路障

无人车显现了当今AI的局限性【技术季刊《AI及其局限：比预期更陡峭》系列之六】

今年3月，位于旧金山的无人驾驶卡车公司“星空机器人”（Starsky Robotics）宣告关门。创始人斯蒂芬·塞尔兹-阿克斯马赫（Stefan Seltz-Axmacher）给出了失败的几个原因。由于一系列科技公司上市后表现不佳，加之货运业务衰退，投资者的兴趣已经开始降温。他写道，自己的公司重视安全性，但缺乏耐心的资方对此反应不佳，他们宁愿看到技术花哨的新功能被源源不断地开发出来。但最大的问题是，技术根本无法胜任。“有监督的机器学习达不到现在热炒的程度。这不是类似于C-3PO（《星球大战》电影中的人形机器人）的真正的人工智能。这无非是一种先进的模式匹配工具。”

监管社交媒体，发现欺诈行为，在古老的游戏击败人类——这些固然都很好。但是，制造一种能够在普通道路上自主行驶的汽车（以及让计算机与人开展听上去合理的对话）是现代AI的宏伟目标之一。有人认为无人驾驶汽车可以让人们随时召唤机器人出租车，这样就不需要拥有汽车了。他们也相信这些车会更安全。电脑永不疲倦，也永远不会分神。根据世卫组织的数据，每年有超过一百万人死于易犯错的人类驾驶员引发的车祸。无人车的拥护者们希望能大幅削减这些数字。

它们本来很快就要做到了。电动汽车制造商特斯拉的老板埃隆·马斯克在2015年预测，“完全自主”将在2018年到来。通用汽车在2016年收购的无人驾驶公司克鲁斯（Cruise）曾计划2019年之前在旧金山推出无人驾驶出租车。2015年，被广泛视为行业领头羊的谷歌子公司Waymo的时任老板克里斯·厄姆森（Chris Urmson）表示，希望自己11岁的儿子永远不需要驾照。

但是进展慢了下来。2018年，网约车公司优步测试的一辆无人车在亚利桑那州撞到了一名推着自行车过马路的女性，成为无人车致行人死亡的第一

例。特斯拉的“自动驾驶”（Autopilot）软件虽名为“自动”，用户依然须将手放在方向盘上并看着路（几个看起来没能做到的人在事故中丧生）。极少数几家载客的公司，例如美国的Waymo和中国的文远知行，覆盖的地理范围都不大，并且依赖人类安全驾驶员。已离开Waymo的厄姆森现在认为这项技术的推广速度会更慢、更渐进。

| 黑天鹅和苦涩的教训

无人驾驶汽车的工作原理与其他机器学习应用是一样的。计算机处理大量数据以提取有关如何驾驶的一般规则。至少从理论上讲，数据越多，系统的性能越好。特斯拉的汽车不断将数据传回总部，用来完善软件。

Waymo声称，它的汽车除在现实世界中行驶了数百万英里外，也使用模拟驾驶在虚拟环境中生成了远超过十亿英里的数据。

澳大利亚机器人专家罗德尼·布鲁克斯（Rodney Brooks）长期以来一直对无人驾驶技术的辉煌未来持怀疑态度。他说，问题在于深度学习的方法从根本上说是一种统计方法，根据由训练数据规定的方式把输入与输出联系起来。这使它们无法应付工程师们说的“边缘案例”，即训练数据中不常见的异常情况。驾驶充满了这类怪事。其中一些是“大场面”，比如路上有一匹脱缰的马，或者是轻型飞机紧急降落在高速公路上（4月份在加拿大发生）。大多数不是什么大事，例如一个人穿着小鸡造型的服装跑出来。人类驾驶员应对这种情况一般都不假思索，机器却步履维艰。

例如，一项研究发现，当车道标记被雪部分覆盖时，计算机视觉系统就晕了。另一项研究发现，某些贴纸可能会导致汽车将“停车”标志误认为是时速限制45英里的标志。即使是未被遮挡的物体，如果从不寻常的方向观察也会迷惑计算机，比如一篇论文提到摩托车被归类成了降落伞或雪橇。塞尔兹-阿克斯马赫说，解决此类问题极其困难。“很多人认为完成最后10%要比前90%更难，”他说，“但没想过要难一万倍。”

杜克大学人类与自主实验室主任玛丽·“丫头”·卡明斯（Mary “Missy” Cummings）说，人类能够更好地应对这些怪异的情形，因为他们可以用对世界运行方式“自上而下”的推理，来指导感官收到的“自下而上”的信号

模糊或不完整的情况。AI系统大多缺乏这种能力，从某种意义上说，它只能用一半的大脑工作。尽管它们在自己的舒适区十分称职，但即使是微不足道的改变也可能带来问题。由于缺乏推理和归纳能力，那些让计算机能够工作的数据也会禁锢它们。卡明斯博士说：“这些系统从根本上就是脆弱的。”

在无人车以外的领域，这种智能的狭隘也显而易见。谷歌的“翻译”系统在语言互译方面通常都做得不错。但在2018年，研究人员注意到，当被要求把连续18个“dog”译成约鲁巴语（尼日利亚和贝宁的部分地区使用的一种语言）再译回英语时，它给出了这样的译文：“末日钟还有三分钟就要到12点。我们正在经历世界上的人物和戏剧性发展，这表明我们越来越接近末日和耶稣的归来。”

纽约大学的心理学教授加里·马库斯（Gary Marcus）表示，除了颇有些喜剧价值外，误译凸显了谷歌的系统并不理解语言的基本结构。它全然不懂动词或名词之类的概念，更不用说理解名词指的是现实世界中的物理对象了。相反，它构造了统计规则，将一种语言的字母字符串与另一种语言的字母字符串联系在一起，但对这些字母所指的概念一无所知。因此，他说，哪怕幼儿也能轻易解答的问题也会让语言处理系统困惑不已。

这些限制到底有多紧要因领域而异。毕竟自动化系统并不一定要胜过专业译员才有用处（谷歌的系统之后有所调整）。但这确实也给聊天机器人或个人助手到底能做到什么程度设置了上限。而对于无人车等性命攸关的应用，卡明斯博士说，AI的局限性可能会成为拦路虎。

研究人员开始思索如何解决问题。AI领域的资深活动家约书亚·本希奥（Yoshua Bengio）在12月的一次会议中专门就此发表了主题演讲。本希奥博士说，当前的机器学习系统“以一种非常狭隘的方式学习，它们需要比[人类]多得多的数据来学习新任务，它们需要人类通过标签提供高级概念，但仍然犯下非常愚蠢的错误。”

不同的研究人员对如何改进现状有不同的想法。一种想法是扩大机器训练的范围，而不单是数量。斯坦福大学AI实验室的克里斯托弗·曼宁

（Christopher Manning）指出，相比机器，生物大脑学习的数据集要丰富得多。人工语言模型仅用大量的文本或语音训练。他说，但婴儿可以依靠声音、语调或跟踪父母的眼神，以及丰富的物理环境来帮助自己在现实世界中把握抽象概念。这涉及到AI研究中一个叫做“具身认知”的古老观点，它认为如果人们要正确地理解世界，就需要充分沉浸其中，而不仅限于抽象的存在，如数据中心里的一些电脉冲。

生物学也提供了一些思路。布鲁克斯博士认为，当前一代AI研究人员“迷恋”始于空白状态的模型——创建者没有手工置入任何提示。但是“所有动物的大脑都有天生的结构，”他说，“本能就是从这里来的。”

马库斯博士则认为，机器学习技术应与较早的“符号AI”方法结合使用。这些方法强调形式逻辑、层次类别和自上而下的推理，在1980年代最受欢迎。现在，随着机器学习方法的兴起，它们已成为一潭死水。

但其他人则主张坚持现有方法。去年，艾伯塔大学和DeepMind的AI研究人员理查德·萨顿（Richard Sutton）发表了一篇名为《苦涩的教训》（The Bitter Lesson）的文章，认为AI的历史表明，试图将人类的理解建构到计算机中的尝试很少行得通。相反，该领域的大多数进步都得益于摩尔定律，以及不断引入更多蛮力计算来解决问题的能力。“苦涩的教训”是：“[人类] 思想的实际内容极度、无可救药地复杂.....这不是应该置入[机器]的东西。”

在研究实验室之外，人们对无人车的期待正在降温。一些中国公司正尝试在城市基础设施中构建数字导轨，以减轻无人车本身的认知负担。同时，成熟的汽车制造商现在更喜欢谈论“驾驶员辅助”工具，例如自动车道保持或停车系统，而不是完全自动驾驶的汽车。新一波创业公司则有意缩减野心，希望制造能在狭小有限的区域（如机场或退休社区）里行驶的汽车，或在人行道上缓慢移动、在人员的远程监督下递送包裹的车辆。“出于科

学原因，我们不打算使用现有的技术实现完全无人驾驶，”卡明斯博士说，“这些不那么宏伟的目标——我觉得要现实得多。”■



Computing hardware

Machine, learning

The cost of training machines is becoming a problem

THE FUNDAMENTAL assumption of the computing industry is that number-crunching gets cheaper all the time. Moore's law, the industry's master metronome, predicts that the number of components that can be squeezed onto a microchip of a given size—and thus, loosely, the amount of computational power available at a given cost—doubles every two years.

For many comparatively simple AI applications, that means that the cost of training a computer is falling, says Christopher Manning, the director of Stanford University's AI Lab. But that is not true everywhere. A combination of ballooning complexity and competition means costs at the cutting edge are rising sharply.

Dr Manning gives the example of BERT, an AI language model built by Google in 2018 and used in the firm's search engine. It had more than 350m internal parameters and a prodigious appetite for data. It was trained using 3.3bn words of text culled mostly from Wikipedia, an online encyclopedia. These days, says Dr Manning, Wikipedia is not such a large data-set. "If you can train a system on 30bn words it's going to perform better than one trained on 3bn." And more data means more computing power to crunch it all.

OpenAI, a research firm based in California, says demand for processing power took off in 2012, as excitement around machine learning was starting to build. It has accelerated sharply. By 2018, the computer power used to train big models had risen 300,000-fold, and was doubling every three and a half months (see chart). It should know—to train its own "OpenAI Five" system, designed to beat humans at "Defense of the Ancients

2”, a popular video game, it scaled machine learning “to unprecedented levels”, running thousands of chips non-stop for more than ten months.

Exact figures on how much this all costs are scarce. But a paper published in 2019 by researchers at the University of Massachusetts Amherst estimated that training one version of “Transformer”, another big language model, could cost as much as \$3m. Jerome Pesenti, Facebook’s head of AI, says that one round of training for the biggest models can cost “millions of dollars” in electricity consumption.

| *Help from the cloud*

Facebook, which turned a profit of \$18.5bn in 2019, can afford those bills. Those less flush with cash are feeling the pinch. Andreessen Horowitz, an influential American venture-capital firm, has pointed out that many AI startups rent their processing power from cloud-computing firms like Amazon and Microsoft. The resulting bills—sometimes 25% of revenue or more—are one reason, it says, that AI startups may make for less attractive investments than old-style software companies. In March Dr Manning’s colleagues at Stanford, including Fei-Fei Li, an AI luminary, launched the National Research Cloud, a cloud-computing initiative to help American AI researchers keep up with spiralling bills.

The growing demand for computing power has fuelled a boom in chip design and specialised devices that can perform the calculations used in AI efficiently. The first wave of specialist chips were graphics processing units (GPUs), designed in the 1990s to boost video-game graphics. As luck would have it, GPUs are also fairly well-suited to the sort of mathematics found in AI.

Further specialisation is possible, and companies are piling in to provide it. In December, Intel, a giant chipmaker, bought Habana Labs, an Israeli firm, for \$2bn. Graphcore, a British firm founded in 2016, was valued at \$2bn in

2019. Incumbents such as Nvidia, the biggest GPU-maker, have reworked their designs to accommodate AI. Google has designed its own “tensor-processing unit” (TPU) chips in-house. Baidu, a Chinese tech giant, has done the same with its own “Kunlun” chips. Alfonso Marone at KPMG reckons the market for specialised AI chips is already worth around \$10bn, and could reach \$80bn by 2025.

“Computer architectures need to follow the structure of the data they’re processing,” says Nigel Toon, one of Graphcore’s co-founders. The most basic feature of AI workloads is that they are “embarrassingly parallel”, which means they can be cut into thousands of chunks which can all be worked on at the same time. Graphcore’s chips, for instance, have more than 1,200 individual number-crunching “cores”, and can be linked together to provide still more power. Cerebras, a Californian startup, has taken an extreme approach. Chips are usually made in batches, with dozens or hundreds etched onto standard silicon wafers 300mm in diameter. Each of Cerebras’s chips takes up an entire wafer by itself. That lets the firm cram 400,000 cores onto each.

Other optimisations are important, too. Andrew Feldman, one of Cerebras’s founders, points out that AI models spend a lot of their time multiplying numbers by zero. Since those calculations always yield zero, each one is unnecessary, and Cerebras’s chips are designed to avoid performing them. Unlike many tasks, says Mr Toon at Graphcore, ultra-precise calculations are not needed in AI. That means chip designers can save energy by reducing the fidelity of the numbers their creations are juggling. (Exactly how fuzzy the calculations can get remains an open question.)

All that can add up to big gains. Mr Toon reckons that Graphcore’s current chips are anywhere between ten and 50 times more efficient than GPUs. They have already found their way into specialised computers sold by Dell, as well as into Azure, Microsoft’s cloud-computing service. Cerebras has

delivered equipment to two big American government laboratories.

Such innovations will be increasingly important, for the AI-fuelled explosion in demand for computer power comes just as Moore's law is running out of steam. Shrinking chips is getting harder, and the benefits of doing so are not what they were. Last year Jensen Huang, Nvidia's founder, opined bluntly that "Moore's law isn't possible any more".

| *Quantum solutions and neuromantics*

Other researchers are therefore looking at more exotic ideas. One is quantum computing, which uses the counter-intuitive properties of quantum mechanics to provide big speed-ups for some sorts of computation. One way to think about machine learning is as an optimisation problem, in which a computer is trying to make trade-offs between millions of variables to arrive at a solution that minimises as many as possible. A quantum-computing technique called Grover's algorithm offers big potential speed-ups, says Krysta Svore, who leads the Architectures and Computation Group at Microsoft Research.

Another idea is to take inspiration from biology, which proves that current brute-force approaches are not the only way. Cerebras's chips consume around 15kW when running flat-out, enough to power dozens of houses (an equivalent number of GPUs consumes many times more). A human brain, by contrast, uses about 20W of energy—about a thousandth as much—and is in many ways cleverer than its silicon counterpart. Firms such as Intel and IBM are therefore investigating "neuromorphic" chips, which contain components designed to mimic more closely the electrical behaviour of the neurons that make up biological brains.

For now, though, all that is far off. Quantum computers are relatively well-understood in theory, but despite billions of dollars in funding from tech giants such as Google, Microsoft and IBM, actually building them remains

an engineering challenge. Neuromorphic chips have been built with existing technologies, but their designers are hamstrung by the fact that neuroscientists still do not understand what exactly brains do, or how they do it.

That means that, for the foreseeable future, AI researchers will have to squeeze every drop of performance from existing computing technologies. Mr Toon is bullish, arguing that there are plenty of gains to be had from more specialised hardware and from tweaking existing software to run faster. To quantify the nascent field's progress, he offers an analogy with video games: "We're past Pong," he says. "We're maybe at Pac-Man by now." All those without millions to spend will be hoping he is right. ■



计算硬件

机器学习中

训练机器的成本正成为一个问题【技术季刊《AI及其局限：比预期更陡峭》系列之五】

计算行业的基本假设是，数字运算一直都会越来越便宜。摩尔定律是主导该行业的节拍器，它预测可以挤进给定大小的微芯片上的元件数量（大致可以认为是给定成本下的计算能力）每两年翻一番。

斯坦福大学AI实验室主任克里斯托弗·曼宁（Christopher Manning）表示，对于许多相对简单的AI应用而言，这意味着训练计算机的成本正在下降。但这并不是放之四海而皆准的。激增的复杂度加上竞争，意味着最前沿应用的成本急剧上升。

曼宁博士以BERT为例：BERT是谷歌在2018年建立并已用于该公司搜索引擎的一个AI语言模型。它具有超过3.5亿个内部参数，对数据的胃口也大得惊人。它使用33亿个文字单词进行了训练，大部分来自在线的维基百科。曼宁说，照现在来看，维基百科并不是一个很大的数据集。“如果可以用300亿个单词训练一个系统，那么它的性能将比用30亿个单词训练的系统更好。”而更多的数据意味着需要更多的计算能力来处理这一切。

总部位于加州的研究公司OpenAI表示，随着对机器学习的热情越来越高，对处理能力的需求在2012年开始上升，之后急剧加速。到2018年，用于训练大型模型的计算能力已增长了30万倍，并且每三个半月翻一番（见图表）。这家公司确实应该了解这一点——为了训练自己的“OpenAI Five”系统在流行的电子游戏“Dota 2”中击败人类，它将机器学习扩展到了“前所未有的水平”，在数千个芯片上不间断地运行了超过十个月。

确切报道所有这一切花了多少钱的数字很少见。但是，马萨诸塞州阿默斯特大学（University of Massachusetts Amherst）的研究人员在2019年发表的一篇论文估计，为另一个大型语言模型“变形金刚”（Transformer）训练

一个版本可能要花费多达300万美元。Facebook的AI负责人杰罗姆·佩森蒂（Jerome Pesenti）说，为那些最大型的模型进行一轮训练可能会耗费数百万美元的电力。

| 来自云的帮助

Facebook在2019年实现了185亿美元的利润，付得起这些账单。那些现金没那么充裕的公司就感到肉痛了。颇具影响力的美国风险投资公司安德森·霍洛维茨（Andreessen Horowitz）指出，许多AI创业公司都是向亚马逊和微软等云计算公司租用处理能力的。它说，由此产生的账单（有时占收入的25%或更多）是投资AI创业公司可能不如投资传统软件公司有吸引力的原因之一。3月，曼宁在斯坦福的同事（包括AI大咖李飞飞）发起了云计算计划“国家研究云”（National Research Cloud），旨在帮助美国的AI研究人员负担不断攀升的费用。

对计算能力不断增长的需求推动了芯片设计和专用设备的蓬勃发展，这些设备可以高效地执行AI中使用的计算。第一波专用芯片是图形处理单元（GPU），它在1990年代被设计出来，用于增强视频游戏图形。幸运的是，GPU也非常适合AI中用到的那种数学。

还可以进一步专门化，并且有许多公司正致力于此。去年12月，芯片制造巨头英特尔以20亿美元收购了以色列公司哈瓦那实验室（Habana Labs）。成立于2016年的英国公司Graphcore在2019年的估值达20亿美元。最大的GPU制造商英伟达等成熟公司也调整了设计以适应AI。谷歌自行设计了自有的“张量处理单元”（TPU）芯片。中国科技巨头百度也开发了自己的“昆仑”芯片。毕马威会计师事务所的阿方索·马龙（Alfonso Marone）认为，AI专用芯片市场的规模已达100亿美元左右，到2025年可能达到800亿美元。

Graphcore的联合创始人之一奈杰尔·图恩（Nigel Toon）说：“计算机体系的结构需要符合它们所处理的数据的结构。”AI工作负荷的最基本特征是“极易并行”，也就是说它们可以被切成数千块并同时处理。例如，Graphcore的芯片具有1200多个独立的数字运算“核心”，可以链接在一起

以提供更强的能力。加州创业公司Cerebras采用了一种极端的方法。芯片通常是分批制造的，把数十或数百个芯片蚀刻在直径300毫米的标准晶圆上。Cerebras的每块芯片都占据了整个晶圆，这样就可以在里面挤进40万个核。

其他优化也很重要。Cerebras的创始人之一安德鲁·费尔德曼（Andrew Feldman）指出，AI模型花费大量时间将数字乘以零。由于这些计算的结果总是为零，因此都是不必要的，而Cerebras的芯片都能避免执行这些计算。Graphcore的图恩说，AI并不需要超级精确的计算，这一点与许多任务不同。这意味着芯片设计师可以通过降低芯片处理的数字精度来节省能源。（计算结果到底可能模糊到什么程度仍然是个悬而未决的问题。）

所有这一切加起来可以获得巨大的收益。图恩认为Graphcore现有芯片的效率是GPU的10到50倍。这些芯片已经进入了戴尔出售的专用计算机以及微软的云计算服务Azure。Cerebras已为两个大型美国政府实验室提供了设备。

此类创新将变得越来越重要，因为AI引发的计算能力需求激增正值摩尔定律逐渐枯竭之际。缩小芯片变得越来越困难，收益也不可与当年同日而语。去年，英伟达的创始人黄仁勋直言不讳地说：“摩尔定律已不再适用。”

| 量子解决方案和神经动力学

因此，其他研究人员正在寻找更多新奇的创意。一个是量子计算，它利用量子力学的反直觉特性大幅加速某些类型的计算。关于机器学习的一种思考方式是把它看作优化问题——计算机试图在数百万个变量之间折衷取舍，以求出误差尽可能小的解。微软研究院量子架构与计算小组负责人克里斯塔·斯沃尔（Krysta Svore）说，一种称为葛洛沃算法（Grover's algorithm）的量子计算技术有可能大大提高速度。

另一个想法是从生物学中获得启发，这证明了当前的蛮力计算不是唯一的出路。全速运行时，Cerebras的芯片消耗约15千瓦的功率，足以为数十座

房屋供电（同等数量的GPU消耗的功率还要多很多倍）。相比之下，人脑消耗的能量是20瓦左右（约是其千分之一），并且在许多方面都比硅基技术更聪明。因此，英特尔和IBM等公司正在研究“神经形态”芯片，其中包含的元件将能更贴切地模仿组成生物大脑的神经元的电行为。

但是，就目前而言，这一切还很遥远。对量子计算机的理解在理论上比较清晰，但是尽管谷歌、微软和IBM等技术巨头提供了数十亿美元的资金，实际打造它仍然是工程上的挑战。神经形态芯片是使用现有技术构建的，但神经科学家仍然不了解大脑究竟在做什么或是如何做到的，这让设计困难重重。

这意味着，在可预见的未来，AI研究人员将不得不从现有的计算技术中挤出每一点性能。图恩很乐观，认为通过更专门的硬件和调整现有软件来加速还会有很大的收益。为了量化这个尚处于初期的领域的发展，他用电子游戏来类比：“我们已经走过了《乓》，”他说，“现在可能是在《吃豆人》的阶段。”所有那些没有百万美元可以挥霍的人肯定希望他是正确的。■



The business world

Algorithms and armies

Businesses are finding AI hard to adopt

“FACEBOOK: THE INSIDE STORY”, Steven Levy’s recent book about the American social-media giant, paints a vivid picture of the firm’s size, not in terms of revenues or share price but in the sheer amount of human activity that thrums through its servers. 1.73bn people use Facebook every day, writing comments and uploading videos. An operation on that scale is so big, writes Mr Levy, “that it can only be policed by algorithms or armies”.

In fact, Facebook uses both. Human moderators work alongside algorithms trained to spot posts that violate either an individual country’s laws or the site’s own policies. But algorithms have many advantages over their human counterparts. They do not sleep, or take holidays, or complain about their performance reviews. They are quick, scanning thousands of messages a second, and untiring. And, of course, they do not need to be paid.

And it is not just Facebook. Google uses machine learning to refine search results, and target advertisements; Amazon and Netflix use it to recommend products and television shows to watch; Twitter and TikTok to suggest new users to follow. The ability to provide all these services with minimal human intervention is one reason why tech firms’ dizzying valuations have been achieved with comparatively small workforces.

Firms in other industries would love that kind of efficiency. Yet the magic is proving elusive. A survey carried out by Boston Consulting Group and MIT polled almost 2,500 bosses and found that seven out of ten said their AI projects had generated little impact so far. Two-fifths of those with “significant investments” in AI had yet to report any benefits at all.

Perhaps as a result, bosses seem to be cooling on the idea more generally. Another survey, this one by PwC, found that the number of bosses planning to deploy AI across their firms was 4% in 2020, down from 20% the year before. The number saying they had already implemented AI in “multiple areas” fell from 27% to 18%. Euan Cameron at PwC says that rushed trials may have been abandoned or rethought, and that the “irrational exuberance” that has dominated boardrooms for the past few years is fading.

There are several reasons for the reality check. One is prosaic: businesses, particularly big ones, often find change difficult. One parallel from history is with the electrification of factories. Electricity offers big advantages over steam power in terms of both efficiency and convenience. Most of the fundamental technologies had been invented by the end of the 19th century. But electric power nonetheless took more than 30 years to become widely adopted in the rich world.

Reasons specific to AI exist, too. Firms may have been misled by the success of the internet giants, which were perfectly placed to adopt the new technology. They were already staffed by programmers, and were already sitting on huge piles of user-generated data. The uses to which they put AI, at least at first—improving search results, displaying adverts, recommending new products and the like—were straightforward and easy to measure.

Not everyone is so lucky. Finding staff can be tricky for many firms. AI experts are scarce, and command luxuriant salaries. “Only the tech giants and the hedge funds can afford to employ these people,” grumbles one senior manager at an organisation that is neither. Academia has been a fertile recruiting ground.

A more subtle problem is that of deciding what to use AI for. Machine

intelligence is very different from the biological sort. That means that gauging how difficult machines will find a task can be counter-intuitive. AI researchers call the problem Moravec's paradox, after Hans Moravec, a Canadian roboticist, who noted that, though machines find complex arithmetic and formal logic easy, they struggle with tasks like co-ordinated movement and locomotion which humans take completely for granted.

For example, almost any human can staff a customer-support helpline. Very few can play Go at grandmaster level. Yet Paul Henninger, an AI expert at KPMG, an accountancy firm, says that building a customer-service chatbot is in some ways harder than building a superhuman Go machine. Go has only two possible outcomes—win or lose—and both can be easily identified. Individual games can play out in zillions of unique ways, but the underlying rules are few and clearly specified. Such well-defined problems are a good fit for AI. By contrast, says Mr Henninger, “a single customer call after a cancelled flight has...many, many more ways it could go”.

What to do? One piece of advice, says James Gralton, engineering director at Ocado, a British warehouse-automation and food-delivery firm, is to start small, and pick projects that can quickly deliver obvious benefits. Ocado's warehouses are full of thousands of robots that look like little filing cabinets on wheels. Swarms of them zip around a grid of rails, picking up food to fulfil orders from online shoppers.

Ocado's engineers used simple data from the robots, like electricity consumption or torque readings from their wheel motors, to train a machine-learning model to predict when a damaged or worn robot was likely to fail. Since broken-down robots get in the way, removing them for pre-emptive maintenance saves time and money. And implementing the system was comparatively easy.

The robots, warehouses and data all existed already. And the outcome is

clear, too, which makes it easy to tell how well the AI model is working: either the system reduces breakdowns and saves money, or it does not. That kind of “predictive maintenance”, along with things like back-office automation, is a good example of what PWC approvingly calls “boring AI” (though Mr Gralton would surely object).

There is more to building an AI system than its accuracy in a vacuum. It must also do something that can be integrated into a firm’s work. During the late 1990s Mr Henninger worked on Fair Isaac Corporation’s (FICO) “Falcon”, a credit-card fraud-detection system aimed at banks and credit-card companies that was, he says, one of the first real-world uses for machine learning. As with predictive maintenance, fraud detection was a good fit: the data (in the form of credit-card transaction records) were clean and readily available, and decisions were usefully binary (either a transaction was fraudulent or it wasn’t).

| *The widening gyre*

But although Falcon was much better at spotting dodgy transactions than banks’ existing systems, he says, it did not enjoy success as a product until FICO worked out how to help banks do something with the information the model was generating. “Falcon was limited by the same thing that holds a lot of AI projects back today: going from a working model to a useful system.” In the end, says Mr Henninger, it was the much more mundane task of creating a case-management system—flagging up potential frauds to bank workers, then allowing them to block the transaction, wave it through, or phone clients to double-check—that persuaded banks that the system was worth buying.

Because they are complicated and open-ended, few problems in the real world are likely to be completely solvable by AI, says Mr Gralton. Managers should therefore plan for how their systems will fail. Often that will mean throwing difficult cases to human beings to judge. That can limit the

expected cost savings, especially if a model is poorly tuned and makes frequent wrong decisions.

The tech giants' experience of the covid-19 pandemic, which has been accompanied by a deluge of online conspiracy theories, disinformation and nonsense, demonstrates the benefits of always keeping humans in the loop. Because human moderators see sensitive, private data, they typically work in offices with strict security policies (bringing smartphones to work, for instance, is usually prohibited).

In early March, as the disease spread, tech firms sent their content moderators home, where such security is tough to enforce. That meant an increased reliance on the algorithms. The firms were frank about the impact. More videos would end up being removed, said YouTube, "including some that may not violate [our] policies". Facebook admitted that less human supervision would likely mean "longer response times and more mistakes". AI can do a lot. But it works best when humans are there to hold its hand. ■



商业世界

算法和军队

企业发现AI难以实施【技术季刊《AI及其局限：比预期更陡峭》系列之三】

史蒂文·列维（Steven Levy）近期出版的《Facebook：内幕》（Facebook: The Inside Story）一书生动地描绘了这家美国社交媒体巨头的规模——说的不是收入或股价，而是服务器上巨量的人类活动。每天有17.3亿人使用Facebook，撰写评论和上传视频。列维写道，行动的规模如此之大，“以至于只能用算法或军队来管理”。

实际上，Facebook两者都用。人工审查员与经过训练的算法一起工作，以发现违反各个国家或地区法律或网站自身政策的帖子。但算法比起人类具有许多优势。它们不睡觉，不休假，也不抱怨自己的绩效考核。它们很快——每秒扫描成千上万条消息，而且不知疲倦。而且，当然，也不用给它们付工资。

不只是Facebook。谷歌使用机器学习来优化搜索结果并定位广告；亚马逊和奈飞（Netflix）使用它来推荐产品和电视节目；推特和抖音会推荐值得关注的新用户。能够在最少的人工干预下提供所有这些服务的能力，是科技公司员工队伍相对较小、估值却高得让人眩晕的原因之一。

其他行业的公司也想要这种效率，但事实证明这种魔法难以把握。波士顿咨询集团和麻省理工学院对近2500位老板的调查发现，他们中七成人说自己的AI项目到目前为止还没有产生多少影响。在AI上做了“重大投资”的人中，五分之二还根本没看到任何好处。

也许正因如此，更多的老板们在部署AI这件事上开始冷静下来。普华永道的一项调查发现，计划在公司中部署AI的老板人数在2020年为4%，低于一年前的20%。称自己已经在“多个领域”实施AI的人数从27%降至18%。普华永道的尤安·卡梅伦（Euan Cameron）表示，匆忙上马的试验可能已被放弃或重新考虑，并且过去几年董事会中充斥的“非理性繁荣”正在逐渐

消失。

回归现实有多个原因。其中一个平淡无奇：企业，尤其是大型企业，常常会发现变革很难。历史上的一个类比是工厂电气化。就效率和便利性而言，电力相对于蒸汽动力具有巨大的优势。大多数基础技术都是在19世纪末发明的，但电力却花了30多年才在富裕世界中被广泛采用。

还有AI技术专有的原因。互联网巨头有很好的条件来采用新技术，它们的成功可能误导了企业。它们本来就已经配备了程序员，坐拥大量用户生成的数据。它们应用AI的地方（至少是在最开始）都非常直截了当且易于评估，比如改善搜索结果、显示广告、推荐新产品等。

不是所有企业都那么幸运。对于许多公司而言，要找到所需的员工可能很难。AI专家稀缺，并且要求丰厚的薪水。“只有科技巨头和对冲基金才雇得起这些人。”一家两者都不是的公司的一位高级经理抱怨道。学术界则一直是一片招聘AI专家的沃土。

一个更微妙的问题是决定AI派上什么用场。机器智能与生物智能大不相同。这意味着衡量一个任务对机器来说是难是易可能并不符合人们的直觉。AI研究人员称这个问题为莫拉维克悖论，这是以加拿大机器人专家汉斯·莫拉维克（Hans Moravec）命名的。莫拉维克指出，尽管复杂算术和形式逻辑对机器来说很容易，但诸如协调运动等人类完全司空见惯的任务却让它们苦苦挣扎。

比如，几乎任何人都可以去接客服电话，却很少有人能成为围棋大师。然而，会计师事务所毕马威的AI专家保罗·亨宁格（Paul Henninger）表示，在某些方面，搭建一个客服聊天机器人要比一台超强围棋机器还要难。围棋只有两个可能的结果（输或赢），并且都可以轻松判断。一个游戏可以有无数种不同的进展方式，但基本规则很少而且很明确。此类明确定义的问题非常适合AI。相比之下，亨宁格说：“航班取消后的一个客户来电……有多得多得多的可能出现的情况。”

该怎么办呢？英国仓库自动化和食品交付公司Ocado的工程总监詹姆斯·

格拉尔顿（James Gralton）说，一个建议是从小处入手，选择可以迅速带来明显收益的项目。Ocado的仓库里充满了成千上万的机器人，看上去就像带轮子的小文件柜。它们沿着轨道网格快速穿行，抓起食物以履行来自在线购物者的订单。

Ocado的工程师使用来自机器人的简单数据（例如耗电量或车轮电动机的扭矩读数）训练机器学习模型，以预测损坏或磨损的机器人何时会发生故障。由于出故障的机器人会堵住路，因此将它们撤下并提前维护可以节省时间和金钱。而且该系统的实施相对容易。

机器人、仓库和数据都已经存在。结果也很清晰，这就很容易判断AI模型运行得好不好：系统要么减少了故障并节省了资金，要么没有。这种“预测性维护”以及后台办公自动化之类的东西，是普华永道赞许地称之为“无聊的AI”的一个很好的例子（尽管格拉尔顿肯定会反对这种说法）。

构建AI系统需要的不只是它在真空环境中的准确性。它还必须做一些可以整合到公司工作中的东西。在1990年代末，亨宁格在费埃哲公司（Fair Isaac Corporation，以下简称FICO）研究“猎鹰”（Falcon）项目，这是一个面向银行和信用卡公司的信用卡欺诈检测系统。他说这是机器学习最早的现实应用之一。与预测性维护一样，欺诈检测也是一个很好的用途：数据（以信用卡交易记录的形式）干净且是现成的，决策是二元的（交易要么是欺诈，要么不是），这很有帮助。

| 不断扩张的螺旋

他说，尽管“猎鹰”比银行现有系统更擅长发现欺诈交易，但直到FICO研究出如何帮助银行利用模型生成的信息采取行动之后，猎鹰作为一个产品才获得成功。“猎鹰受到的限制和当今许多AI项目一样：从可用的模型演变为有用的系统。”最终，亨宁格说，是创建案件管理系统这个乏味得多的任务——向银行工作人员举报潜在的欺诈行为，使他们能够阻止交易、放行或致电客户核实——让银行相信该系统值得购买。

格拉尔顿说，由于现实世界中的问题复杂且开放，很少有可以完全用

AI解决。因此，管理层应该对系统可能失灵做好规划。通常，这将意味着将困难的案例交给人类做判断。这可能会导致节省成本的程度达不到预期，尤其是遇到模型调校不良而经常做出错误决策的情况。

科技巨头在新冠肺炎大流行中的经验证明了始终保持人类参与的好处。这场疫情伴随着大量的在线阴谋论、虚假信息和胡说八道。由于人类审查员会看到敏感的私人数据，因此他们通常在执行严格安全策略的办公室中工作（例如，通常被禁止携带智能手机上班）。

今年3月初，随着疾病蔓延，科技公司让其内容审查员回家办公，让此类安全措施很难实施。这意味着对算法的依赖增加了。这些公司对其影响直言不讳。YouTube表示，这会删除更多视频，“其中有些可能并没有违反我们的政策”。Facebook承认，更少的人员监督可能意味着“更长的响应时间和更多的错误”。AI可以做很多事情。但只有在人类在旁引导时才做得最好。■



Data

Not so big

Data can be scarcer than you think, and full of traps

AMAZON'S "GO" STORES are impressive places. The cashier-less shops, which first opened in Seattle in 2018, allow app-wielding customers to pick up items and simply walk out with them. The system uses many sensors, but the bulk of the magic is performed by cameras connected to an AI system that tracks items as they are taken from shelves. Once the shoppers leave with their goods, the bill is calculated and they are automatically charged.

Doing that in a crowded shop is not easy. The system must handle crowded stores, in which people disappear from view behind other customers. It must recognise individual customers as well as friends or family groups (if a child puts an item into a family basket, the system must realise that it should charge the parents). And it must do all that in real-time, and to a high degree of accuracy.

Teaching the machines required showing them a lot of "training data" in the form of videos of customers browsing shelves, picking up items, putting them back and the like. For standardised tasks like image recognition, AI developers can use public training datasets, each containing thousands of pictures. But there was no such training set featuring people browsing in shops.

Some data could be generated by Amazon's own staff, who were allowed into test versions of the shops. But that approach took the firm only so far. There are many ways in which a human might take a product from a shelf and then decide to choose it, put it back immediately or return it later. To work in the real world, the system would have to cover as many of those as

possible.

In theory, the world is awash with data, the lifeblood of modern AI. IDC, a market-research firm, reckons the world generated 33 zettabytes of data in 2018, enough to fill seven trillion DVDs. But Kathleen Walch of Cognilytica, an AI-focused consultancy, says that, nevertheless, data issues are one of the most common sticking-points in any AI project. As in Amazon's case, the required data may not exist at all. Or they might be locked up in the vaults of a competitor. Even when relevant data can be dug up, they might not be suitable for feeding to computers.

Data-wrangling of various sorts takes up about 80% of the time consumed in a typical AI project, says Cognilytica. Training a machine-learning system requires large numbers of carefully labelled examples, and those labels usually have to be applied by humans. Big tech firms often do the work internally. Companies that lack the required resources or expertise can take advantage of a growing outsourcing industry to do it for them. A Chinese firm called MBH, for instance, employs more than 300,000 people to label endless pictures of faces, street scenes or medical scans so that they can be processed by machines. Mechanical Turk, another subdivision of Amazon, connects firms with an army of casual human workers who are paid a piece rate to perform repetitive tasks.

Cognilytica reckons that the third-party "data preparation" market was worth more than \$1.5bn in 2019 and could grow to \$3.5bn by 2024. The data-labelling business is similar, with firms spending at least \$1.7bn in 2019, a number that could reach \$4.1bn by 2024. Mastery of a topic is not necessary, says Ron Schmelzer, also of Cognilytica. In medical diagnostics, for instance, amateur data-labellers can be trained to become almost as good as doctors at recognising things like fractures and tumours. But some amount of what AI researchers call "domain expertise" is vital.

The data themselves can contain traps. Machine-learning systems correlate inputs with outputs, but they do it blindly, with no understanding of broader context. In 1968 Donald Knuth, a programming guru, warned that computers “do exactly what they are told, no more and no less”. Machine learning is full of examples of Mr Knuth’s dictum, in which machines have followed the letter of the law precisely, while being oblivious to its spirit.

In 2018 researchers at Mount Sinai, a hospital network in New York, found that an AI system trained to spot pneumonia on chest x-rays became markedly less competent when used in hospitals other than those it had been trained in. The researchers discovered that the machine had been able to work out which hospital a scan had come from. (One way was to analyse small metal tokens placed in the corner of scans, which differ between hospitals.)

Since one hospital in its training set had a baseline rate of pneumonia far higher than the others, that information by itself was enough to boost the system’s accuracy substantially. The researchers dubbed that clever wheeze “cheating”, on the grounds that it failed when the system was presented with data from hospitals it did not know.

| *Different kind of race*

Bias is another source of problems. Last year America’s National Institute of Standards and Technology tested nearly 200 facial recognition algorithms and found that many were significantly less accurate at identifying black faces than white ones. The problem may reflect a preponderance of white faces in their training data. A study from IBM, published last year, found that over 80% of faces in three widely used training sets had light skin.

Such deficiencies are, at least in theory, straightforward to fix (IBM offered a more representative dataset for anyone to use). Other sources of bias can be trickier to remove. In 2017 Amazon abandoned a recruitment project

designed to hunt through CVs to identify suitable candidates when the system was found to be favouring male applicants. The post mortem revealed a circular, self-reinforcing problem. The system had been trained on the CVs of previous successful applicants to the firm. But since the tech workforce is already mostly male, a system trained on historical data will latch onto maleness as a strong predictor of suitability.

Humans can try to forbid such inferences, says Fabrice Ciaï, who runs PwC's machine-learning team in Britain (and Amazon tried to do exactly that). In many cases they are required to: in most rich countries employers cannot hire on the basis of factors such as sex, age or race. But algorithms can outsmart their human masters by using proxy variables to reconstruct the forbidden information, says Mr Ciaï. Everything from hobbies to previous jobs to area codes in telephone numbers could contain hints that an applicant is likely to be female, or young, or from an ethnic minority.

If the difficulties of real-world data are too daunting, one option is to make up some data of your own. That is what Amazon did to fine-tune its Go shops. The company used graphics software to create virtual shoppers. Those ersatz humans were used to train the machines on many hard or unusual situations that had not arisen in the real training data, but might when the system was deployed in the real world.

Amazon is not alone. Self-driving car firms do a lot of training in high-fidelity simulations of reality, where no real damage can be done when something goes wrong. A paper in 2018 from Nvidia, a chipmaker, described a method for quickly creating synthetic training data for self-driving cars, and concluded that the resulting algorithms worked better than those trained on real data alone.

Privacy is another attraction of synthetic data. Firms hoping to use AI in medicine or finance must contend with laws such as America's Health

Insurance Portability and Accountability Act, or the European Union's General Data Protection Regulation. Properly anonymising data can be difficult, a problem that systems trained on made-up people do not need to bother about.

The trick, says Euan Cameron, one of Mr Ciais's colleagues, is ensuring simulations are close enough to reality that their lessons carry over. For some well-bounded problems such as fraud detection or credit scoring, that is straightforward. Synthetic data can be created by adding statistical noise to the real kind. Although individual transactions are therefore fictitious, it is possible to guarantee that they will have, collectively, the same statistical characteristics as the real data from which they were derived. But the more complicated a problem becomes, the harder it is to ensure that lessons from virtual data will translate smoothly to the real world.

The hope is that all this data-related faff will be a one-off, and that, once trained, a machine-learning model will repay the effort over millions of automated decisions. Amazon has opened 26 Go stores, and has offered to license the technology to other retailers. But even here there are reasons for caution. Many AI models are subject to "drift", in which changes in how the world works mean their decisions become less accurate over time, says Svetlana Sicular of Gartner, a research firm. Customer behaviour changes, language evolves, regulators change what companies can do.

Sometimes, drift happens overnight. "Buying one-way airline tickets was a good predictor of fraud [in automated detection models]," says Ms Sicular. "And then with the covid-19 lockdowns, suddenly lots of innocent people were doing it." Some facial-recognition systems, used to seeing uncovered human faces, are struggling now that masks have become the norm. Automated logistics systems have needed help from humans to deal with the sudden demand for toilet roll, flour and other staples. The world's

changeability means more training, which means providing the machines with yet more data, in a never-ending cycle of re-training. “AI is not an install-and-forget system,” warns Mr Cameron. ■



数据

没那么大

数据可能比你想象的要稀缺，而且充满陷阱【技术季刊《AI及其局限：比预期更陡峭》系列之二】

亚马逊的“GO”商店令人眼前一亮。这些不设收银员的店铺2018年首次在西雅图开业，顾客只要亮出手机应用，就可以拿了商品直接走人。该系统使用大量传感器，但其魔法主要是由连接到AI系统的摄像头完成的。AI系统会追踪商品从架子上被取走的过程。一旦顾客拿着商品离店，账单就结算完毕，自动向他们收费。

在一个拥挤的商店里做到这一点并不容易。系统要能够应付人员密集的环境：摄像头可能被其他顾客阻挡而看不到某些人的动作。它必须能识别单个顾客，还有同行的朋友或是全家出动。如果一个孩子把一件商品放进自家购物篮，系统必须意识到应该向他的父母收费。而且它必须实时又高度准确地完成这一切。

为指导机器做这些，需要向它们展示大量“训练数据”：顾客浏览货架上的商品、拿取商品、把商品放回货架等各种行为的视频。对于像图像识别这样的标准化任务，AI开发人员可以使用公用训练数据集，每个都包含成千上万张图片。但记录人们逛商店的公用训练集尚不存在。

有些数据可由亚马逊自己的员工生成，公司此前让他们进入测试版店铺中。但这么做有其局限。人们有各种各样的方式从架子上取走一件商品并决定买下它、立即把它放回架子，还是稍后再放回。要在现实世界中真正奏效，系统必须涵盖尽可能多的可能性。

从理论上讲，世界充斥着数据，这是现代AI的命脉。市场研究公司国际数据公司（IDC）估计，2018年全球生成了33ZB的数据，足以填满七万亿张DVD。但是，专注于AI领域的咨询公司Cognilytica的凯瑟琳·沃尔克（Kathleen Walch）表示，尽管如此，数据问题仍是所有AI项目中最常见

的症结之一。和亚马逊Go商店的例子一样，所需要的数据可能根本就不存在。或者数据可能被锁在竞争对手的保险库中。即便相关数据可以被挖出，可能也不适合输送给计算机。

Cognilytica表示，一个典型AI项目约80%的时间都花在了各种数据整理上。训练机器学习系统需要大量仔细标注的样本，而这些标注通常须由人类添加。大型科技公司通常在内部开展这项工作。那些缺少相关资源或技术知识的公司可以借力一个不断发展的外包产业来完成这个部分。例如，中国公司莫比嗨客雇用了30多万人来标注源源不断的人脸照片、街道场景或医疗扫描影像以便由机器处理。亚马逊的另一个部门土耳其机器人（Mechanical Turk）为企业与一个临时工大军牵线搭桥，向这些工人支付计件工资来执行重复性任务。

Cognilytica估计，第三方“数据准备”市场在2019年价值超过15亿美元，到2024年可能增至35亿美元。数据标注业务也差不多：2019年企业在这方面至少支出了17亿美元，到2024年可能达到41亿美元。Cognilytica的罗恩·施梅尔策（Ron Schmelzer）说，掌握某个专业课题并非必要，例如在医学诊断中，业余数据标注员经训练后在识别骨折和肿瘤等方面几乎可以和医生媲美。但掌握一定的AI研究人员口中的“领域知识”至关重要。

数据本身可能包含陷阱。机器学习系统将输入与输出相关联，但它们只是盲目地执行，并不理解更广泛的语境。1968年，编程大师高德纳（Donald Knuth）警告说，计算机“完全按你告诉它们的去做，不多也不少”。机器学习中充满了这句话的例证——机器精确遵循规则的字眼，却对其精神一无所知。

2018年，纽约西奈山医疗系统（Mount Sinai）的研究人员发现，一个经训练从X光胸片识别肺炎的AI系统，在它受训的医院以外的其他医院使用时能力明显降低。研究人员发现，机器能够识别出胸片来自哪家医院。（方法之一是分析片子角上的小块金属标记——各家医院的标记各不相同。）

由于训练集里的一家医院的肺炎基准发生率远高于其他医院，胸片来自哪

家医院这个信息本身就足以大幅提高系统的准确性。研究人员把这种巧妙的伎俩叫做“作弊”，因为当向系统出示陌生医院的数据时，它就失灵了。

| 另一个族群

偏见导致了另一种问题。去年，美国国家标准技术研究院（National Institute of Standards and Technology）测试了近200种人脸识别算法，发现许多算法在识别黑人面部时准确性明显低于白人面部。这个问题可能反映出白人面部在机器的训练数据中占了多数。IBM去年发表的一项研究发现，三种被广泛使用的训练集中，超过80%的人脸都是较浅的肤色。

至少从理论上讲，这类缺陷很容易纠正（IBM提供了一个更具代表性的数据集供所有人使用）。其他的偏见来源可能更难消除。2017年，亚马逊喊停了一个通过简历寻找合适人选的招聘项目，因为发现该系统对男性申请人有利。事后检验发现了一个循环的、自我增强的问题。公司用以前成功被录取的申请人的简历训练该系统，但由于技术人员的队伍本身大部分是男性，因此根据历史数据来训练的系统会把男性这个特征作为适合度的强预测指标。

普华永道机器学习英国团队的负责人法布里斯·西亚斯（Fabrice Ciaï）说，人类可以尝试禁止机器做这类推导（亚马逊正是这么做的）。在许多情况下他们必须这么做：在大多数富裕国家，雇主不能基于性别、年龄或种族等因素来雇用人员。但算法可以比它的人类主人更聪明，西亚斯说，它们能用替代变量重构出被禁用的信息。从业余爱好到工作经历，再到电话号码中的区号，各种信息都可能暗示申请者很可能是女性、年轻人或少数族裔。

如果现实世界中的数据难题太过艰巨，那么一种选择是自己创造一些数据。这就是亚马逊改进Go商店时所用的方法。该公司使用图形软件来生成虚拟购物者。这些“人造人”被拿来训练机器处理许多困难或异常的情景，它们在真实训练数据中未曾出现，在实际环境中部署系统时却可能发生。

这并非亚马逊独树一帜。无人车公司用高保真模拟现实来做大量训练，在

这种模拟中如果出错不会造成真正的破坏。芯片制造商英伟达2018年发表的一篇论文描述了一种为无人车快速创建综合训练数据的方法，并得出结论称由此生成的算法比仅用真实数据训练的算法的效果更好。

隐私关切是“合成数据”的另一个吸引力所在。希望在医学或金融中使用AI的公司必须遵守美国的《健康保险可携性和责任法案》（HIPAA）或欧盟的《通用数据保护条例》（GDPR）等法律。要给数据做恰当的匿名处理可能会很难，而用虚拟人训练的系统根本不用担心这个。

西亚斯的同事尤安·卡梅伦（Euan Cameron）说，诀窍在于确保模拟足够接近现实，以使得经验可以推广。对于像欺诈识别或信用评级这样清晰界定的问题，这很简单。还可以将统计噪声添加到真实数据中来创建合成数据。这样，尽管单个交易是虚拟的，但可以保证它们整体上具有与源数据相同的统计特征。但一个问题越复杂，就越难确保从虚拟数据中汲取的经验能被顺畅地用于现实世界。

希望在于所有这些都与数据相关的折腾都是一次性的，而一旦训练好，机器学习模型将用数百万次自动决策来回报这番努力。亚马逊已经开设了26家Go商店，并已提出将相关技术授权给其他零售商。但即使到了这一步也仍需要谨慎。研究公司高德纳（Gartner）的斯韦特兰娜·希克尔勒

（Svetlana Sicular）说，许多AI模型都受到“漂移”（drift）的影响，即随着时间流逝，世界运转方式的变化意味着它们的决策变得不那么准确。顾客的行为在变化，语言在演变，监管机构也会改变公司能做什么的规定。

有时漂移在一夜之间发生。“购买单程机票 [在自动检测模型中] 曾是一个很好的预测欺诈的指标，”希克尔勒说，“新冠肺炎导致封城后，突然有很多人都在买单程票，却都是清白的。”如今戴口罩已成为常态，一些习惯了识别裸露面部的人脸识别系统碰到了麻烦。自动化物流系统现在需要人员的帮助才能应付对卷筒纸、面粉及其他生活必需品的需求激增。世界的可变性意味着机器需要更多训练，即为它们提供更多数据——这是一个无休止的再培训循环。卡梅伦警告说：“人工智能不是个一劳永逸的系统。”■



Artificial intelligence and its limits

Reality check

After years of hype, an understanding of AI's limitations is starting to sink in, says Tim Cross

IT WILL BE as if the world had created a second China, made not of billions of people and millions of factories, but of algorithms and humming computers. PwC, a professional-services firm, predicts that artificial intelligence (AI) will add \$16trn to the global economy by 2030. The total of all activity—from banks and biotech to shops and construction—in the world's second-largest economy was just \$13trn in 2018.

PwC's claim is no outlier. Rival prognosticators at McKinsey put the figure at \$13trn. Others go for qualitative drama, rather than quantitative. Sundar Pichai, Google's boss, has described developments in AI as “more profound than fire or electricity”. Other forecasts see similarly large changes, but less happy ones. Clever computers capable of doing the jobs of radiologists, lorry drivers or warehouse workers might cause a wave of unemployment.

Yet lately doubts have been creeping in about whether today's AI technology is really as world-changing as it seems. It is running up against limits of one kind or another, and has failed to deliver on some of its proponents' more grandiose promises.

There is no question that AI—or, to be precise, machine learning, one of its sub-fields—has made much progress. Computers have become dramatically better at many things they previously struggled with. The excitement began to build in academia in the early 2010s, when new machine-learning techniques led to rapid improvements in tasks such as recognising pictures and manipulating language. From there it spread to business, starting with the internet giants. With vast computing resources

and oceans of data, they were well placed to adopt the technology. Modern AI techniques now power search engines and voice assistants, suggest email replies, power the facial-recognition systems that unlock smartphones and police national borders, and underpin the algorithms that try to identify unwelcome posts on social media.

Perhaps the highest-profile display of the technology's potential came in 2016, when a system built by DeepMind, a London-based AI firm owned by Alphabet, Google's corporate parent, beat one of the world's best players at Go, an ancient Asian board game. The match was watched by tens of millions; the breakthrough came years, even decades, earlier than AI gurus had expected.

As Mr Pichai's comparison with electricity and fire suggests, machine learning is a general-purpose technology—one capable of affecting entire economies. It excels at recognising patterns in data, and that is useful everywhere. Ornithologists use it to classify birdsong; astronomers to hunt for planets in glimmers of starlight; banks to assess credit risk and prevent fraud. In the Netherlands, the authorities use it to monitor social-welfare payments. In China AI-powered facial recognition lets customers buy groceries—and helps run the repressive mass-surveillance system the country has built in Xinjiang, a Muslim-majority region.

AI's heralds say further transformations are still to come, for better and for worse. In 2016 Geoffrey Hinton, a computer scientist who has made fundamental contributions to modern AI, remarked that "it's quite obvious that we should stop training radiologists," on the grounds that computers will soon be able to do everything they do, only cheaper and faster. Developers of self-driving cars, meanwhile, predict that robotaxis will revolutionise transport. Eric Schmidt, a former chairman of Google (and a former board member of *The Economist's* parent company) hopes that AI could accelerate research, helping human scientists keep up with a deluge

of papers and data.

In January a group of researchers published a paper in *Cell* describing an AI system that had predicted antibacterial function from molecular structure. Of 100 candidate molecules selected by the system for further analysis, one proved to be a potent new antibiotic. The covid-19 pandemic has thrust such medical applications firmly into the spotlight. An AI firm called BlueDot claims it spotted signs of a novel virus in reports from Chinese hospitals as early as December. Researchers have been scrambling to try to apply AI to everything from drug discovery to interpreting medical scans and predicting how the virus might evolve.

| *Dude, where's my self-driving car?*

This is not the first wave of AI-related excitement (see timeline in next story). The field began in the mid-1950s when researchers hoped that building human-level intelligence would take a few years—a couple of decades at most. That early optimism had fizzled by the 1970s. A second wave began in the 1980s. Once again the field's grandest promises went unmet. As reality replaced the hype, the booms gave way to painful busts known as "AI winters". Research funding dried up, and the field's reputation suffered.

Modern AI technology has been far more successful. Billions of people use it every day, mostly without noticing, inside their smartphones and internet services. Yet despite this success, the fact remains that many of the grandest claims made about AI have once again failed to become reality, and confidence is wavering as researchers start to wonder whether the technology has hit a wall. Self-driving cars have become more capable, but remain perpetually on the cusp of being safe enough to deploy on everyday streets. Efforts to incorporate AI into medical diagnosis are, similarly, taking longer than expected: despite Dr Hinton's prediction, there remains a global shortage of human radiologists.

Surveying the field of medical AI in 2019, Eric Topol, a cardiologist and AI enthusiast, wrote that “the state of AI hype has far exceeded the state of AI science, especially when it pertains to validation and readiness for implementation in patient care”. Despite a plethora of ideas, covid-19 is mostly being fought with old weapons that are already to hand. Contact tracing has been done with shoe leather and telephone calls. Clinical trials focus on existing drugs. Plastic screens and paint on the pavement enforce low-tech distancing advice.

The same consultants who predict that AI will have a world-altering impact also report that real managers in real companies are finding AI hard to implement, and that enthusiasm for it is cooling. Svetlana Sicular of Gartner, a research firm, says that 2020 could be the year AI falls onto the downslope of her firm’s well-publicised “hype cycle”. Investors are beginning to wake up to bandwagon-jumping: a survey of European AI startups by MMC, a venture-capital fund, found that 40% did not seem to be using any AI at all. “I think there’s definitely a strong element of ‘investor marketing,’” says one analyst delicately.

This Technology Quarterly will investigate why enthusiasm is stalling. It will argue that although modern AI techniques are powerful, they are also limited, and they can be troublesome and difficult to deploy. Those hoping to make use of AI’s potential must confront two sets of problems.

The first is practical. The machine-learning revolution has been built on three things: improved algorithms, more powerful computers on which to run them, and—thanks to the gradual digitisation of society—more data from which they can learn. Yet data are not always readily available. It is hard to use AI to monitor covid-19 transmission without a comprehensive database of everyone’s movements, for instance. Even when data do exist, they can contain hidden assumptions that can trip the unwary. The newest AI systems’ demand for computing power can be expensive. Large

organisations always take time to integrate new technologies: think of electricity in the 20th century or the cloud in the 21st. None of this necessarily reduces AI's potential, but it has the effect of slowing its adoption.

The second set of problems runs deeper, and concerns the algorithms themselves. Machine learning uses thousands or millions of examples to train a software model (the structure of which is loosely based on the neural architecture of the brain). The resulting systems can do some tasks, such as recognising images or speech, far more reliably than those programmed the traditional way with hand-crafted rules, but they are not “intelligent” in the way that most people understand the term. They are powerful pattern-recognition tools, but lack many cognitive abilities that biological brains take for granted. They struggle with reasoning, generalising from the rules they discover, and with the general-purpose *savoir faire* that researchers, for want of a more precise description, dub “common sense”. The result is an artificial *idiot savant* that can excel at well-bounded tasks, but can get things very wrong if faced with unexpected input.

Without another breakthrough, these drawbacks put fundamental limits on what AI can and cannot do. Self-driving cars, which must navigate an ever-changing world, are already delayed, and may never arrive at all. Systems that deal with language, like chatbots and personal assistants, are built on statistical approaches that generate a shallow appearance of understanding, without the reality. That will limit how useful they can become. Existential worries about clever computers making radiologists or lorry drivers obsolete—let alone, as some doom-mongers suggest, posing a threat to humanity's survival—seem overblown. Predictions of a Chinese-economy-worth of extra GDP look implausible.

Today's “AI summer” is different from previous ones. It is brighter and

warmer, because the technology has been so widely deployed. Another full-blown winter is unlikely. But an autumnal breeze is picking up. ■



人工智能及其局限

面对现实

本文作者蒂姆·克罗斯（Tim Cross）说，经过多年的热捧，人们开始认识到AI的局限性【技术季刊《AI及其局限：比预期更陡峭》系列之一】

那就像是世界创造了第二个中国——只不过构成它的不是十几亿人和数百万家工厂，而是算法和嗡嗡作响的计算机。专业服务公司普华永道（PwC）预测，到2030年，人工智能（AI）将为全球经济增加16万亿美元。而全球第二大经济体2018年所有活动的总和——从银行、生物技术到商店和建筑业——也不过13万亿美元。

普华永道的说法并不稀奇。它的竞争对手、麦肯锡的预测者认为，这个数字大概在13万亿美元。其他人则希望从定性而非定量的角度一语惊人。谷歌的老板桑达尔·皮查伊（Sundar Pichai）形容AI的发展“比火或电的影响更深远”。其他预测也描绘了同样宏大的变化，但不那么令人愉快。聪明的计算机能完成放射科医生、货车司机或仓库工人的工作，可能导致一大波失业潮。

不过，今天的AI技术是否真会带来那么翻天覆地的变化？对此的怀疑近来悄悄滋生。AI正在触及这样或那样的极限，也没能兑现它的一些支持者所做的更宏大的承诺。

毫无疑问，人工智能（或者确切地说是机器学习，它的子领域之一）已经取得了显著进展。在诸多以前难以解决的任务上，计算机的表现已大幅改进。2010年代初期，新的机器学习技术推动图像识别和语言处理等任务取得快速改进，学术界开始为之兴奋。之后它开始传入企业界，最先进入了互联网巨头。这些巨头拥有大量计算资源和海量数据，因此有很好的条件来采用这项技术。如今，现代AI技术驱动了搜索引擎和语音助手、电子邮件回复建议、用于解锁智能手机和管控边境的人脸识别系统，以及尝试识别社交媒体上不受欢迎的帖子的算法。

这项技术最高调地展现自身潜力的一次可能是在2016年。总部位于伦敦的DeepMind是谷歌母公司Alphabet旗下的AI公司，它创建了一个系统，在古老的亚洲棋盘游戏围棋上击败了世界最好的棋手之一。几千万人观看了这场比赛。这项突破比AI大咖们所预期的提前发生了几年甚至几十年。

从皮查伊拿它类比电和火也可以看出，机器学习是一种通用技术，能够影响整个经济。它擅长识别数据中的模式，而这在任何地方都有用。鸟类学家用它来分类鸟类鸣叫；天文学家用它在微弱的星光中寻找行星；银行用它评估信用风险，防范欺诈。在荷兰，当局用它监控社会福利支付系统。在中国，由AI技术驱动的人脸识别功能让顾客可以“刷脸”购买食品杂货，也帮助该国在穆斯林占多数的新疆地区运行镇压性的大众监视系统。

AI的先驱们说，还会发生更多转变，有好有坏。2016年，为现代AI做出了基础性贡献的计算机科学家杰弗里·辛顿（Geoffrey Hinton）表示：“显而易见，我们应该停止培训放射科医生了”，因为计算机很快将能完成他们所有的工作，而且成本更低，速度更快。与此同时，无人驾驶汽车的开发人员预测机器人出租车将彻底改变交通运输。谷歌前董事长（也是《经济学人》母公司的前董事会成员）埃里克·施密特（Eric Schmidt）希望AI能让科研提速，帮助人类科学家跟上论文和数据的洪流。

今年1月，一组研究人员在《细胞》（Cell）期刊上发表了一篇论文，描述了一个根据分子结构预测抗菌功能的AI系统。该系统选出了100个分子供进一步分析，其中之一后来被证实是一种有效的新抗生素。新冠大流行使得这类医疗应用被牢牢聚焦。AI公司“蓝点”（BlueDot）声称，它早在去年12月中国医院的报告中就发现了一种新型病毒的迹象。研究人员一直在努力尝试把AI应用到药物研发、读取医学扫描影像、预测病毒如何进化等方面。

丨 老兄，我的无人车在哪儿呢？

这并不是第一波AI热潮（参见本系列之二中的时间表）。这个领域发端于1950年代中期，当时研究人员希望用几年时间——顶多二三十年——就建立起和人类水平相当的机器智能。到了1970年代，这种最初的乐观情绪已

经消散殆尽。第二波热潮始于1980年代。该领域最宏伟的承诺又一次落空。随着现实取代了炒作，繁荣让位给了痛苦的萧条期——所谓的“人工智能之冬”。研究经费枯竭，行业的声誉也受损。

现代AI技术要成功得多。每天都有几十亿人在智能手机和互联网服务中用到它——大多数时候都毫无知觉。然而，尽管取得了这样的成功，现实依然是许多关于AI的最宏大的断言再度成空。而随着研究人员开始怀疑这项技术是否已经走到了瓶颈，人们的信心动摇了。无人车已经变得更有能耐，但始终差一口气，还不能足够安全地开上日常的街道。同样，将AI整合到医学诊断中的努力比预期花费的时间更长：尽管辛顿博士做出了那样的预测，全球范围内人类放射科医师仍然短缺。

心脏病学家、热衷AI的艾瑞克·托波尔（Eric Topol）2019年调研医疗AI领域后写道：“AI炒作的水平远远超过了AI科学的水平，尤其是在患者护理的验证和实施能力方面。”尽管新想法众多，人们大多都还是在用手头现有的旧式武器在与新冠肺炎作战。对病毒接触者的追踪是靠走访和打电话完成的。临床试验专注于现有药物。塑料隔板和人行道上的油漆执行着技术含量不高的社交疏离建议。

那些预测AI会改变世界的顾问们同时也在报告说，真实的公司中真实的经理人发现AI难以实施，对它的热情正在降温。研究公司高德纳（Gartner）的斯韦特兰娜·希克尔勒（Svetlana Sicular）表示，从2020年开始，在其公司提出的著名的“炒作周期”中，AI技术可能进入了下行部分。投资者开始意识到市场的跟风效应：风投基金MMC对欧洲AI创业公司的一项调查发现，有四成公司似乎根本没有用到任何AI。“我认为‘投资者营销’绝对是个重要因素。”一位分析师含蓄地表示。

本技术季刊将探讨为何热情开始冷却。它将论证，尽管当今的AI技术功能强大，但有其局限性，而且在部署时可能困难重重。那些希望利用AI潜力的人必须直面两方面的问题。

首先是实际操作上的。机器学习革命建立在三个事物上：改进的算法、运

行算法的更强大的计算机，以及（由于社会逐渐数字化而产生的）更多可让算法从中学习的数据。但数据并不总是现成的。例如，如果没有记录每个人移动轨迹的完整数据库，就很难用AI来监控新冠病毒的传播。即使数据确实存在，它们也可能包含了隐含假设而误导那些不够警觉的人。最新的AI系统对计算能力的需求可能耗资巨大。大型组织总是要耗时长久才能将新技术融入自己的体系：想想20世纪的电力或21世纪的云。所有这些不一定会减少AI的潜力，但会拖慢采用它的速度。

第二组问题更深入，涉及算法本身。机器学习用成千上万或几百万个示例来训练软件模型（其结构大致基于人脑的神经结构）。所生成的系统可以执行某些任务，如识别图像或语音，它们比用人工设计的规则来编程的传统方法可靠得多，但其“智慧”并不是大多数人所理解的那种。它们是强大的模式识别工具，但没有对生物大脑而言理所当然的诸多认知能力。它们难以做出推理、归纳自己发现的规则，也难以获得通用的应变能力——对于这种能力，研究人员找不到更精确的称法，而叫它“常识”。其结果就是一个人工弱智专才，在清晰界定的任务上表现杰出，但如果遇到意料之外的输入，就可能错得离谱。

如果不出现一项新的突破，这些弊端就从根本上限定了AI可以做什么，不能做什么。无人车必须能在一个瞬息万变的世界里自如驰骋，它已经延期交付了，甚至可能永远不会到达。诸如聊天机器人和个人助理之类处理语言的系统都建立在统计方法之上，它们会生成一种肤浅的理解的表象，而脱离现实。这将限制它们的用处。生存方面的担忧——认为聪明的计算机会让放射科医生或货车司机失业——似乎过头了，更别提一些末日论者所说的整个人类的生存岌岌可危了。认为AI会带来等同于一整个中国经济体量的额外GDP的预测看起来也不可信。

今天的“人工智能之夏”不同以往。这种技术已经被如此广泛地部署，这个夏天更明亮，也更炽热。进入又一个全面的寒冬已不大可能。但秋天的微风已开始轻拂。■



Luxury in the pandemic

Fashion victims

Slow times in the luxury world will separate the bling from the chaff

MILAN, PARIS or New York this time of year would usually be teeming with fashionistas scrambling to get from the Balenciaga show to the Chanel party. Not in 2020. Fashion weeks have been cancelled, repurposed as posh catwalk webinars. Shops selling Hermès ties and Prada pumps are only just reopening, wondering what to do with stock of pre-covid-19 vintage. Instagram influencers normally on hand to feed the hype have nothing to snap.

The world of personal luxury goods—from handbags and haute couture to diamond rings and pricey Swiss watches—has been in hibernation. At the height of the pandemic between March and May sales slumped by 75% or so on a year earlier, according to the Boston Consulting Group. They have slowly picked up as Asia, then Europe and America, started reopening. Even so, the outlook for the luxury world is far from glittering.

The global recession hangs over a sector fuelled by consumer confidence. Beyond that short-term shock, the industry is facing an overhaul in how its baubles are made, where they are sold and to whom. Trends once expected to play out over a decade may unfold in mere quarters. Rapid change has set nerves jangling in a business meant to exude timeless tradition.

Start with who is buying and where. Although most purveyors of luxury are European (with America home to some of the lesser marques), most of their customers come from Asia. Asians bought more than half of the €281bn (\$315bn) in bling sold last year. Chinese buyers alone have gone from 1% of purchases in 2000 to 35% last year, according to Bain, another consultancy. But most of that—perhaps 70%—was purchased overseas,

often on jaunts to Europe. Just over a tenth of all luxury sales were actually booked in mainland China.

Unless intercontinental tourism rebounds faster than expected, new ways will have to be found to get Euro-chic into Chinese hands. Firms hope that shopping sprees will simply move from Paris to Shanghai. In the short run, this might boost margins: the likes of Louis Vuitton (part of LVMH, the biggest luxury group) and Gucci (part of Kering, another French giant) charge a third more in China than in Europe for the same products. Closing a few flagship stores in high-rent tourism hotspots such as Paris or Milan, which usually sell half their stock to tourists, could save firms money in property costs.

Yet any boost to margins may be short-lived. The difference between European and Chinese prices has narrowed. Those in China have been declining as apps make international price comparisons easier and firms woo shoppers facing ever more restrictions from Chinese authorities on bringing luxury items home from abroad. And more shops on the mainland, in cities they would once have deemed *déclassé*, may diminish the aura of exclusivity that shopping on Avenue Montaigne in Paris or New York's Fifth Avenue confers. The de facto discounts were aimed at luring buyers to the West precisely for that reason.

The pandemic has accelerated other trends. Online sales of luxury goods, at 7-8% of the total on average, are around half those of mass-market fashion retailers like H&M and Zara. The closure of shops has, predictably, eased some of the reservations brands may have about selling their wares on the internet. LVMH has said online purchases are "significantly higher" as a share of sales than pre-pandemic. Sales through department stores—which are in terrible financial shape, notably in America—are also likely to shrink.

Meanwhile, costs may rise. Though they love to show off in-house

“artisans” stitching handbags and the like, even the poshest *maisons* quietly outsource some of their production. Many rely on outsiders for more than half their products. These suppliers are often small family firms in Italy, which went into the pandemic with slim margins and slimmer financial buffers. Luxury groups are now having to assist them financially in a hurry lest they disappear for good.

All this paints a drab financial picture. Sales are forecast to fall by a third in 2020, and recover only by 2022 at the earliest. That will crimp margins, since luxury firms’ costs are largely fixed. Rents must still be paid and brands advertised—the poshest ones spend the best part of \$1bn a year on marketing—even as sales droop.

In many industries, squished margins and falling sales might lead to a slew of takeovers. Few expect that to happen in luxury. Most of the big players have healthy balance-sheets and are expected to find ways to return to profitability (see chart 2). Many smaller marques are controlled by founders or their families, who are loth to sell in a downturn. If anything, consolidation might slow; all eyes are on whether LVMH will complete its \$17bn takeover of Tiffany, an American jeweller, agreed weeks before covid-19 struck.

Not all parts of the industry are equally vulnerable. In a crisis, buyers stick to more established brands. “They want the best of the best,” says Luca Solca of Bernstein, a broker. Good news, then, for the likes of Louis Vuitton and Chanel, which have in fact pushed up prices in recent months. In contrast, brands hoping for a turnaround in their fortunes—Burberry is a perennial candidate—are less able to gain the attention a relaunch might otherwise garner.

Some segments have also been hit harder than others. Perfumes and cosmetics have held up best: a lockdown is no reason to forgo a skincare

regime, apparently. Fashion houses face bigger problems, as cooped-up fashionistas see less need to replenish their wardrobes. Worse, unlike jewellery or handbags, surplus stock of apparel is rapidly going out of style. Overt discounts are frowned upon in luxury for fear of cheapening precious brands. Most at risk are fancy watchmakers like Richemont, which attract sellers at fairs and trade shows that have now been cancelled.

The question is whether amid this shake-up the luxury world can keep its grip on the wallets of the world's big spenders. Fears that consumers would opt for a more ascetic post-pandemic future are dissipating: reports of "revenge shopping" as China emerged from lockdown implies that rich folks' appetite for status symbols remains intact. But these worries are being replaced by those over Chinese shoppers developing a taste for nascent local brands, at the expense of the old-world stalwarts.

The biggest potential changes may concern the designers themselves. By late June the most exalted would normally start displaying autumn and winter collections in shop windows. This year they will make up for lost time by selling their summer season through the summer, as might seem sensible anyway. Giorgio Armani, an Italian veteran, has argued this should become the new norm. What a bold fashion statement that would be. ■



疫情中的奢侈

时尚灾民

在低迷期，奢侈品行业将大浪淘沙

往年此时，米兰、巴黎或纽约通常都会挤满时尚达人，在从巴黎世家的秀场到香奈儿的派对等时尚盛事之间不断赶场。2020年却不是这样。各种时装周都已经取消，改成了线上时装秀。出售爱马仕领带和Prada鞋子的店铺才刚刚重新开门营业，还不知道该如何处理从疫情前积压下来的过时商品。通常可以随时就位“带货”的Instagram网红们却巧妇难为无米之炊。

从手提包和高级时装，到钻石戒指和昂贵的瑞士手表，个人奢侈品行业在过去几个月里进入了休眠模式。波士顿咨询公司的数据显示，在3月至5月疫情高峰期，奢侈品销售额同比下降了约75%。随着亚洲、欧洲和美洲先后重启经济，销售缓慢回升。但即便如此，这个行业的前景光芒折损。

全球经济衰退的阴云笼罩着这个靠消费者信心推动的行业。除了短期冲击之外，该行业的制造方式、销售地点和销售对象都面临一场全面变革。时尚趋势曾经十年一转，如今却可能几个季度一变。快速的变化让这个本应散发永恒传承气质的行业紧张不安。

先来看看消费者的分布情况。尽管大多数奢侈品公司来自欧洲（一些二线品牌来自美国），它们的顾客却大多来自亚洲。去年售出的价值2810亿欧元（3150亿美元）的奢侈品中，一半以上卖给了亚洲人。另一家咨询公司贝恩表示，仅中国人奢侈品消费占比就从2000年的1%上升到了去年的35%。但其中大部分（大概70%）购于海外，通常是在欧洲旅行的途中。实际上，在所有奢侈品销售中，只有十分之一略多发生在中国大陆。

除非跨洲旅游业的反弹速度快于预期，否则必须找到让欧洲奢侈品进入中国的新途径。奢侈品公司希望中国人直接把扫货地点从巴黎改到上海。短期内这可能会提高利润：路易威登（隶属于最大的奢侈品集团LVMH）和古驰（属于另一家法国巨头开云集团）等公司的产品在中国的标价比在欧

洲贵三分之一。关掉几家开在巴黎或米兰等旅游热点地段的租金高昂的旗舰店可以为公司节省物业成本，通常这些店里一半的货品都是卖给游客的。

不过，任何利润提升可能都是短暂的。欧洲和中国的价差已经缩小。有了手机应用，人们更容易比较不同地区的售价，而且奢侈品公司努力吸引的消费者从国外带奢侈品入境时面临中国海关越来越多的限制，因此奢侈品在中国的价格一直在下降。而如果这些公司在它们过去看不上的中国城市开出更多店，可能会褪去人们在巴黎蒙田大道或纽约第五大道购物的“尊享”的光环。这正是它们过去通过价差这种变相的折扣把消费者吸引到西方购物的原因。

疫情还加速了其他趋势。奢侈品的在线销售额平均占总销售额的7%至8%，约为H&M和Zara等大众时尚零售商占比的一半。可想而知，关闭实体店铺让品牌对网上销售的保留态度有所放松。LVMH表示，在线购物占总体销量的比重如今“大大高于”疫情之前。通过百货商店（财务状况糟糕，在美国尤其如此）实现的销售额也很可能会减少。

与此同时，成本可能会上升。尽管奢侈品牌喜欢炫耀自家“工匠”手工缝制的手袋等产品，但即便是最奢华的品牌也悄悄地将部分产品的生产外包。许多品牌一半以上的产品都依靠外部生产。这些供应商通常都是意大利的小型家族企业，在疫情发生之前本就利润微薄，财务缓冲能力差。奢侈品集团现在不得不加紧给予它们经济上的援助，以免它们永远消失。

这一切描绘出一个黯淡的财务前景。预计2020年销售额将下降三分之一，最快要到2022年才能恢复。由于奢侈品公司的成本大体上是固定的，这将压缩利润。在销售额下滑之时，它们要照付租金、照做广告（最奢华的品牌每年的营销支出近10亿美元）。

在许多行业中，利润和销售额下降可能引发大量收购。少有人认为奢侈品行业会出现这种情况。大多数大公司的资产负债表都很健康，预期也会找到恢复盈利的方法（见图表2）。许多较小的品牌由创始人或家族控制，

他们不愿在经济低迷时期卖掉公司。如果说在这方面真会有什么变化，那就是整合可能会放缓。市场在密切关注LVMH是否会完成在疫情爆发的几周前达成的一项交易：以170亿美元收购美国珠宝商蒂芙尼。

并非行业中的每个部分脆弱度都一样。在危机中，消费者会坚持选购更成熟的品牌。“他们想要优中择优。”经纪公司盛博的露卡·索尔卡（Luca Solca）说。对路易威登和香奈儿这类品牌来说，这是个好消息。事实上，近几个月它们还抬高了价格。相比之下，那些希望扭转命运的品牌（博柏利是常驻代表）在危机时期更难获得一次重新开张本可能带来的关注。

一些细分市场受到的冲击也比另一些更大。香水和化妆品的销售维持得最好——显然不能因为封城了就不护理皮肤了。时装公司的麻烦更大些，因为居家隔离的时尚达人们不再需要添置那么多衣物。更糟糕的是，与珠宝或手袋不同，积压的服装库存正在迅速过时。由于担心伤害品牌价值，奢侈品行业不喜欢公开打折。风险最大的是像历峰集团（Richemont）这样的高档钟表制造商，它们通常通过交易会和贸易展吸引经销商，但如今这些活动都已取消。

问题是，在这场动荡中，奢侈品行业是否能够继续抓住那些消费大户的钱袋。对于疫情后消费者可能变得更克制的担忧正在消散：对中国解除封城后出现“报复性购物”的报道表明，富人对象征地位的奢侈品的偏好依然如故。但新的担忧是中国消费者如今对新兴的本土品牌青睐有加，从而损害到国际老品牌的销量。

可能发生的最大变化可能关乎设计师自身。最受尊崇的设计师通常会从6月下旬开始在门店的橱窗展示秋冬系列。今年，他们将在整个夏季销售夏装来弥补损失。这似乎也是明智之举。意大利时装设计大师乔治·阿玛尼认为这应成为新常态。这将是多么大胆的时尚宣言啊。■



Industry in Africa

Will it bloom?

The continent is searching for its own path to economic take-off

THE FATHER of development economics and the father of African nationalism did not take long to fall out. Arthur Lewis had made his name studying industrial revolutions. Kwame Nkrumah, Ghana's first prime minister, had made his resisting British rule. On independence in 1957 Nkrumah invited Lewis to be his adviser.

It seemed a wise pick. Lewis was astute, respected, and trusted in anti-colonial circles. Later, he would win a Nobel prize for economics (the first black person to do so). In a landmark paper, he argued that in developing economies people were poor because they were in the wrong jobs: move them from subsistence farms into factories and commercial farms and the economy would grow.

But how to make it happen? Nkrumah wanted to throw money at factories. "I am a politician," he explained, "and must gamble on the future." Lewis urged balance. "If agriculture is stagnant," he once wrote, "industry cannot grow." He lasted only 15 months in the job. Meanwhile, it was the countries of East Asia, not Africa, that industrialised and grew rich.

The question of how to make African economies more productive is gaining new urgency amid a pandemic that is disrupting supply chains. Shortages of drugs and medical equipment are fuelling calls for the local production of essential goods. Tito Mboweni, South Africa's finance minister, wants to "set up manufacturing to make what we need and stop relying on imports from China". Uganda is trying to discourage imports. Ghana also says it is making import substitution a priority.

Yet a transformation of sorts had already begun well before covid-19. The proportion of Africans working on farms fell from 66% in 2000 to just under 58% in 2015. Most of these people flowed into informal services or petty manufacturing, such as taxis or roadside carpentry, where they earn more than farmers. They do not represent the industrial revolution of which policymakers dream. Yet beneath that broad trend lies a myriad of stories. Nigeria is slowly shaking off its dependence on oil exports. Rwanda hosts conferences and upmarket tourists. Lesotho, one of the few countries to have moved successfully into manufacturing, ships out its apparel along South African roads.

In Ethiopia Bensa Buta spends his days in a tiny cubicle, a picture of the Virgin Mary stuck to the wall, entombed in a mountain of teff. The 86-year-old trader has been dealing in the grain since the days of Emperor Haile Selassie. The market has changed “incomparably”, he says. Ethiopians use injera, a spongy teff pancake, as plate, cutlery and tasty carbohydrate. Now many buy it ready-made rather than baking it at home. Making or selling injera employs more than 100,000 people.

Across Africa, goods once made at home are now being bought and sold. Rural Africans spend only 40% of their work hours on their farms, and the rest on side-businesses such as transport or trade. They buy nearly half the food they eat, as well as concrete blocks and tin sheets for their homes.

Commercialisation is most evident in the towns and cities. Appetite is growing for processed foods, meat, dairy foods and vegetables. “These kids are looking to try new things,” says Monica Musonda, a Zambian businesswoman who has launched an instant-noodle company. In Ghana, a self-anointed “Koko King” has turned millet porridge into a convenience food for harried commuters. Another entrepreneur has built a multinational drinks company by bottling traditional herbal bitters.

Expanding markets create economies of scale. Many of Africa's manufacturers began life as trading firms, switching from imports to local production. The same logic is pulling foreign companies to the continent. Consultants at McKinsey estimate that Chinese firms handled 12% of Africa's industrial production in 2017, employing several million people. Only a few were eyeing exports to the West. Instead, 93% of their revenues came from local and regional sales. Tian Tang, a Chinese business in Uganda, was founded by a trader importing suitcases; it now makes steel, plywood and mattresses. Another outfit chasing untapped demand is Roha, an American firm. In Ethiopia it built a factory making glass bottles for local brewers.

African growth is already being driven by internal consumption and investment, argues Carlos Lopes of the University of Cape Town. The expansion of regional trade would reinforce that dynamic, especially in industry. Manufactured goods make up only 19% of African countries' exports to the rest of the world, but 43% of what they sell to each other.

Yet Africa will not get rich by producing only for itself. The countries south of the Sahara have less combined purchasing power than Germany. To find larger markets, firms must export to the world. As they learn to compete globally, they also become more productive.

Some argue that the key to East Asia's early growth was an activist state, high investment and a relentless focus on manufactured exports. Africa has never come close to replicating it. An early wave of import substitution was derailed by a debt crisis. In the 1980s the state lost interest in industrial policy. Factories closed as the IMF and World Bank pressed governments to open their markets to foreign competition.

Unlike Africa, East Asia has little wealth buried beneath its soil, so it relied on sweat instead. At first, low wages gave it a competitive edge. Although

Africa has millions of poor people, many African countries are unable to follow the Asian model because their labour costs are too high, according to researchers at the Centre for Global Development, a think-tank. However, wages in Asia have risen a lot in recent years. Since transport costs have fallen, many tasks can now be done thousands of miles apart. Garment firms in Africa stitch shirts from imported fabrics and buttons; carmakers piece together kits of parts. That makes it easier to get a foot on the industrial ladder, but harder to climb beyond the first rung.

So African countries are scouting out a new path. “The scope for classic labour-intensive, export-oriented industrialisation is narrower now,” says Yaw Ansu, who advises the minister of finance in Ghana. “But countries like us can compensate by basing our model on adding value to our agriculture and natural resources.” One example is Blue Skies, a company near Accra. Its workers dice fruit sold in European shops.

Another example is horticulture. In normal times, more than 400 tonnes of cut flowers are flown out of Nairobi every day, on average. In Ziway, an Ethiopian town, kilometre-long greenhouses sprawl like aircraft hangars beside the dust and donkey carts. Roses grow for transport to the Netherlands. Covid-19 has thrown many of these firms into crisis. But when travel and trade bounce back, so will opportunities.

This is not classic manufacturing, but it is not subsistence farming either. Economists at UNU-WIDER, a research institute, talk of these as “industries without smokestacks”. They include tourism and call centres. Africa’s diversity means there will be many routes to success.

Six years ago Roger Lee decided to open a new factory. As the boss of TAL Apparel, a clothing firm in Hong Kong, he already ran operations from China to Indonesia. In Ethiopia he found a supportive government, duty-free access to American markets and wages that were a tenth of what he

paid in China. So he rented a shed at a new industrial park in Hawassa.

If Asian-style manufacturing is to take off anywhere in Africa, it might be in Ethiopia, which has some of the lowest wages in the world. Clothing firms like TAL employed 27,000 people in Hawassa before the covid crisis. One Asian factory-owner says the city reminds him of a Bangladeshi port when his uncles opened shop there three decades ago.

Yet Hawassa is an experiment, and much could still go wrong. Ethnic riots have caused shutdowns. Workers rarely meet production targets. Most are young women from the countryside. “They don’t have the mindset for working in a factory,” sighs a manager. Bosses show “no mercy”, says one 19-year-old, rushing from her shift to night class at a local college. It is hard to get time off for sickness or to sit an exam. Workers’ pay does not stretch far and rents are high, so they sleep four to a room.

The low wages that pull in investors also push workers away. In its first year of operation, attrition rates at the industrial park were roughly 100%. Chris Blattman of the University of Chicago and Stefan Dercon of the University of Oxford tracked new hires in Ethiopian factories and commercial farms. A third quit within three months, and 77% within a year.

The Ethiopian experience points to the paradoxes at the heart of Africa’s transformation. While economists worry about jobless millions, factory bosses struggle to find pliant labour. Workers arrive late and quit at harvest time. Contracts are hard to enforce. Markets gum up.

None of this would surprise a visitor from 18th-century Lancashire or 1990s Guangdong. In societies set to agrarian rhythms, the transition to industrial capitalism is a profound social rupture. It carries new notions of law, time and discipline, and creates new kinds of people: commercial farmers, docile workers, methodical managers. It means loss as well as gain. It

should be no surprise when many people are indifferent or hostile to change.

The same hesitation is found in some African leaders, long cushioned by aid and oil money. “The urgency for economic transformation is not making them lose any sleep,” says Abebe Shimeles of the African Economic Research Consortium. Yet demographic destiny is pushing the continent towards a reckoning. Some 15m-20m young Africans are entering the workforce each year. Without good jobs, many may take their grievances to the streets.

Some economists such as Dani Rodrik at Harvard University argue that automation, competition and shifting demand are closing the door to countries wanting to copy Asia’s miracle. Yet not everyone needs a factory job. Many Africans will move from subsistence farms to commercial ones, or from living alongside a game reserve to guiding tourists around one. Economic transformation, of a distinctively African kind, is a prize worth chasing. ■



非洲工业

会盛开吗？

非洲大陆正在寻找自己的经济腾飞之路

发展经济学之父和非洲民族主义之父很快就出现了意见不合。阿瑟·刘易斯（Arthur Lewis）以研究工业革命闻名。加纳首任总理夸梅·恩克鲁玛（Kwame Nkrumah）成名于抵抗英国统治。1957年加纳独立时，恩克鲁玛邀请刘易斯担任他的顾问。

当时看来这是个明智的选择。刘易斯机敏精明，受人尊敬，在反殖民统治的圈子里颇受信赖。后来，他获得了诺贝尔经济学奖（成为首个获颁该奖的黑人）。他在一篇具有里程碑意义的论文中指出，在发展中国家，人们之所以贫穷，是因为干的活不对：把他们从自给农场转移到工厂和商业农场中，经济就会增长。

但这要如何实现呢？恩克鲁玛想砸钱建工厂。“我是政治家，”他解释说，“必须赌未来。”刘易斯竭力劝他保持平衡。“如果农业停滞不前，”他曾写道，“工业就无法发展。”他的顾问工作只坚持了15个月。在这一时期，实现工业化和致富的是东亚而不是非洲的国家。

在疫情扰乱供应链的情况下，如何提高非洲经济生产力的问题变得更加紧迫。由于药品和医疗设备短缺，要求必需品的生产本地化的呼声越来越高。南非财政部长蒂托·姆博韦尼（Tito Mboweni）希望“发展制造业来满足我们的需求，不再依赖从中国进口”。乌干达正试图限制进口。加纳也表示正在优先发展进口替代。

不过，早在疫情发生之前很久，某种转型就已经开始了。非洲的农业人口比例在2000年为66%，2015年跌至不到58%。其中大多数流向了非正规服务业或小规模制造业，例如开出租车或在路边做木工，收入比务农高。他们并不代表政策制定者梦想的工业革命。然而，在这种大趋势之下，很多变化正在发生。尼日利亚正在慢慢摆脱对石油出口的依赖。卢旺达在发展

会展业和高端旅游。莱索托是为数不多的成功向制造业转型的几个国家之一，它生产的服装通过南非的公路运往各地。

在埃塞俄比亚，商人邦萨·布塔（Bonsa Buta）每天都待在一间贴着圣母玛利亚画像的小屋里。这个小屋隐藏在一座种满苔麸的山中。86岁的他从海尔·塞拉西一世（Emperor Haile Selassie）时期起就做苔麸贸易了。他说，现在市场变得和以前“大不一样”。对埃塞俄比亚人来说，英吉拉这种海绵状的苔麸薄饼既能当盘子、餐具用，又是美味的碳水化合物。现在，许多人都是直接买成品英吉拉，而不是在家中自己烙制。现在制作或销售英吉拉的从业人员超过十万。

在整个非洲，以前在家中制作的物品现在都在买卖。在非洲农村，人们只花40%的工作时间在自家田里干活，其余时间去做运输或贸易等副业。他们不仅购买盖房用的混凝土砖和锡板，自己吃的食物也有近一半是买来的。

商业化在城镇最为明显。人们对加工食品、肉类、奶制品和蔬菜的需求越来越大。“孩子们都想尝试新东西。”创建了一家方便面公司的赞比亚女商人莫妮卡·穆松达（Monica Musonda）说。在加纳，一位自封“小米大王”的商人为赶时间上班的通勤族供应由小米粥加工而成的方便食品。另一位企业家通过生产瓶装的传统草药味饮品打造了一家跨国饮料公司。

不断扩大的市场形成了规模经济。许多非洲制造企业都是从贸易公司起家，从进口转为本地生产。同样的逻辑也将外国公司吸引到了非洲。麦肯锡的咨询顾问估计，2017年，中国企业在非洲贡献了12%的工业产值，雇用了数百万名员工。其中只有少数企业专注于向西方出口。而中国企业93%的收入来自当地和区域销售。乌干达的中国企业天唐集团前身是一家进口手提箱的贸易公司，现在生产钢材、胶合板和床垫。另一家前来开发潜在市场需求的公司是美国的Roha。它在埃塞俄比亚建了一家工厂，为当地酿酒商生产玻璃瓶。

开普敦大学的卡洛斯·洛佩斯（Carlos Lopes）认为，非洲的增长已经在

由内部消费和投资拉动了。区域贸易的扩大将增强这种活力，特别是在工业领域。工业制成品仅占非洲国家对世界其他地区出口的19%，却占到非洲国家之间贸易的43%。

但是，非洲无法仅靠供应本地市场致富。撒哈拉以南国家的总体购买力还不如德国一国。为了寻找更大的市场，企业必须向世界出口商品。在学习在全球范围内竞争的过程中，它们的生产效率也不断提升。

有些人认为，东亚早期发展的关键在于积极干预的政府、高投资和对出口制造业的不懈坚持。而一直以来非洲距离复制这一切都相去甚远。债务危机打乱了早期的进口替代浪潮。二十世纪80年代，政府对产业政策失去了兴趣。由于国际货币基金组织和世界银行向非洲各国政府施压，要求它们开放市场接受外国竞争，工厂纷纷倒闭。

与非洲不同，东亚的地底下没有埋藏多少财富，因此它的发展依靠勤劳和汗水。起初，低工资给东亚带来了竞争优势。据智库全球发展中心

（Centre for Global Development）的研究人员称，虽然非洲有数以百万计的贫困人口，但许多非洲国家由于劳动力成本过高，无法效仿亚洲模式。然而，近年来亚洲的工资水平上涨了很多。由于运输成本下降，现在有很多工作可以在千里之外的地方完成。非洲的服装公司用进口的面料和纽扣缝制衬衫；汽车制造商将成套的零件组装起来。这使得非洲更容易踏上工业阶梯，但要从第一级再往上爬就更难了。

因此，非洲国家正在探索一条新的道路。“现在，传统的劳动密集型、出口导向型的工业化空间越来越窄。”加纳财政部长的顾问尤·安苏（Yaw Ansu）说。“但像我们这样的国家可以把发展模式建立在为自己的农业和自然资源增值的基础上，以弥补这一点。”加纳首都阿克拉（Accra）附近的蓝天公司（Blue Skies）就是一例，其工人的工作是把要运往欧洲的水果切块。

另一个例子是园艺。正常情况下，平均每天有400多吨切花从内罗毕空运出境。在埃塞俄比亚的小镇济瓦伊（Ziway），一座座一公里长的温室像

飞机库一样排列着，旁边停着垃圾车和驴车。这里种植的玫瑰要运往荷兰。疫情导致许多这类公司陷入危机。但等到旅行和贸易恢复之日，机会也会再来。

这不是典型的制造业，但也不是自给自足的农业。研究机构联合国世界发展经济研究院（UNU-WIDER）的经济学家把这些称为“无烟产业”。它包括旅游业和呼叫中心。非洲的多样性意味着成功之路不止一条。

六年前，李震之决定开设一家新工厂。他是联业集团的老板，这家香港服装公司的工厂已经遍及从中国到印度尼西亚等地。在埃塞俄比亚，他发现政府支持外资企业，从这里产品可以免税进入美国市场，且工资水平是他在中国大陆所付的十分之一。于是，他在哈瓦萨（Hawassa）的一个新工业园区里租了一间厂房。

如果亚洲式的制造业能在非洲哪个国家腾飞，那可能就是埃塞俄比亚了，那里的一些工资在世界最低之列。在新冠危机爆发之前，联业集团等服装公司在哈瓦萨雇用了2.7万名员工。一位亚洲工厂的老板说，这座城市让他想起了30年前孟加拉国的一个港口，当时自己的几个叔叔在那里刚刚开设了工厂。

不过，哈瓦萨只是一个实验，可能出问题的地方还有很多。种族骚乱曾导致停工。工人很少能达到生产目标。大多数工人是年轻的农村妇女。“他们没有在工厂工作的心态。”一位经理感叹道。一名下了班赶着去上当地大学夜校的19岁女工说，老板可“不会留情”。无论是休病假还是去考试，都很难请到假。工人的工资不太够用，租金又高，所以四个人睡一个房间。

低工资引来了投资者，却赶走了工人。在投入运营的第一年，工业园区的员工流失率差不多是百分之百。芝加哥大学的克里斯·布拉特曼（Chris Blattman）和牛津大学的斯特凡·德尔康（Stefan Dercon）追踪了埃塞俄比亚工厂和商业农场新员工的情况。有三分之一的员工在三个月内辞职，77%在一年内辞职。

埃塞俄比亚的经历显现出非洲转型的核心矛盾。一方面经济学家担心数百万人没有工作，另一方面工厂老板们却在苦苦寻找听话的劳动力。工人经常迟到，到了农作物收割季节就会辞职。合同难以执行。市场一片混乱。

十八世纪的兰开夏郡或二十世纪90年代的广东省的人们若看到这情景，不会感到惊讶。在习惯了农耕节奏的社会中，向工业资本主义的过渡是一次深刻的社会断裂。它带来法律、时间和纪律的新观念，并创造了新型的人：商业农民、服从管束的工人、按部就班的管理者。这既会带来损失，也会带来收益。许多人对变化无动于衷或抗拒抵触，也就不足为奇了。

在一些非洲领导人身上也能看到同样的犹豫。长期以来他们以援助和石油收入做后盾。“经济转型的紧迫性丝毫没有让他们睡不着觉。”非洲经济研究联合会（African Economic Research Consortium）的阿贝贝·希梅利斯（Abebe Shimeles）说。不过，人口结构趋势正在推动非洲认清形势。每年大约有1500万至2000万的非洲年轻人加入劳动力大军。没有好的就业机会，很多人可能会上街抗议。

哈佛大学的丹尼·罗德里克（Dani Rodrik）等一些经济学家认为，自动化、竞争和需求变化使得大门正在对那些想要复制亚洲奇迹的国家关闭。然而，并不是每个人都需要一份工厂的活计。许多非洲人将从自给自足农场转向商业农场，或者从与野生动物保护区为邻转向在保护区周围为游客做向导。独具非洲特色的经济转型值得奋力追求。■



Schumpeter

The great game

How Tencent has used stealth to become a gaming superpower

TENCENT, THE world's biggest gaming company, gives away most of its video games for nothing. Lest anyone think that the Chinese tech giant, which has a market value of \$580bn, has a heart of gold, think again. It makes most of its gaming sales by encouraging players to buy virtual clothing, weapons, explosives and the like. These are usually cheap but prices increase depending on their cosmetic appeal or effectiveness in blasting an opponent to smithereens. For reasons known only to gamers, they willingly pay. During the lockdown in China, gaming revenues soared.

In the real world, that same scattershot purchasing model is one that Tencent has used to build, stealthily, a bridgehead in the global gaming industry. This year it has taken stakes in two Japanese games developers. Last year it took control of Supercell, a Finnish creator in which it had already invested about \$8.6bn. It owns 100% of Riot Games, American publisher of "League of Legends", and in the past decade has amassed stakes in more than a dozen other of the world's hottest game developers, including Epic, owner of the smash hit "Fortnite". According to *Technode*, which reports on Chinese tech firms, in that time it has made more than 100 other investments in fintech and artificial intelligence, particularly in America. It has stakes in household names such as Tesla, Uber, Snapchat and Spotify, and opens its chequebook for digital pioneers in India and the rest of Asia. Yet unlike other Chinese-owned, globe-spanning firms such as Huawei and TikTok, it rarely faces the sort of public backlash that has grown common as a result of America's tensions with China. Its unique approach to international gaming helps explain why.

Until recently, Tencent's gaming acquisitions overseas looked more like

disparate bets than part of a strategic master-plan, which helped keep them under the radar. That is because Tencent's main focus has always been China, where WeChat, its chat service-turned-superapp of 1.2bn users, drives traffic for gaming, streaming services such as music and video, digital payments and business services, as well as generating copious advertising. Gaming has long been Tencent's biggest cash generator. Though its share of revenues is falling as Tencent diversifies into the business market and fintech, its high profitability remains crucial for keeping the wheels of the digital leviathan running. The company controls more than half of China's \$33bn gaming market, and has helped pioneer gaming on smartphones, where China leads the world. For foreign gaming companies that receive its cash, one of the main attractions has been to go into partnership with Tencent to bring their games into China.

Notwithstanding the first-quarter surge, gaming growth in the Middle Kingdom is no longer setting the blistering pace of a few years ago and, as so often in China, the state has intruded. In 2018-19 the gaming industry was kneecapped by President Xi Jinping's crackdown on online addiction, blood, butchery, boobs and bums (there are rules for how much skin a female avatar can show). Faced with domestic headwinds, David Dai of Bernstein, an equity-research firm, says Tencent will quintuple gaming revenue from overseas from a pittance last year to about \$3.5bn in 2021. It will do that by building on partnerships with foreign firms in which it holds stakes to make mobile games for the global market. Last year one of its studios developed a mobile version of "Call of Duty", Activision Blizzard's PC and console blockbuster. It was the biggest launch of a mobile game ever. This year, it is working with Riot to launch a smartphone version of "League of Legends", the most popular desktop game in history. Ultimately, as a Tencent insider puts it, the dream is to "go it alone"; ie, to produce a Tencent game somewhere in the world that is a global hit.

If that happens, Tencent's higher profile will generate a bigger risk of

geopolitical flak, even if gaming is hardly a strategic threat to anyone. Yet the way it operates its sprawling empire may provide it with cover. Tencent stands apart from many Chinese firms by the freedom it gives the companies it invests in to act with autonomy, to compete fiercely against each other (and Tencent itself), and by promising to keep most of their data out of its clutches. This is particularly true in gaming, says Steven Messner, a specialist on Chinese gaming at *pc Gamer*, an industry publication. “It is not in the business of telling companies what to do.”

Some investors would like it to be more proactive in knitting its disparate strands together, to cash in more effectively on people’s data and boost its advertising revenues. Some grumble on Reddit, a fire-hose of gamer chat (in which Tencent also owns a stake), about the risks its acquisitions pose of bringing China’s bossy regulations to their anarchic pastime. But so far its global gaming investments have been spared the scrutiny from American authorities which other big Chinese firms have faced. If they focus at all on Tencent, it is on WeChat, because of allegations it is used to support surveillance and censorship in China. Yet WeChat is not used with gaming in the rest of the world. One reason for the China hawks’ relaxed attitude may be because of Tencent’s strategically ambiguous and hands-off approach to its gaming assets.

| *Brother, can you spare a Tencent?*

In fact, Tencent could be a force for good if it promotes mobile gaming globally. More than two-thirds of Chinese gamers play on their smartphones, compared with just over a third of American ones; the latter have five years of catching up to do. Tencent also hopes to develop cloud-gaming, in which 5G smartphones and faster connectivity enable players to stream games as easily as films, and increase use of augmented and virtual reality in mobile gaming. The trouble is that its partner in both endeavours in China is Huawei, which will raise hackles in America. Expect to hear

more about Tencent's global gaming prowess in the future. Tencent, of course, will hope that this attention is not because it, too, gets caught up in Sino-American bangs and explosions. ■



熊彼特

大游戏

腾讯如何悄然长成了游戏世界里的超人

全球最大的游戏公司腾讯的大部分电子游戏都可以免费玩。如果你就此认为这家市值5800亿美元的中国科技巨头真是良心商家，你得再想想。腾讯游戏收入的大部分都来自鼓励玩家购买虚拟服装、武器、炸药等装备。这些装备通常很便宜，但外观越酷炫，或是将对手炸成碎片的威力越大，价格就越高。玩家出于只有他们这群人才知道的原因心甘情愿地花钱。在中国因疫情封城期间，游戏业务的收入飙升。

在现实世界中，腾讯也采取了同样遍地开花的购买模式，在全球游戏产业中悄然建起桥头堡。今年它入股了两家日本游戏开发商。去年，它取得了芬兰游戏开发商Supercell的控制权，此前它已经在这家公司投资了约86亿美元。它还拥有《英雄联盟》（League of Legends）的发行商、美国的拳头游戏公司（Riot Games）100%的股份，并在过去十年里入股了其他十几家世界最红火的游戏开发商，包括拥有大热游戏《堡垒之夜》（Fortnite）的Epic。报道中国科技公司的《动点科技》（Technode）称，这十年间，腾讯在金融科技和人工智能领域开展了100多项其他投资，尤其是在美国。它在特斯拉、优步、Snapchat和Spotify等家喻户晓的公司都持有股份，还向印度和亚洲其他地区的数字先驱企业大举投资。由于中美关系紧张，公开抵制华为、TikTok等在全球扩张的中资企业已经成了家常便饭，但腾讯却很少面对这些。这从它处理国际游戏业务的独特方式中可以找到一些原因。

直到最近，腾讯在海外的游戏业务收购看上去都更像是一个个互不相干的赌注，而不像是一个大战略的一部分，这帮助它们避开了关注。之所以如此，是因为它的业务重心一直放在中国。在那里微信已经从聊天软件变成了拥有12亿用户的超级应用。除了带来了大量广告业务，它还游戏、音乐和视频等流媒体服务、数字支付及商业服务增加了流量。长期以来，游戏一直是腾讯最大的摇钱树。尽管随着腾讯向商业市场和金融科技等方面

多元化发展，游戏的营收份额有所下降，但其高盈利能力对维持这个数字巨头的运转仍然至关重要。中国游戏市场价值高达330亿美元，腾讯在其中占据了大半江山；它还帮助开拓了智能手机游戏市场，如今中国在这个领域领先世界。对于接受腾讯投资的外国游戏公司来说，其中一个主要的吸引力是通过与腾讯合作将自家游戏带到中国市场。

尽管第一季度中国的游戏市场大幅增长，但增幅已经不再像几年前那样迅猛。而正如在中国经常发生的那样，政府已经介入这个领域。2018至2019年，国家主席习近平出手整治网瘾、血腥暴力、凶杀和淫秽色情等（对游戏中女性角色的衣着暴露程度设置了规定），重创了游戏行业。证券研究公司盛博的戴昊表示，面对国内的不利局面，腾讯将扩大海外游戏业务：到2021年，这一块将在去年不大的基数上增长四倍，达到约35亿美元。为实现这个目标，腾讯将加强与自己持股的国外公司的合作，为全球市场开发手机游戏。去年它旗下的一家工作室为动视暴雪公司（Activision Blizzard）的爆款电脑和主机游戏《使命召唤》（Call of Duty）开发了手机版，刷新了手机游戏首周下载量的世界记录。今年，它正与拳头游戏公司合作推出有史以来最流行的电脑桌面游戏《英雄联盟》的手机版。如腾讯一位内部人士所言，公司最终的梦想是“单干”，也就是在世界某地制作出一款风靡全球的腾讯自己的游戏。

如果这个梦想成真，腾讯会吸引来更多注意，从而增加自己在地缘政治纷争中被攻击的风险，即便游戏业务几乎不对任何人构成战略威胁。不过，腾讯管理自己庞杂帝国的方式可能为它提供了掩护。有别于许多中国公司，腾讯给予其持股公司经营自主权，允许它们彼此（包括与腾讯自己）展开激烈竞争，并承诺不插手它们大部分的数据。行业刊物《电脑玩家》（pc Gamer）的中国游戏专家史蒂夫·梅斯纳（Steven Messner）说，腾讯在游戏行业更是这样做的，“它不指挥其他公司该怎么做。”

一些投资者希望腾讯能更主动地把不同的业务整合在一起，利用用户数据更高效地赚钱，并增加广告收入。一些人在游戏玩家社交网站Reddit（腾讯也持有股份）上抱怨，腾讯的收购行动可能会让他们无政府主义的消遣被置于中国专横的监管之下。但到目前为止，腾讯在全球游戏业务上的投

资还没有像其他中国大公司那样面临美国政府的审查。如果它们真要盯上腾讯，那也是冲着微信，因为微信被指用来帮助中国的监视和舆论审查。但在世界其他地方，微信并没有和游戏挂钩。对华鹰派对腾讯持宽松态度，其中一个原因可能是它在游戏资产上战略性地采取了模棱两可和不干预的方式。

| 大哥，能放过腾讯吗？

事实上，如果腾讯在全球范围内扩展手游业务，可能是件好事。在中国，超过三分之二的玩家用智能手机玩游戏，而在美国这一比例只略高于三分之一。美国得花五年时间才能赶上中国。腾讯还希望开发云游戏业务，届时5G智能手机和更快的网速会让玩家像看电影那样，轻松地在线传送游戏数据。此外它还想要在手游中更多应用增强现实和虚拟现实技术。麻烦在于，它在国内这两个项目上的合作伙伴都是华为，而这会惹恼美国。等着看未来腾讯在全球游戏领域展现更多威力吧。当然，腾讯会希望自己获得关注不是因为也被卷入了中美双方的枪炮轰炸之中。 ■



Virgin

Still smiling, captain?

Richard Branson's business empire looks for help to fly through turbulence

NO OTHER BUSINESS figure holds a candle to Sir Richard Branson when it comes to public-relations stunts. Not all of the British entrepreneur's capers go off without a hitch, however: he was once rescued by an RAF helicopter when his speedboat capsized while attempting a record-breaking Atlantic crossing. His record in business with his Virgin-branded empire is also studded with successes and failures, among the latter being Virgin Cola, Virgin Brides (an attempt to disrupt the wedding industry) and Virgin Cars (a short-lived online retailer). Through thick and thin the bearded tycoon has hustled on, armed with a high-profile brand and a cheesy perma-grin. At the end of 2019 his empire was estimated to be worth over £4bn (\$5.1bn).

That, though, was before covid-19. The Virgin group was heavily exposed to virus-induced shutdowns: among its businesses are two airlines, hotels, gyms and a cruise line. (Other interests include banking, mobile-phone and broadband networks and space tourism.) In March Sir Richard—who owns Virgin outright—said its travel, leisure and wellness businesses faced “a massive battle to survive and save jobs”.

His carefully crafted image as the corporate world's lovable outsider has taken a hit. Critics cried hypocrisy when Virgin Atlantic (VA), a long-haul airline, asked the British government for a bail-out; Sir Richard had said a decade earlier, when arch-rival BA posted a record loss, that weak firms should be allowed to die. They also noted that a rescue for a tax exile might be a bit rich. Sir Richard and the group's parent company are both domiciled in the tax- and disclosure-light British Virgin Islands. (Virgin says he moved there for lifestyle reasons, not tax, and that the main

operating companies pay tax in Britain.)

The government's rejection of a bail-out has forced managers to come up with a plan to shore up VA. The shareholders (Virgin, with 51%, and Delta, an American airline, with 49%) will defer taking fees, such as royalties; private investors are being courted for loans; the airline is hoping to renegotiate aircraft leases. It is cutting 3,150 jobs and closing hubs at Gatwick and Newark, New Jersey; and it is back in talks over a government loan, or a guarantee that would tempt credit-card firms to release frozen booking payments. A spokesman says VA "remains in a stable position".

Virgin is also looking to revive Virgin Australia, the country's second-largest airline until it slid into administration in April, rendering Virgin's 10% stake worthless. Two private-equity firms are sniffing around. Final bids are due by June 22nd. Virgin may co-invest in a recapitalisation. Neither airline was in rude health even before covid-19. VA lost £26m in 2018, the last year for which it has filed accounts. It has hired a restructuring firm to work on options, including a contingency plan for a "pre-packaged" bankruptcy.

A business that hopes to operate at a higher altitude may act as saviour: Sir Richard's space-tourism venture, Virgin Galactic, which was floated in New York last year. In recent weeks a Branson-controlled BVI firm, Vieco 10, has sold 37.5m Galactic shares, raising \$560m but cutting the tycoon's stake from over 50% to around 30%.

The proceeds will be used across the Virgin group to cushion the blow from the pandemic. They exceed the \$360m in extra liquidity that Virgin's managers, led by Josh Bayliss, reckon will be needed over the next year to ensure that all the businesses can keep trading. But that estimate has already been raised once, and the group acknowledges that more will be needed for 2021-22. Moreover, Sir Richard may be loth to cut his stake in

Galactic further. The business, currently valued at \$3.4bn, is still widely seen as promising, despite being beset by delays. Some 600 would-be space travellers have paid \$80m in deposits.

Covid could have come at a better time for Virgin. If it had struck just after the sale of Virgin America, another airline, to Alaska Air Group in 2016, the group would have been flush with the proceeds of over £800m. Instead, it came “deep in the investment cycle”, Mr Bayliss says. Virgin does not tend to sit on gains from sales for long, thanks to its owner’s restless desire to keep trying new things.

Some of these nascent businesses looked bright before covid but are now beleaguered. The first ship in the Virgin Voyages cruise line, a joint venture with Bain Capital, sits off the Florida coast, diverted there while en route to a launch event in New York when the virus struck. The price tag for that vessel and three more being built is €3bn (\$3.4bn). Virgin says the fleet has sufficient funding and it now hopes to launch in October.

The newish hotels business, with properties opened or planned in several American cities, has also been clobbered. Of the three already up and running, only Chicago is currently taking bookings. Some of Virgin’s older businesses are feeling acute pain, too. Virgin Active, which operates 238 gyms in eight countries, was shuttered in March. Sites are reopening, but the need for social distancing will limit their appeal.

Despite these tribulations, Mr Bayliss is confident Virgin can weather the storm. There are no plans to change the business model, which is essentially to run Virgin as a family office for Sir Richard, with two main parts: Virgin Group Holdings, which builds businesses, brings in partners and then partially or wholly divests; and a licensing business, which extracts royalty fees from Virgin-branded firms, often long after Sir Richard has sold out. Some 35 businesses around the world pay to use its brand;

Virgin owns equity in under half of them. Royalty income for 2018 was £94.3m, a third higher than four years earlier.

The future, Mr Bayliss argues, lies in “inverting” the old Virgin way, which put holding stakes above brand income. Royalties, he says, provide “steady, recurring liquidity, like an annuity”, whereas the returns from investing only in assets can be “lumpier”. “The value of the brand is greater and more enduring than the value of the investment capital on its own,” he says.

How valuable that brand will be once the crisis abates remains to be seen. Between now and then, a prized asset or two may have to be sold. It would not be the first time. Sir Richard has a history of sacrificing businesses to keep the empire afloat. In 1992, after a vicious fight with BA, he was forced to offload his beloved Virgin Records—the label behind bands from the Sex Pistols to Simple Minds. He later admitted to weeping when the sale closed.





维珍

机长，笑容还在？

理查德·布兰森的商业帝国寻求帮助来穿过湍流

论公关噱头，没有哪个商界人物比得上理查德·布兰森爵士（Sir Richard Branson）。然而这位英国企业家的冒险活动并不是桩桩都顺风顺水：某次尝试打破横渡大西洋的记录时，他的快艇倾覆，被英国皇家空军的直升机救起。他的维珍品牌帝国的商业战绩同样有成有败，失败的有维珍可乐、维珍新娘（试图颠覆婚庆行业）和维珍汽车（一家短命的网络零售商）。这位留着山羊胡子的大亨以一个高调的品牌和永远挂在脸上的刻意笑容做武装，不畏艰难险阻地向前冲。2019年底，他的帝国估值超过40亿英镑（51亿美元）。

不过那是在新冠疫情发生之前。病毒引发的停摆对维珍集团造成了严重影响：它旗下有两家航空公司、酒店、健身房和一家邮轮公司。（其他业务包括银行、移动电话、宽带网络和太空旅游。）完全拥有维珍品牌的布兰森在3月表示，维珍的旅游、休闲和健康业务面临“一场求生和保住工作的大战”。

他精心打造的人设——一个可爱的企业界局外人——受到了冲击。当长途航空公司维珍航空（VA）请求英国政府出手纾困时，批评人士大呼其虚伪：十年前头号竞争对手英国航空（BA）公布创纪录亏损时，布兰森曾表示应该任由实力不济的公司灭亡。批评者还指出，救助一个跨境避税的公司不免有些荒唐。布兰森的居住地和维珍集团母公司的注册地都在对税收和信息披露较少的英属维京群岛。（维珍集团表示，布兰森搬到那里是出于生活方式而非税收方面的原因，而且主要的运营公司都在英国纳税。）

政府拒绝纾困，管理层只得另外制定计划撑住维珍航空。股东（维珍集团持股51%，美国的达美航空持股49%）将推迟收取品牌授权费等费用。此外也在向私人投资者寻求贷款。维珍航空也希望重新协商飞机租赁事宜。它正在裁员3150人，并退出了盖特威克机场和新泽西州的纽瓦克机场。它

还重启协商一笔政府贷款或一项会促使信用卡公司解冻预订付款的担保协议。一名发言人表示维珍航空“状况依然稳定”。

维珍也在想办法重振维珍澳洲航空（Virgin Australia）。它一直以来是澳洲第二大航空公司，但在4月进入托管程序，维珍10%的股份因此变得一文不值。两家私募股权公司正在四处嗅探。最终报价的截止日期为6月22日。维珍可能会共同投资于资本重组。即便在疫情发生前，这两家航空公司的财务状况已经不是太好。维珍航空在2018年（该公司提交账目的最后一年）亏损了2600万英镑。它已经聘请了一家重组公司研究各种方案，其中包括“预先包装”破产的应急计划。

一个有志于飞上更高空的业务或许可以充当救星：布兰森去年于纽约上市的太空旅游公司维珍银河（Virgin Galactic）。最近几周，布兰森控股的位于英属维京群岛的公司Vieco 10出售了3750万股维珍银河的股票，筹资5.6亿美元，但这位大亨的持股比例也从超过50%降至30%左右。

这笔收入将用于整个维珍集团，以缓解疫情带来的冲击。其金额超过了乔希·贝利斯（Josh Bayliss）领导的管理层预计需要的水平——据他们估算，未来一年要确保所有业务能够继续交易需要3.6亿美元的额外流动资金。但这个估算数字已经提高过一次，而且维珍集团也承认2021至2022年还需要更多资金。此外，布兰森可能不愿意进一步减持维珍银河的股份。这项目前价值34亿美元的业务尽管屡受延期的困扰，仍被普遍看好。约有600名意欲前往太空旅行的人已经支付了8000万美元的订金。

对于维珍来说，这场疫情来得不是时候。如果它发生在2016年集团刚把另一家航空公司维珍美国航空（Virgin America）出售给阿拉斯加航空集团（Alaska Air Group）的当口，那么它手头有高达八亿多英镑的进账可供支配。而现实是，疫情发生时，用贝利斯的话说，维珍正“深陷投资周期之中”。这家公司并不喜欢长时间地靠销售收入过舒服日子，因为它的所有者渴望不断尝试新事物。

这些新兴业务中，有些在疫情发生前看起来还前景光明，现在却陷入了困

境。与贝恩资本（Bain Capital）合资的维珍邮轮公司（Virgin Voyages）的首艘邮轮在驶往纽约举行启动仪式的途中赶上了疫情，于是改道停靠在佛罗里达的海岸。它和另外三艘在建的邮轮价值达30亿欧元（34亿美元）。维珍表示船队目前资金充足，希望能在10月首航。

起步不久的酒店业务在美国多个城市开业或计划开业，现在也遭受重创。已经开始运营的三家酒店中目前只有芝加哥的一家在接受预订。维珍的部分老业务也感受到了剧痛。在八个国家经营238家健身房的维珍活力（Virgin Active）于3月关闭。目前门店正在重新开放，但由于要保持社交距离，吸引力也将受限。

尽管磨难重重，但贝利斯相信维珍能够经受住这场风暴。目前维珍还没有改变商业模式的计划。这一模式本质上就是将维珍当作布兰森的家族办公室来运营，主要分为两个部分，一个是维珍集团控股公司（Virgin Group Holdings），负责打造业务，引入合作伙伴，然后将业务部分或全部剥离；另一个是授权业务，向使用维珍品牌的公司收取授权费，通常是在布兰森售出所持股份很久之后收取。全球约有35家企业付费使用维珍品牌，维珍持有其中不到一半企业的股权。2018年的授权费收入为9430万英镑，较四年前增长三分之一。

贝利斯认为，未来在于把维珍将持股置于品牌收入之上的旧有方式“倒转”。他说，授权费提供了“像年金一样稳定且经常性的流动性”，而仅投资于资产的回报可能就“不那么稳定”。“品牌的价值比投资资本本身的价值更大、更持久。”他表示。

危机消退后维珍品牌价值几何还有待观察。在那之前，维珍可能会不得不卖掉一两件珍贵的资产。这也不是第一次了。布兰森先前就曾为维持帝国的运转牺牲掉某些业务。1992年与英国航空的一场恶斗结束后，他被迫卖掉了心爱的维珍唱片——该公司曾拥有性手枪和头脑简单（Simple Minds）等众多乐队。后来他承认，交易完成时他哭了一场。■



Chinese brands

Upping the Anta

An ambitious Chinese sportswear firm does some fancy footwork

DING SHIZHONG, the founder and boss of Anta, the world's third-biggest sportswear firm by market capitalisation, refused to let the covid-19 pandemic interfere with sales. In early February, as the virus forced shops to close, Mr Ding gave each of his 30,000 employees a new assignment: hawk Anta's apparel and shoes to personal contacts on WeChat, a messaging platform. Such resolve to protect revenues is admirable. Yet it reflects insecurity.

Anta, established in 1991, has long been runner-up on its home turf to Nike and Adidas. The Western sportswear powerhouses together accounted for over two-fifths of China's market in 2019, according to Euromonitor, a market-research firm. Anta has a sixth of the market but it is moving fast. Revenues grew by over 40% in each of the past two years, double the rate of the industry. Operating profit hit 8.7bn yuan (\$1.2bn) in 2019. But that is still only half the sum made in China by Nike.

Anta's aim is to become "a Chinese brand that stands out in the world". It is perhaps best known in the West as the shoe sponsor for Klay Thompson, a star player with the Golden State Warriors basketball team, and Manny Pacquiao, a Filipino boxer. But the brand generates few foreign sales. Even in China, many urban youngsters think Anta "lacks the cool factor", says Lu Ge of the Beijing Institute of Fashion Technology—despite being the official kit supplier for China's Olympic athletes.

That perception stems in part from Anta's customer base. Its shops are concentrated in medium-sized cities, to cater to consumers that are less well off than those in Beijing or Shanghai, the preferred haunts of Nike and

Adidas. A pair of Anta shoes typically costs a third less than a similar pair of Nikes, observes Dallas Cai of Oriental Patron, a broker. Pricier and associated with more global superstars, Nike and Adidas have far more brand appeal.

Mr Ding's all-hands-on-deck strategy and Anta's clientele may have insulated the firm from the worst of covid-19's ravages. Ms Cai observes that, as China began to re-open in late February, residents of cities where Anta is strong may have been less fastidious about social distancing than counterparts in richer locales. Revenues at Anta fell by 20-25% in the first quarter year-on-year, according to the firm's latest financial update. That looks rosy compared with Adidas. It saw sales in China drop by 58% in the same period.

Relying on rivals' bad luck is not a long-term plan. Mr Ding recently wrote that Anta aspires to make the leap from an "affordable brand" to a "desirable" one. He has some more upmarket trademarks at his disposal. In 2009 Anta acquired the Chinese operation of Fila, a sportswear firm with Italian roots. Last year, in a \$5.2bn deal, the firm bought a majority stake in Amer Sports, a Finnish outfit with assets including Wilson tennis rackets and Salomon skis. But that may not be enough to take on and beat Nike and Adidas. Shifting perceptions will be hard. ■



中国品牌

向上踏步

一家雄心勃勃的中国运动服饰公司走出了一些花式步法

全球市值第三大运动服装公司安踏的创始人兼老板丁世忠拒绝让新冠疫情影响销售。2月初，病毒迫使商店关门后，他给全部三万名员工都分配了一项新任务：把安踏的服装和鞋子推销给微信上的联系人。这种保卫营收的决心令人钦佩，但也反映出一种不安全感。

创立于1991年的安踏在其本土市场一直跟随耐克和阿迪达斯之后。市场研究公司欧睿（Euromonitor）的数据显示，2019年这两家西方运动服饰巨头总共占到中国市场的五分之二以上。安踏占六分之一，但发展迅速。过去两年它的收入每年增长超过40%，是整个行业增速的两倍。2019年营业利润达到87亿元，但仍然只有耐克在中国的营业利润的一半。

公司誓言“要做世界的安踏”。在西方，它最出名的战绩可能是为金州勇士篮球队的明星球员克莱·汤普森（Klay Thompson）和菲律宾拳击手曼尼·帕奎奥（Manny Pacquiao）提供了运动鞋赞助。但这个品牌在海外的销量很小。北京服装学院的卢戈（音译）表示，即使在中国，许多城市年轻人也认为安踏“不够酷”，尽管它是中国奥运选手的官方服装供应商。

这种印象部分源于安踏的客户群设定。安踏的店铺集中在中等城市，以迎合那些不及北京或上海的消费者富裕的群体，而京沪两地是耐克和阿迪达斯的首选。经纪公司东英金融集团（Oriental Patron）的达拉斯·蔡（Dallas Cai）观察到，一双安踏鞋通常比一双类似的耐克鞋便宜三分之一。耐克和阿迪达斯价格更贵，而且和更多全球超级巨星联系在一起，品牌号召力要大得多。

丁世忠全体总动员的策略和安踏的客户群可能让公司避免了在疫情中遭受最严重的冲击。蔡女士观察到，中国从2月下旬开始逐渐解封后，在安踏影响力较强的城市，居民们可能没有更富裕地区的人们那么在意社交距

离。根据安踏最新的财报，今年第一季度公司收入同比下降了20%到25%。与阿迪达斯相比，这看起来还不错。同期阿迪达斯在中国的销售额下降了58%。

依靠对手的霉运不是长久之计。丁世忠最近写道，安踏渴望实现从“买得起”到“想要买”的飞跃。他手头还有一些更高端的品牌。2009年安踏收购了源自意大利的运动服饰公司斐乐（Fila）的中国业务。去年公司以52亿美元的价格收购了芬兰体育用品公司Amer Sports的多数股权，该公司的资产包括威尔胜（Wilson）网球拍和萨洛蒙（Salomon）滑雪板。但这可能还不足以挑战并击败耐克和阿迪达斯。改变印象会很难。■



Schumpeter

Boffins v the bug

How the quest for a vaccine could restore faith in big pharma

UNPRECEDENTED IS AN overused word. But to find a parallel for the response of the pharmaceutical industry to the covid-19 pandemic, it is necessary to go back to the start of the second world war, another time when countries were desperate for miracle cures. Back then big pharmaceutical companies, especially in America, were as unproductive and unloved as they are today. People were appalled at the mis-selling of addictive narcotics, as they have been during the opioid crisis. And in pre-war Britain, scientists had discovered what they believed could be a wonder antibiotic—penicillin. Yet they could not find any firm, even in America, prepared to take the risk of producing it at scale.

Then came Pearl Harbour and everything changed. As Gerald Posner writes in a new book, “Pharma: Greed, Lies, and the Poisoning of America”, the war effort led American firms like Merck, Squibb and Pfizer to pool their research on penicillin. Mass-producing the antibiotic became as much of a national-security priority as building an atom bomb. By D-Day in 1944, there was enough penicillin to treat 40,000 troops. It was a turning point. The pharma industry emerged from the war revelling “in the glow of its collaborative wartime penicillin programme”.

As the title of his book suggests, Mr Posner is no fan of the industry as it exists 75 years later. Yet even he would have noticed the return of a halo-like glow, albeit via Zoom, as the bosses of some of the world’s best-known pharmaceutical firms gathered on May 28th to recount their collaborative efforts to find a covid-19 vaccine. The talk was of “racing against the virus, not against each other”, of altruism, and of pride in a mission that is critical for saving lives and livelihoods. One of the bigwigs was Pascal Soriot, the

61-year-old French chief executive of AstraZeneca, an Anglo-Swedish firm. His presence was telling. Until the coronavirus, the company barely dabbled in the \$60bn-a-year vaccine business. Yet now he is leading the effort not just to create a vaccine, but also to bring big pharma back in from the cold.

Under Mr Soriot, a trained veterinarian who took over at AstraZeneca in 2012, the firm is bucking a decade-long trend of drugmaking fatigue in the industry, in which acquisitions have often made up for a lack of innovation. He credits its success to a faith in science. His pride and joy is AstraZeneca's research-and-development centre under construction in Cambridge, which he displays on his Zoom wall. The address, he enthuses, is Number One Francis Crick Avenue, named after the molecular biologist and Nobel laureate. In 2014 he used science as a justification to fend off a \$118bn takeover bid by Pfizer, arguing it would derail cancer treatments the firm had in development. On May 28th AstraZeneca's booming oncology business further vindicated that conviction when it revealed that new data from tests of its bestselling drug, Tagrisso, showed that it reduced the risk of relapse in some early-stage lung cancers by a staggering 83%. Though its returns are still below the industry average, such successes have made AstraZeneca Britain's biggest listed company, now worth £112bn (\$141bn).

Yet it is in the quest for the vaccine that Mr Soriot's faith in innovation could be most consequential. In April the firm struck a landmark deal with Oxford University to distribute a potential jab. Within three weeks it had secured manufacturing capacity for 1bn doses, with the aim of beginning deliveries in September. It received \$1bn from BARDA, an American drug-development authority, to gain access to supplies by the autumn. Such funds help it pay in advance for access to the vats and vials it needs to make and ship the vaccine in vast quantities. It is building parallel supply chains around the world to ensure the vaccine is available everywhere. For an industry that usually takes a decade to launch a new vaccine, this is

remarkable speed.

Other companies are also building supply chains, but in clinical trials, vital for regulatory approval, AstraZeneca is ahead. After early trials of AZD1222, as the vaccine is known, the firm has started testing it on 10,000 people in Britain to see whether it prevents covid-19. It will expand this to 30,000 people in America. In this effort, the bigger the headstart the better. In Britain, as the number of infections fades, the chances of getting conclusive results on the vaccine's efficacy are only 50%, says Adrian Hill, director of Oxford's Jenner Institute, AstraZeneca's partner. That may mean conducting trials in countries where the disease is still rampant.

It is a nerve-racking challenge. The biggest risk, Mr Soriot says, is politics. Vaccine nationalism means countries will bully drugmakers to secure supplies, though AstraZeneca, like its peers, says it is determined to distribute the vaccine equitably. Whatever that means, there are several other hurdles. The speed of development means the risks of mishaps are high. Initially there will only be enough jabs to treat the most exposed people, such as health-care workers, which may breed resentment. Firms like AstraZeneca hope to forestall criticism by producing the vaccine without profit for the time being. But investors will eventually want to reap rewards. The firms are pushing back against an initiative by the World Health Organisation to pool intellectual property on covid-19 to make sure poor countries have access.

| *Stick to the vax*

For now, such hindrances seem like a price worth paying. As Mr Soriot says, "there are times in life when you need to stand up and say it's time to help." There are already pay-offs. The race for the vaccine has galvanised staff, he says. It answers those who criticise the industry for high prices and profits. "This is what a successful, healthy pharmaceutical industry can do," he insists. Expect that point to be rammed home in the future when

governments again turn their wrath on big pharma over high prices. But hope that the industry develops a new thirst for innovation, as happened with penicillin. The post-war years were golden ones for drug discovery. It would be laudable if a post-covid-19 age were, too. ■



熊彼特

科学家大战病毒

寻找疫苗如何能重振人们对大药厂的信心

史无前例是个被用滥了的词。但是，如果要为当前制药业应对新冠疫情的努力找出一个前例，就要一直回溯到第二次世界大战之初，当时世界各国也在不顾一切地寻找灵丹妙药。那个时代的大型制药公司，尤其是美国的药厂，也像今天一样无所作为、不受待见。人们对违规销售成瘾性麻醉药品感到震惊，正如在阿片类药物危机期间一样。而在战前的英国，科学家发现了一种可能有神奇作用的抗生素——青霉素，但他们即便在美国也找不到一家公司愿意冒险来量产这种药。

随后珍珠港事件爆发，一切都变了。正如杰拉尔德·波斯纳（Gerald Posner）在新书《药厂：贪婪、谎言与毒害美国》（Pharma: Greed, Lies, and the Poisoning of America）中所写的，战事促使默克、施贵宝和辉瑞等美国公司联合起来研发青霉素。大规模生产青霉素成了和制造原子弹一样的国家安全要务。到1944年诺曼底登陆战役之前，青霉素的储量已经足够治疗四万名士兵。这是一个转折点。制药产业从战争中崛起，陶醉在“战时青霉素合作计划的光芒之中”。

从书名可知，波斯纳对于75年后这个行业的现状并无好感。不过，当一些世界最知名药厂的老板5月28日聚集在一起（尽管是通过Zoom）讨论共同研发新冠疫苗时，即使是波斯纳也可能会注意到神圣光芒的重现。会议的内容谈及“与病毒赛跑，而非彼此竞赛”、利他主义、以及对一项拯救生命和生计的重大任务的自豪感。其中一位大人物是英国和瑞典合资企业阿斯利康（AstraZeneca）的首席执行官、61岁的法国人帕斯卡·索西欧（Pascal Soriot）。他的到场很能说明问题。在疫情爆发前，这家公司几乎没有涉足过每年600亿美元的疫苗业务。而现在他不仅牵头共同研发疫苗，还要带领大药厂从寒冬中重振旗鼓。

兽医出身的索西欧在2012年接任阿斯利康的掌门人。在他的领导下，这家

公司正在扭转制药业已经持续了长达十年的一个疲软趋势——常常用收购来弥补创新不足。他把公司的成功归功于对科学的信仰。他对阿斯利康正在剑桥建设的研发中心深感骄傲和喜悦，把它展示在自己的Zoom背景页面上。他兴奋地说，该中心的地址是弗朗西斯克里克大道（以分子生物学家、诺贝尔奖获得者Francis Crick的名字命名）1号。2014年，他以科学为由拒绝了辉瑞1180亿美元的收购要约，表示这会让公司正在研发的癌症疗法偏离轨道。5月28日，阿斯利康公布了其蓬勃发展的肿瘤业务的成果，为这种信念做出了更多辩护：其畅销药泰瑞沙（Tagrisso）的最新测试数据显示它将某些早期肺癌的复发风险降低了惊人的83%。尽管阿斯利康的回报率仍低于行业平均水平，但这样的成功已促使它晋升为英国最大的上市公司，目前市值达1120亿英镑（1410亿美元）。

不过，在疫苗的研发过程中，索西欧对创新的信念可能才是最重要的。4月，阿斯利康与牛津大学达成了一项里程碑式的协议，分销一种可能有效的疫苗。仅仅三周内，公司已确保了10亿剂的生产能力，并设定了从9月份开始交付的目标。美国生物学高级研究和发展管理局（BARDA）向它支付了10亿美元以求在秋季获得供应。这些资金有助于提前支付大批量生产和运输疫苗时所需的各种设备容器。该公司正在世界各地建立并行的供应链，确保在任何地方都可获得疫苗。对于一个动辄需要十年时间才能推出一种新疫苗的行业来说，这堪称神速。

其他公司也在纷纷建设供应链，但在事关监管批准的临床试验上，阿斯利康走在前列。在疫苗AZD1222完成早期试验后，该公司已经开始在英国对一万人试验它预防新冠病毒的效果。在美国的试验将扩大至三万人。在这项测试中，开局的规模越大越好。阿斯利康的合作伙伴、牛津大学詹纳研究所（Jenner Institute）的所长阿德里安·希尔（Adrian Hill）说，在英国，随着感染人数不断减少，就疫苗有效性获得确定性结论的机会只剩50%。这可能意味着要在疫情仍然肆虐的其他国家展开试验。

这是一项伤脑筋的挑战。索西欧表示，最大的风险是政治。疫苗民族主义意味着各国将给制药商施压以保障自身供应。不过阿斯利康和其同行一样，表示决心公平地分配疫苗。无论这具体意味着什么，都还要克服另外

几个障碍。研发速度如此之快，意味着忙中出错的风险很高。在初期，疫苗将只够用来防护最易暴露的人群，比如医护人员，而这可能会滋生不满。像阿斯利康这样的公司希望通过暂时非盈利地生产疫苗来防范被抨击。但投资者最终还是会要求获得回报。这些公司正在抵制世卫组织为确保穷国也能利用相关成果而建立新冠知识产权共享池的计划。

| 信守疫苗

目前看来，为这些障碍付出代价是值得的。正如索西欧所说，“人生中有某些时刻，需要你挺身而出，说一句‘该我帮忙了’。”努力已经有了回报。他说，疫苗竞赛激励了员工，提振了士气。它也驳斥了那些指责制药业用高价攫取高利润的声音。“这是一个成功、健康的制药行业所能做到的。”他坚称。可以预见，日后政府再次因药价高昂而把矛头对准大药厂时，这句话会被拿来直击要害。但我们可以希冀该行业能像当年发现青霉素那般，对创新产生新的渴求。二战之后是新药研发的黄金时期，如果后新冠病毒时代也能如此，那将值得额手称庆。■



Video gaming

Command & reconquer

An increasingly risk-averse industry is raiding its back catalogue

“COMMAND & CONQUER” chronicles a war between the Global Defence Initiative and a band of techno-terrorists called the Brotherhood of Nod. The video game was cutting-edge in 1995, when it was first released on a pair of compact discs. Their vast capacity (for the time) allowed a high-fidelity soundtrack and cheesy videos with human actors which advanced the plot between levels. Players could challenge their friends using a new-fangled technology called “the internet”. It got rave reviews and sold an estimated 3m copies.

That number will rise further when a revamped version called “Command & Conquer Remastered” is released on June 5th. It is the same as the old one in nearly every respect, except that the cartoonish 2D graphics of the original have received a high-resolution makeover.

The music business milks fans with remixes, remasters and special editions of famous albums. Film studios sell extra-long “director’s cuts”. Revisiting products may seem a riskier strategy in a medium where the state-of-the-art advances as fast as it does in video gaming. But it is an established trend. More than 30 revamped games have been released in the past year. Some have topped sales charts. “Final Fantasy VII Remake” a reimagining of a PlayStation game from 1997, sold 3.5m copies in three days after its release on April 10th.

Nostalgia is one explanation. The video-game business is now middle-aged, giving it a deep back catalogue. Many of its customers have fond memories of the games they played in their youth. That can make for exacting critics. “Warcraft III: Reforged”, released by Blizzard Entertainment

in January, was panned by fans for unwelcome tweaks to gameplay and the removal of features from the 2002 original.

Remaking games also helps keep valuable franchises in the public eye while new games are in development, says Morris Garrard of Futuresource, a consultancy. He also points out that console gaming is governed by the release of new hardware. Refreshed games can do well at the end of a cycle when there is less competition from flashy new boxes. The deluge may slow as Sony and Microsoft, the dominant firms, are releasing new consoles soon.

Remakes appeal for another reason, too. The cost of developing high-end video games has ballooned. Budgets can exceed \$100m for the glitziest titles. The industry has thus become afflicted by the same risk-aversion that keeps Hollywood churning out endless franchise films and sequels. Remixing an old game, which has sold well once and will probably do so again, is quicker and cheaper than coming up with a new one. ■



电子游戏

命令与再度征服

一个愈发想规避风险的行业正忙不迭地在旧物堆里挖宝

《命令与征服》（Command & Conquer）记述了一场战争，交战双方是全球防御组织和名为Nod兄弟会的一群技术恐怖分子。这款电子游戏最初于1995年以双光盘的形式发行，在当时是最前沿的。光盘的巨大容量（在当时而言）可容纳高保真的配乐和拙劣的视频，里面的真人演员在关卡之间推进情节。玩家可以用一种叫作“互联网”的新奇技术向朋友发起挑战。这款游戏好评如潮，估计销量300万份。

名为《命令与征服：复刻版》的改进版本于6月5日发布后，销量还会进一步上升。这一版除了将原作的2D卡通图形提升为高分辨率画质外，几乎各方面都和旧版本相同。

音乐行业利用著名专辑的混音版、重灌版和特别版从歌迷口袋里捞钱。电影制片公司会出售加长的“导演剪辑版”。鉴于电子游戏这种媒介的顶尖技术发展得如此之快，重制旧产品看似是一个更有风险的策略。但这已是一个明确的趋势。过去一年里已有30多款改进版游戏发布。有些已经高居销售排行榜榜首。《最终幻想7：重制版》（Final Fantasy VII Remake）是1997年在PlayStation平台发行的一款游戏的翻新版，4月10日发售后三天内售出350万份。

一种解释是怀旧之情。电子游戏业已步入中年，积累了丰富的老游戏资源。许多客户都对年轻时玩过的游戏怀有美好的回忆。而这可能使得改版引来痛批。暴雪娱乐（Blizzard Entertainment）1月发布的《魔兽争霸3：重制版》（Warcraft III: Reforged）遭到粉丝的口诛笔伐，因为它对游戏设置做了不受待见的微调，还砍掉了2002年原版的特色功能。

咨询公司Futuresource的莫里斯·杰拉德（Morris Garrard）说，在新游戏尚在开发时，重制老游戏还有助于让珍贵的游戏系列持续受到公众关注。

他还指出，主机游戏受新硬件发布的制约。翻新的老游戏能在周期的尾声表现得很好，因为这时来自炫目新主机的竞争较少。不过由于占主导地位的索尼和微软即将发布新主机，这股洪流可能会放缓。

重制的吸引力还缘于另一个原因。开发高端电子游戏的成本已经激增。最绚丽夺目的游戏的预算可能超过一亿美元。因此，游戏行业已经和好莱坞一样，饱受规避风险的情绪之扰，这种情绪促使好莱坞大量炮制永不完结的系列电影和续集。把曾经很卖座而且很可能会再次卖座的老游戏重新包装一番，比开发一款新游戏更快也更便宜。■



Information technology

AI manoeuvres

Business lessons from the Pentagon

A SMALL REVOLUTION has just occurred in America's armed forces. They have, for the first time, deployed artificial intelligence (AI) to determine when a thorough check-up of a Black Hawk helicopter is in order. The algorithm, trained on maintenance records and sensor data, calculates how long the aircraft can fly safely in, say, a desert, before its engines should be cleaned to prevent sand melting into glass that could cause them to fail.

Such predictive maintenance is the most tangible product so far of the Joint AI Centre (JAIC). With 176 employees and an expected budget of \$240m next fiscal year, up from \$90m in this one, it lies at the heart of an ambitious effort to use machine learning and other AI to help the Pentagon run more efficiently and keep its technological edge, especially over China.

Yet after its first director, Lieutenant-General Jack Shanahan, stepped down on June 1st, JAIC's main output is no longer whizz-bang software or even weapons, but infrastructure to develop them. "I did not want to create a classic insurgency organisation, but one that survives me," said Lieutenant-General Shanahan. The way he had gone about it offered a case study in how large organisations struggled to adopt advanced technology.

Like many company bosses, top brass at the Department of Defence (DoD) in recent years began feeling technologically inadequate. Not just China but Western tech giants were showing them up, in particular Google. So in 2017 the Pentagon's Defence Innovation Board (DIB), chaired by Eric Schmidt, who was also executive chairman of Google's parent, Alphabet, at the time, called for JAIC's creation. A year later the DIB got its way—ironically around the same time that mostly pacifist Googlers pushed

their bosses to abandon work for “Project Maven”, a DoD effort to analyse drone footage.

Things have moved surprisingly briskly since, by the DoD’s sluggish standards. JAIC ranks are set to almost double within a few years, to 300 or so. Its budget is now assured until 2025. Like many corporations flirting with innovation, it has hired outside help, recently signing its first big contract, worth \$800m over five years, with Booz Allen Hamilton, an information-technology consultancy.

Booz Allen’s job will be to pull together JAIC’s IT infrastructure into something like a workbench to build AI applications. This will tap various sources of data, AI’s lifeblood, from a helicopter’s sensors to the DoD’s supply-chain software. It will provide the computing power to crunch them. And it will offer software tools that let developers create, test and run AI systems.

As many corporate bosses have learned the hard way, the best technology is not worth much without the right processes to use it. So Nand Mulchandani, JAIC’s technology chief and a noted Silicon Valley serial entrepreneur, wants the group to function a bit like a venture-capital fund. That means investing in “product teams”, internal startups of sorts, which develop prototype applications that can then be scaled up by outside contractors.

The group is still a long way from “mission accomplished”. Some problems are specific to the Pentagon. JAIC still awaits its own processing power, which has been held up by a legal challenge from Amazon; the tech giant argues that its cloud service was unfairly passed over in favour of Microsoft’s rival offering. JAIC has yet to extricate itself from the fangs of the DoD’s procurement bureaucracy: if it cannot sign its own contracts, it will not be able to move fast enough. And it must be careful not to put off

private-sector partners as it moves from uncontroversial projects such as helicopter maintenance or forecasting forest fires to thornier ones. “Joint warfighting operations”, for instance, accelerate the “sensor-to-shooter” loop—the time it takes from spotting a target until it is attacked. (Google no longer seems fazed: it recently won a Pentagon contract to provide pieces of cloud software.)

Other issues will sound familiar to chief executives. Recruiting data scientists is tough; most would rather work for big tech, not big government. The DoD’s digital collections are, like many legacy corporate systems, a shambles, as the RAND Corporation, a think-tank, concluded in a recent report. Data are often thrown away or stored locally (the initial Maven drone footage had to be collected at bases on CD-ROMs). They come in all sorts of formats and are badly catalogued. As in many big companies, a chief data officer is supposed to sort these things out, but can expect resistance. “Personnel might view data as a means of retaining power,” write the RAND authors.

Lieut-General Shanahan is proud of his work. So are early JAIC supporters like Mr Schmidt. He has since left Alphabet but still chairs the DIB—and calls the general a “real American hero” for getting as far as he has. Whoever takes over at JAIC nevertheless has their work cut out—as does Mr Mulchandani, who will stand in as director until the Senate confirms a military replacement, which may take some time. As Robert Work, a tech-savvy former deputy defence secretary, puts it: “The foundation is in place; now all they have to do is execute.” Many bosses know the feeling. ■



信息技术

AI演练

来自五角大楼的商业经验

美国军队中刚刚发生了一场小革命。他们首次部署了人工智能（AI）来判断何时需要对黑鹰直升机做彻底检修。他们用保养记录和传感器数据训练算法，计算出飞机在当前状态下——比如在沙漠中——还能安全飞行多久，何时将需要清洗发动机，以防沙子融化成玻璃，导致飞机故障。

这种预测性维护技术是美国国防部联合人工智能中心（Joint AI Centre，以下简称JAIC）迄今最具体可见的成果。该中心有176名员工，下一财年的预算有望升至2.4亿美元（本财年为9000万美元）。在五角大楼利用机器学习及其他AI技术提升工作效率并保持技术优势（尤其是领先于中国）的宏伟谋划中，JAIC是重中之重。

不过，在JAIC首任主管、中将杰克·沙纳汉（Jack Shanahan）于6月1日卸任后，该中心的主要产品不再是轰动炫目的软件甚至武器，而是开发这类物品的基础架构。沙纳汉说：“我没有想过要建立一个典型的叛乱组织，而是一个在我离开后也能持续下去的机构。”他为此所做的努力为大型组织采用先进技术的难度提供了一个案例研究。

和许多公司老板一样，近年来美国国防部的要员们开始感到技术上的欠缺。揭了他们短的不仅有中国，还有西方的科技巨头，特别是谷歌。因此，2017年，五角大楼的国防创新委员会（Defence Innovation Board，以下简称DIB）呼吁成立JAIC。DIB主席埃里克·施密特（Eric Schmidt）当时还是谷歌母公司Alphabet的执行董事长。一年后，DIB心愿达成。但讽刺的是，大约在同一时期，在多为和平主义者的员工施压下，谷歌宣布退出国防部的无人机影像分析项目“Project Maven”。

之后，相比美国国防部一贯的行动迟缓，JAIC的进展快得惊人。它的编制将在几年内几乎翻倍，达到300人左右。预算已保证到2025年。和许多尝

试创新的公司一样，JAIC也请来了外援——最近它与信息技术咨询公司博思艾伦（Booz Allen Hamilton）签署了首份大合同，价值八亿美元，为期五年。

博思艾伦的任务是把JAIC的IT基础设施整合成一个类似工作台的系统，以方便打造AI应用。这将能利用从直升机的传感器到国防部的供应链软件等各种数据源，也就是AI的生命线。这个工作台将提供算力来处理这些数据。它还会提供软件工具，供开发人员创建、测试并运行AI系统。

正如许多企业老板在碰壁后领会到的，如果没有正确的使用流程，再好的技术价值也不大。因此，知名硅谷连续创业者、JAIC的技术总监南德·穆尔昌丹尼（Nand Mulchandani）希望JAIC在一定程度上像风险投资基金那样运作，也就是在“产品团队”（类似于内部创业公司）上投资来开发出原型应用，再由外部承包商加以扩展。

JAIC距离“使命达成”还有很长的路要走。有些难题是五角大楼特有的。JAIC自身的数据处理能力因为亚马逊提出的法律诉讼而仍然无法施展。这家科技巨头指控五角大楼不公平地弃用了亚马逊的云服务，而选择了竞争对手微软的产品。JAIC也未能摆脱国防部官僚主义采购程序的魔爪：如果不能自行签署合同，它就无法快速行动。而且随着JAIC从直升机保养或森林火灾预测这类无争议项目转向更棘手的项目，它必须多加小心以免吓退私营部门合作方。例如，其中一个项目“联合作战行动”可以加速“从传感到开火”的回路，即缩短从发现目标到发出攻击所需的时间。（谷歌似乎不再感到困扰：它近期赢得了向五角大楼供应部分云软件的合同。）

其他麻烦则为首席执行官们所熟知。招聘数据科学家并非易事，他们大多数宁愿效力科技巨头，而非大型政府机构。正如智库兰德公司（RAND Corporation）在最近一份报告中总结的，国防部的数据库就像许多传统企业制度那般杂乱无章。数据经常被丢弃或存储在本地（最初，Maven项目不得不从各个基地的光盘上收集无人机拍摄的视频）。数据格式五花八门，编目混乱。和在许多大公司的情况一样，首席数据官本应去解决这些问题，但阻力却可以预见。兰德公司的报告中写道：“职员们可能会把数

据视为保留权力的一种手段。”

沙纳汉为自己的工作感到自豪，施密特等JAIC的早期支持者也是如此。施密特已经离开了Alphabet，但仍担任DIB主席一职，他称赞沙纳汉为JAIC所做的工作，称他为“真正的美国英雄”。但无论是谁接管JAIC，都将面临艰巨的任务，包括临时顶上的穆尔昌丹尼，他将在参议院通过一名军方继任人选之前暂时担任主管，而这可能会持续一段时间。正如精通技术的前国防部副部长罗伯特·沃克（Robert Work）所说：“基础已经打好，接下来他们只需执行。”许多企业老板都知道个中滋味。 ■



Poverty in China

Clarifying the battle lines

China is not as poor as one of its leaders implies

SINCE 2017 China's government has described fighting poverty as one of three "tough" or "critical" battles (alongside quelling pollution and financial risk). Despite the covid-19 pandemic, it still seems confident of victory this year. In March Xi Jinping, the president, pointed out that the number of rural poor fell to 5.51m in 2019. That is only 0.4% of China's vast population. Regional overall poverty, he said, had been basically eradicated.

The claim seemed wildly at odds with another statistic, cited last month by Li Keqiang, the prime minister. "There are still some 600m people [whose] monthly income is barely 1,000 yuan," he said at the close of the annual meeting of China's parliament. Since 1,000 yuan is worth only about \$140, the figure seemed both surprising and depressing. Many commentators concluded that China's victory against poverty was hollow, achieved not by lifting people up but by watering the definition of poverty down.

This scepticism, though, is dogged by two misunderstandings. The first is the conviction that China's rural-poverty line must be ridiculously stingy, lower than the global standard of \$1.90 a day. The second is the belief, inspired by Mr Li's imprecise remarks, that 600m Chinese live on 1,000 yuan a month or less. Neither claim is true.

About a decade ago China drew its rural poverty line at 2,300 yuan a year, or 6.3 yuan a day. The World Bank's most commonly used global poverty line is \$1.90 a day. Since 6.3 yuan is worth only about \$0.90 at today's exchange rate, it seems natural to think that China's poverty line is much lower than the World Bank's.

Natural, but wrong. A fair comparison must first note that China and the World Bank drew their poverty lines with different years in mind. China's line is based on the prices prevailing in 2010; the World Bank's, on prices in 2011. China updates its line every year to reflect the inflation faced by the rural poor. In 2011 the threshold was 2,536 yuan, or 6.95 yuan a day.

That is still a meagre amount. But because prices tend to be lower in rural China than in America, 6.95 yuan stretches further than the equivalent amount of dollars would in America. So the yuan should be converted into dollars not at the market exchange rate, but at the purchasing-power-parity rate. That was 3.04 yuan per dollar in 2011, according to Martin Ravallion of Georgetown University, who helped set the World Bank's line. Thus China's rural-poverty line is equivalent to about \$2.30 a day in 2011 purchasing-power-parity dollars, comfortably above the \$1.90 global line. Indeed, the bank's poverty count for China is lower than the government's.

What about the second misunderstanding? After the furore caused by Mr Li's comments, China's National Bureau of Statistics tried to sort out the confusion last week. It pointed out that the 610m people living in the bottom 40% of China's households had a monthly income per person of almost 1,000 yuan. In other words, if their combined income were divided equally between them, they would each receive roughly 1,000 yuan (ie, 3,000 yuan for a typical household of three). That is the basis for Mr Li's statement. But it is different from saying that all of these 610m live on 1,000 yuan or less. Imagine a country of ten people, where the bottom four earn \$1, \$2, \$3 and \$4 a day, respectively. Their income per person is \$2.50. But only two of them live on less than this amount. China's leaders often quote official statistics that flatter the economy. But on this occasion, Mr Li's comments unflattered to deceive. ■



中国的贫困问题

澄清战线

中国并不像它的一位领导人透露的那般穷困

自2017年以来，中国政府把脱贫列为“三大攻坚战”之一（另外两项是污染防治和防范化解重大金融风险）。尽管受到新冠疫情的影响，它对于在今年打赢这场战役似乎仍然满怀信心。3月，国家主席习近平指出，2019年农村贫困人口已减至551万。这个数字仅占中国庞大人口的0.4%。习近平表示，区域性整体贫困已基本消除。

这一说法似乎与总理李克强上月援引的另一组统计数字大相径庭。“有六亿人每个月的收入也就1000元。”李克强在全国人大闭幕时表示。1000元约合140美元，这个数字看起来不可思议又令人沮丧。许多评论人士总结说，中国所谓的成功脱贫是空话，并不是通过提升人民收入水平来脱贫，而是在“贫困”的定义上掺水。

但这样的质疑存在两方面的误解。一是认定中国的农村贫困线必然低得离谱，低于全球标准每日生活费1.90美元。二是受到李克强不精确的言论影响，以为中国有六亿人每月仅靠不超过1000元的收入过活。两者均不属实。

大约十年前，中国把农村贫困线定为人均年收入2300元，即日收入6.3元。世界银行最常用的全球贫困线标准是日生活费1.90美元。按当前汇率计算，6.3元仅约合0.90美元，所以人们自然会认为中国的贫困线远低于世界银行的标准。

这种看法自然而然，却是错误的。要公平比较，首先必须注意到中国和世界银行是根据不同的年份设定贫困线的：前者是基于2010年的一般物价，后者基于2011年的物价。中国每年都会调整贫困线，以反映农村贫困人口面对的通胀压力。在2011年，该贫困线已调整到每年2536元，即每天6.95元。

这一标准依然很低。但由于中国农村地区的物价往往低于美国水平，因此6.95元人民币比等值美元在美国的购买力要高。因此，不应该按市场汇率把人民币折算成美元，而应以购买力平价计算。曾协助世界银行设定贫困线的乔治城大学教授马丁·拉瓦利翁（Martin Ravallion）表示，按购买力平价，在2011年1美元相当于3.04元人民币。因此，按2011年的购买力平价计算，中国的农村贫困线其实相当于日收入约2.30美元，稳稳超出1.90美元的全球标准。事实上，由世界银行统计得出的中国贫困人口数量低于中国政府公布的数字。

第二个误解又是怎么回事？在李克强的言论引起轩然大波后，中国国家统计局上周出面澄清。它指出，实际情况是中国收入最低的40%家庭对应有6.1亿人，他们的人均月收入近1000元。也就是说，如果把这些人的收入总额在他们之间平均分配，则每人拿到约1000元（一个三口之家的收入即为3000元）。这是李克强言论的数据基础，但不等于说这6.1亿人口的月收入都在1000元以内。想象一个只有十个人的国家，收入最低的四个人的日收入分别为一美元、两美元、三美元和四美元，则这四人的人均日收入为2.50美元，但其中只有两人的收入低于这个平均数。中国领导人的发言经常会引用美化经济情况的官方数据，而这次，李克强未经美化的言论误导了大家。■



The Belt and Road Initiative

Break time

The pandemic is hurting Xi Jinping's global infrastructure project

JUST OVER a year ago, at a gathering in Beijing of world leaders who had signed up to his Belt and Road Initiative (BRI), China's president, Xi Jinping, peppered his speech with proverbs. "The ceaseless inflow of rivers makes the ocean deep," was one—a reference to how his scheme, involving huge spending on infrastructure in other countries, would promote the global flow of goods, capital and technology and with them, economic growth. Amid the pandemic, many countries may be wishing this were so. But some BRI projects are stalling as countries struggle to repay related debts. China's own economy is faltering, too. Silk roads are getting bumpier.

The BRI is the centrepiece of Mr Xi's foreign policy. In 2017 he gave it hallowed political status by having it written into the Communist Party's constitution. Lauding it thereby became obligatory. China's state-owned media are duly doing so. "BRI co-operation is entering a stage of high-quality development," said a headline in *Global Times*, a party-owned tabloid. "The BRI will become a catalyst for global economic recovery," said another on the website of the party's mouthpiece, the *People's Daily*.

But the going is rough along the Silk Road Economic Belt and the 21st-Century Maritime Silk Road, to give the scheme its full name. Since 2013, when Mr Xi first began talking about these new silk roads, China has given or promised hundreds of billions of dollars in loans and grants for power plants, ports, railways, roads and other infrastructure in Africa, Latin America, South-East Asia, Central Asia and Europe (see chart 1). But as a result of covid-19, work on some projects has come to a halt. A few have been scrapped. Several that seemed of dubious worth even before the pandemic now look like white elephants. Many of the loans are on the

brink of technical default, as debtor countries—hammered by covid-19—seek to defer payments that are coming due.

In February Egypt postponed indefinitely China-funded construction of what was to be the world's second-largest coal-fired power plant, at Hamrawein. The following month Bangladesh cancelled plans for a coal plant at Gazaria. In April Pakistan asked China for easier repayment terms on \$30bn-worth of power projects. In April Tanzania's president, John Magufuli, said he would cancel a \$10bn port project at Bagamoyo because it was signed (by his predecessor) with conditions that "only a drunkard" would accept—chiefly, that China would gain full control of the port with a 99-year lease. And in May, Nigerian legislators voted for a review of all of China's loans for Chinese projects amid concerns that financing may have been agreed on unfavourable terms. African leaders have called for emergency debt-forgiveness from sovereign creditors including China, which is owed about \$8bn this year in payments on about \$145bn in loans to African countries, many involving BRI projects.

Work has also been delayed by quarantine and safety measures related to the pandemic, including restrictions imposed by some countries on the return of Chinese workers who had gone back to China for the lunar new-year holiday in January. In Vietnam such impediments have delayed a 20-day test of a new metro line in Hanoi—more than 100 Chinese experts involved in building it have been unable to re-enter the country. The project was already at least four years behind schedule and, at a cost of nearly \$800m for eight miles of track, massively over budget.

This presents problems for China's leaders in the realms of economics, diplomacy and politics at home, where the BRI is closely linked with the prestige of Mr Xi. First, there will be financial losses. Many countries raise the cash for BRI projects by exporting commodities. But the pandemic has hit demand for them. Should China reduce the amount owed, as sovereign

lenders sometimes do in response to a financial crisis? Or should it try to preserve as many loans and BRI projects as it can by delaying payments and extending terms (its typical approach)? Either way, experts say, a wave of defaults is inevitable.

In April, amid debtors' growing calls for help, the G20, which includes China, broadly agreed to allow up to 73 countries to suspend debt-service payments totalling about \$12bn-14bn until the end of the year. But the devil is in the details. The G20 warns that applying for a suspension of debt-service payments could breach other terms to which a country may have agreed. Unlike members of the Paris Club of big sovereign lenders, who do not require collateral for their development loans, China's banks do for about 60% of their lending to developing countries, says Carmen Reinhart, the World Bank's incoming chief economist. In theory a country could apply for debt relief only to find that China could claim the rights to a mine, a port or money held in escrow. This is one reason why China's banks prefer to renegotiate sovereign loans bilaterally, and in secret. They have leverage, and can choose how to apply it.

But this is where diplomatic risk will loom large for China. Claiming assets from defaulting countries would create a furore. It would damage China's image in countries that the BRI was intended to help, and strengthen suspicions among Western hawks that China is using the BRI to saddle countries with debt (see chart 2) and thereby gain control of infrastructure that could help it strategically. "If they thought they were facing a backlash now, it would be really severe for them" if they were to seize collateral, says Scott Morris of the Centre for Global Development, a think-tank in Washington. China may decide to tread warily. Until the global economy recovers, there will certainly be fewer new BRI projects. "It feels hard to imagine the initiative maintaining the level of ambition that it had," says Mr Morris.

However, given the political importance China attaches to the BRI at home, and the effort it has made to persuade countries to sign documents endorsing it (more than 130 have, most of them non-Western), it is unlikely to let the idea drop. Fortunately for China's propagandists, the BRI is a shape-shifting concept that allows them to adapt it to changing circumstances. Hitherto its focus has been on building hard infrastructure. But the term is often applied to almost any activity abroad involving big Chinese firms that can be touted as helping to create a "Silk Road of Peace"—in other words, it means anything the Chinese government likes. Amid the pandemic, officials can easily play down the pouring of concrete and stress other kinds of Chinese largesse.

Under the banner of the BRI, officials are now lauding the idea of a "Health Silk Road" to help distribute medical support and food aid. The idea harks back to the first speech Mr Xi gave, in 2013, about his plans for a Maritime Silk Road. In it he recalled at length how, nine years earlier, China had responded to the Indian Ocean tsunami by mounting its biggest-ever relief operation overseas. In Indonesia, he said, many local people had learned to speak Chinese and hailed members of the Chinese rescue team with the words: "China, Beijing, I love you." China expects that the BRI-branded medical supplies which it is now showering on covid-struck countries will prompt similar expressions of gratitude. Focusing on such assistance makes political sense for China. It can make a big difference to recipients' efforts to fight the disease, and requires far less cash than a port or railway.

Also gaining more prominence is the vaguely defined idea of a "Digital Silk Road". It has been adapted for pandemic use to include helping other countries replicate China's successes with app-based approaches to tracking the coronavirus.

Chinese officials may take advantage of the lull in building-work to think again about which projects are necessary. They have been stung by Western

criticism of the social and environmental costs of BRI infrastructure and of the opaque deals involved. At last year's meeting with world leaders, Mr Xi stressed that the BRI should be "open, green and clean". The pandemic offers a chance quietly to nix unpopular dams, which can suffer costly delays due to protests, and dirty coal plants, which are not a sound investment anyway. "Nobody on Wall Street will tell you that a coal plant will be affordable 40 years from now," says Kevin Gallagher at Boston University. Instead, China may push the expansion of solar and wind energy. Mr Gallagher notes that in Pakistan, Chinese firms have built multiple wind farms under the auspices of BRI. "If you ask for that stuff, China has it."

If done right, without drowning countries in debt, BRI projects may yet provide a welcome boost to the global economy. Before the pandemic the World Bank estimated that BRI transport projects in Asia, including high-speed railways, would boost the GDP of participating countries by up to 3.4% overall. Some of those rail projects have stalled, and China is now preoccupied with its own hard-hit economy. But Daniel Rosen of Rhodium Group, a research firm, argues that China's policy banks have ample capacity to maintain the present level of BRI lending. It just is not economically prudent for them to do so, especially before a global recovery is on track.

When that happens, the BRI may revert to its original focus. And many countries in desperate need of better infrastructure will welcome this. They have few other options. In November America, Japan and Australia announced an alternative to the BRI called the "Blue Dot Network" to fund infrastructure projects in the developing world. But, as with multilateral lenders such as the World Bank, the financial muscle behind it looks puny in comparison. "The BRI has the best promise of meeting the glaring infrastructure gaps in the global economy," Mr Gallagher says. "There's no global infrastructure surge without the BRI." But for the moment, that boost

will have to wait. ■



“一带一路”倡议

暂时断开

全球疫情打击了习近平的全球基建计划

就在一年多以前，签署参与“一带一路”倡议的多国领导人在北京出席高峰论坛时，中国国家主席习近平在会上发表的讲话旁征博引，比如“河海不择细流，故能就其深”——表达他这项涉及巨额投资他国基建的计划将促进全球货物、资本和技术的流动，进而推动世界经济增长。在眼下的全球疫情中，许多国家可能希望这真能实现。但随着一些国家还不出相关债务，部分“一带一路”项目陷入停滞。中国自身的经济也在动荡衰退中。“丝绸之路”正变得崎岖难行。

“一带一路”倡议是习近平外交政策的核心。2017年，它被写入中国共产党党章，赋予了它神圣的政治地位。为它大唱赞歌也就成了强制任务。中国官媒全力响应。党的小报《环球时报》的头条写道，“推动‘一带一路’建设向高质量发展迈进”。党的喉舌《人民日报》在官网头条中称，“‘一带一路’倡议将成为全球经济复苏催化剂”。

然而，“丝绸之路经济带和21世纪海上丝绸之路”（“一带一路”的全称）的推进碰到了麻烦。自2013年习近平首次提出新丝路建设构想至今，中国已提供或承诺提供数千亿美元的贷款及援助用于在非洲、拉美、东南亚、中亚及欧洲建设发电厂、港口、铁路、公路等各类基础设施（见图表1）。但受新冠疫情的影响，部分项目已经停滞，有些已经取消。多个项目在疫情爆发前就价值存疑，如今看来更是华而不实。许多相关债务都面临技术性违约，因为深受疫情打击的债务国正寻求延期偿还即将到期的债务。

今年2月，埃及宣布无限期推迟位于汉拉维恩（Hamrawein）由中国资助建设的世界第二大燃煤电厂项目。3月，孟加拉国取消了在加扎里亚（Gazaria）建设燃煤电厂的计划。4月，巴基斯坦就总值300亿美元的多个电力项目请求中国放宽还款期限。同月，坦桑尼亚总统马古富力表示将取消100亿美元的巴加莫约（Bagamoyo）港口项目，因为由他的前任签署

的这个项目包含“只有醉汉”才会接受的条款——主要内容是中国将通过一个99年期租约完全控制该港口。5月，尼日利亚议会投票通过决议，将审查国内所有中国建设项目中的中方贷款，因为担心其中的融资条款不利于尼方。非洲多国领导人呼吁包括中国在内的主权债权人紧急减免债务。中国对非洲国家发放的贷款共约1450亿美元，今年应还款约为80亿美元，其中许多涉及“一带一路”项目。

项目进展也因为疫情制定的隔离安全措施而受延阻，包括一些国家限制在1月回国过年的中国工人重新入境。在越南，这类阻碍导致河内一条新地铁线20天的试运行推迟，因为参与建设的100多名中国专家无法再次入境。该项目进度已比原计划延误至少四年，全长八英里的地铁耗资近八亿美元，严重超支。

这给中国经济、外交和政治领域的官员带来了难题，因为在中国国内，“一带一路”和习近平的声望紧密关联。首先，中国将面临经济损失。许多国家通过出口大宗商品为该项目筹集资金，但全球疫情导致对这些商品的需求大减。中国应否像主权债权人有时对金融危机的反应那样减免债务？还是说，应该以推迟还款、延长期限的方式（中国的常用手段）尽量保全贷款债权和“一带一路”项目？专家表示，无论采取哪种方式，一波债务违约潮都在所难免。

今年4月，在债务国求援呼声日益高涨之际，包括中国在内的20国集团基本上同意允许多达73个国家暂停偿还债务直至年底，金额总计约为120亿美元至140亿美元。但魔鬼存在于细节之中。20国集团警告说，申请暂停偿还债务可能违反一国之前签署的其他条款。世界银行新任首席经济学家卡门·莱因哈特（Carmen Reinhart）指出，“巴黎俱乐部”（发达国家债权人组织）成员国提供的发展贷款并不要求抵押，而与之不同的是，中国的银行向发展中国家提供的贷款约有60%是要求抵押的。理论上一个国家是可以申请债务减免的，但结果却可能是中国可以由此要求获得代管的矿山、港口或资金的所有权。这就是为什么中国的银行更愿意通过双边谈判私下重新谈判主权贷款条款的原因之一。因为它们握有筹码，可以选择如何运用它。

但在这方面有明显的外交风险。向违约国家索赔资产会引发轩然大波。这将有损中国在“一带一路”意图援助的国家眼中的形象，并让西方鹰派人士更加怀疑中国利用该计划令他国债台高筑（见图表2），进而掌控对它具有战略意义的他国基础设施。华盛顿智库全球发展中心（Centre for Global Development）的斯科特·莫里斯（Scott Morris）表示，“如果中国现在觉得受到抵制”，那么它真要索取抵押资产的话，“这抵制将是实打实的”。中国可能会决定谨慎行事。在全球经济复苏之前，“一带一路”的新项目肯定会减少。“很难想象这个计划能保持当初那种雄心。”莫里斯说。

然而，鉴于中国在国内给“一带一路”赋予的政治重要性以及它为游说各国签署支持该倡议所付出的努力（已有130多个国家签署，多为非西方国家），就此偃旗息鼓不大可能。对中国的宣传部门而言，幸好“一带一路”是个很灵活的概念，可以因时因势调整。迄今为止，该倡议的重点一直是建设硬件基础设施。但这个概念往往被用于中国大企业在海外开展的任何可标榜为帮助打造“和平丝绸之路”的活动——换言之，它可以是中国政府属意的一切。在疫情笼罩全球之时，官员们不难转变主题，少谈大兴土木的工程建设，多讲其他方式的中国慷慨援助之举。

现在，在“一带一路”的旗帜下，官员们正大谈“健康丝绸之路”的概念，向沿线国家提供医疗和食品援助。这个想法可追溯到习近平在2013年首次发表的关于“海上丝绸之路”的讲话。其中，他详细回顾了九年前中国在印度洋海啸后做出的行动——在海外实施了有史以来规模最大的救援行动。他提到，在印尼，许多当地人学会了一些中文，向中国救援队队员欢呼道：“中国、北京，我爱你。”中国现在以“一带一路”的名义向疫情重灾国大量援助医疗物资，希望它们同样感恩戴德。专注于此类援助在政治上对中国有益，既能帮助受援国大大提升抗疫能力，所需资金又远少于港口或铁路等项目。

定义模糊的“数字丝绸之路”也风头日盛。顺应疫情的需要，“数字丝路”的内涵已经包括帮助其他国家仿效中国的成功经验，利用应用追踪病毒。

中国官员可能会利用这段援外基建项目的暂停期重新考虑一下哪些项目是

必要的。他们一直备受西方批评，指责“一带一路”基建项目的社会和环境成本高昂且涉及不透明交易。在去年会晤多国领导人时，习近平强调“一带一路”倡议应坚持“开放、绿色、廉洁”的理念。疫情提供了机会，正好可以悄然废止那些不受欢迎的水坝工程（原本可能会因为抗议行动而延误，造成巨大损失）以及污染严重的燃煤电厂项目（反正本身也不是明智的投资）。波士顿大学的凯文·加拉格尔（Kevin Gallagher）表示：“华尔街没有人会说40年后燃煤电厂还是划算的。”相反，中国可以推广太阳能和风力发电。加拉格尔指出，通过“一带一路”，中国公司已在巴基斯坦建立了多个风电场。“如果你想要这一类项目，中国也有。”

开展得当的话，“一带一路”项目仍可能给全球经济带来可喜的提振，却不会用债务压垮他国。疫情爆发前，世界银行估计，包括高铁在内的亚洲的“一带一路”运输项目将促进参与国的GDP整体增长多达3.4%。其中一些铁路项目现在已停顿，中国也在忙着修复遭受重创的国内经济。但调研公司荣鼎集团（Rhodium Group）的丹尼尔·罗森（Daniel Rosen）认为，中国的政策性银行有足够的的能力维持“一带一路”目前的贷款水平。只是这样做在经济上并不明智，尤其是在全球经济复苏启动之前。

等复苏这一天到来时，“一带一路”可能会转回最初的重点。这是许多亟需更优良基础设施的国家所乐见的。它们没什么其他选择。去年11月，美国、日本和澳大利亚联合公布了“一带一路”的替代选项“蓝点网络”（Blue Dot Network）计划，资助发展中国家的基础设施项目。但是，与世界银行等多边贷款方一样，该计划背后的财力与中国相比显得微不足道。“‘一带一路’最有希望弥合全球经济中刺眼的基建差距，”加拉格尔说，“没有‘一带一路’，全球基建不会激增。”但眼下，想要这样的提振只能等了。■



Hacking

Basin motives

Sleuths uncover a brazen case of cyber-mischief

COMPANIES SUFFER hacking attacks on a daily basis. The most recent known victim was Honda, which announced that its computers had been locked down by ransomware on June 9th. Stories about the firms suspected of doing the hacking, though, are rarer. Also on June 9th CitizenLab, part of the Munk School of Government at the University of Toronto, said that it had unearthed one of the biggest-known groups of such workaday, mercenary hackers, which it has dubbed “Dark Basin”.

This outfit has targeted thousands of people at hundreds of organisations all over the world, carrying out what Norton LifeLock, a cyber-security firm that worked with CitizenLab, describes as “financial, political and industrial espionage”. Its targets have included company bosses, judges, journalists, members of various parliaments, government officials and ordinary people in the midst of a divorce in America, Mexico and elsewhere.

Most of the attacks involved “phishing” attempts, in which hackers try to trick targets into handing over usernames and passwords. Emails that appear to come from friends or colleagues contain links that, when clicked on, reveal convincing replicas of legitimate sites such as social networks or email providers. Anyone attempting to log in would be handing their username and password to the attackers. Some victims were bombarded almost daily with carefully crafted emails whose details suggested the hackers knew quite a bit about them. Others were followed in the real world at the same time they were being stalked online.

Attributing hacks to a specific actor is tricky. But a combination of technical

breadcrumbs, linguistic cues, public boasting by the hackers themselves and the fact that the attacks happened during the Indian working day, led CitizenLab to point the finger at a company based in New Delhi, BellTroX InfoTech Services. The firm purports to offer everything from medical-transcription services to “penetration testing”, a legitimate form of hacking in which experts are contracted by a company looking to test its electronic defences.

BellTroX’s boss, Sumit Gupta, has been in trouble before. Along with several American private investigators, he was indicted on a separate set of hacking charges in California in 2015. Soon after CitizenLab’s report was released, BellTroX’s website disappeared. (Requests for comment went unanswered, though Mr Gupta has told Reuters, a news agency, that he provided nothing more than “technical support”.)

While CitizenLab is willing to point the finger at the suspected hackers, it is less sure about who did the hiring. Some of the targets were involved in a campaign called “ExxonKnew”, which alleges that ExxonMobil, an oil firm, spent decades deliberately playing down the severity of climate change. (In 2019 ExxonMobil won a court case in New York on the matter.) However, CitizenLab did not accuse the firm of commissioning the attacks and an ExxonMobil spokesman denied the firm had knowledge of, or was involved in, the hacks.

Another group of targets appear to have been journalists covering Wirecard, a German payments-processing firm embroiled in an accounting scandal (on June 5th police raided its offices in Munich). Attacks seem also to have been made against hedge funds with a short position in Wirecard’s stock. Once again, the report does not allege that Wirecard commissioned the attacks. (Wirecard says it has not been in contact with a hacker group from India.)

John Scott Railton, one of the report's authors, says that the brazen nature of the hacking suggests those responsible were not worried about legal consequences. Hacking-for-hire holds appeal for anyone aiming to play dirty, he says, and may have become a standard tool for private investigators. "These kinds of services allow their clients to cause trouble from a distance, in a different jurisdiction, with minimal friction and not much chance of getting caught." Businesses—and anyone caught up in a bad-tempered divorce—beware. ■



黑客

隐藏的动机

调查人员揭露一起肆无忌惮的网络攻击

企业每天都在遭受黑客攻击。最近的已知受害者是本田，6月9日它宣布公司电脑被勒索软件锁定。然而关于涉嫌实施黑客攻击的公司的报道却少之又少。同样在6月9日，隶属于多伦多大学蒙克政府学院（Munk School of Government）的公民实验室（CitizenLab）称，他们发现了已知最大的实施日常攻击的黑客雇佣组织之一，并称之为“黑暗盆地”（Dark Basin）。

这个组织已经将世界各地数百个组织的成千上万人列为目标。与公民实验室合作的网络安全公司Norton LifeLock称其从事“金融、政治和工业间谍活动”。其目标包括美国、墨西哥等国的公司老板、法官、记者、议员、政府官员，还有正在离婚的普通民众。

大多数攻击都涉及“网络钓鱼”——黑客诱骗目标交出用户名和密码。看似来自朋友或同事的电子邮件中包含着的链接被点击时，会进入某个合法网站（比如社交网络或电子邮件供应商）的假冒复制品，看起来非常逼真。尝试登录的人就把自己的用户名和密码交给了攻击者。一些受害者几乎每天都会被精心设计的电子邮件轰炸，这些邮件的细节表明黑客对他们有相当的了解。另一些人在网上被跟踪的同时，在现实生活中也被跟踪。

要确定黑客攻击的具体实施者很棘手。但是，技术痕迹、语言线索、黑客自己的公开吹嘘，以及攻击发生在印度的工作日这一事实，让公民实验室将矛头指向了位于新德里的BellTroX信息技术服务公司（BellTroX InfoTech Services）。该公司声称提供从医疗记录转录到“渗透测试”的一切服务。渗透测试是一种合法的黑客行为，由希望测试自身电子设备防御能力的公司雇用专家实施这种测试。

BellTroX的老板苏米特·古普塔（Sumit Gupta）以前就遇到过麻烦。2015年，他和几名美国私家侦探在加州被指控犯有另外一系列黑客罪行。在公

民实验室的报告发布后不久，BellTroX的网站就消失了。（该公司未回应置评请求，但古普塔曾对路透社表示自己只是提供了“技术支持”。）

尽管公民实验室愿意指出可疑的黑客，但它不太确定是谁雇用了他们。其中一些被攻击目标曾参与一项名为“埃克森知道”（ExxonKnew）的活动，指控石油公司埃克森美孚（ExxonMobil）数十年来一直故意淡化气候变化的严重性。2019年埃克森美孚在纽约打赢了一场相关的官司。不过，公民实验室并没有指控埃克森美孚委托黑客进行攻击，埃克森美孚的发言人也否认公司知晓或参与了黑客攻击。

另一组目标似乎是报道德国支付处理公司Wirecard的记者。这家公司卷入了一宗会计丑闻，6月5日遭到警方突击搜查了它在慕尼黑的办公室。受到攻击的似乎还有做空Wirecard股票的对冲基金。同样，报告并没有指称是Wirecard委托展开这些攻击。Wirecard表示公司未曾与来自印度的黑客组织联系过。

报告的作者之一约翰·斯科特·雷顿（John Scott Railton）说，黑客行为的肆无忌惮表明，肇事者并不担心法律后果。他说，对任何想要耍诈的人来说，雇用黑客都具有吸引力，而且可能已经成为私家侦探的标准工具。“这类服务让客户可以从一个不同的司法管辖区远程制造麻烦，阻碍很小，被抓住的机会也不大。”各家企业，还有陷入离婚恶战的人，都要小心了。■



The Economist film

Why the melting Arctic matters to us all

Scientists previously thought that by 2070 there will be no sea ice at all in the Arctic, they now believe this will happen by 2040.



经济学人视频

北极融化为何与我们息息相关？

科学家此前认为到2070年，北极的所有海冰将不复存在。现在他们认为这可能早在2040年就将发生。



Twitter and Facebook

A tale of two social networks

Different business models make for different politics

BIG EGOS butting heads has been a constant theme of the technology industry. When the personal computer was still young, Microsoft's Bill Gates, a super-pragmatist, was pitted against Apple's Steve Jobs, an extreme aesthete. In business software, a later duel was fought between Oracle's Larry Ellison and SAP's Hasso Plattner, who locked horns because they were so alike. The latest clash is in social media, between Twitter's Jack Dorsey and Facebook's Mark Zuckerberg—one a hands-off new-ager with a taste for fasting and ice baths, the other an absolutist ruler on a mission to bring the world closer together.

This difference in personality, as well as in their politics, undoubtedly played a role when Mr Dorsey allowed Twitter to flag two recent tweets from President Donald Trump as unacceptable: one for its falsity, the other for glorifying violence. Mr Trump immediately shot back, threatening in a hastily issued executive order to rein in social media, but not before Mr Zuckerberg had appeared on television to protest that he did not want to be the “arbiter of truth” and would never follow Twitter's lead.

Yet a less noticed factor that governed their responses is their differing “business model”. In Silicon Valley this is a fuzzier concept than in the world beyond, describing not just how a company makes money but the fundamental workings of its economic engine.

At first blush, Twitter and Facebook look similar. Each is a social network, connecting users online and presenting them with content in a “feed”, a never-ending list of posts, pictures and videos of pets. Each makes money by selling advertising, and thus has an interest in using every trick to

attract users' attention. And each employs gobbets of data gleaned from users' behaviour to allow advertisers to hit targets precisely, for which they pay handsomely.

Look closer, however, and these combinations of similar attributes have created two very different firms, explains Dipayan Ghosh, a fellow at the Harvard Kennedy School and author of "Terms of Disservice", a new book on social media. Twitter is essentially a modern-day "Speakers' Corner", where anyone can hold forth and others can talk back. Social-media scholars refer to it as a one-to-many broadcast network. Facebook is at its core a one-to-one or one-to-a-few network, replicating social relationships of the sort between friends, family or colleagues.

The difference may seem subtle, but it has several implications for the two firms' businesses. For starters, Facebook is able to gather more data about its users because they are more engaged with other users. This makes it easier to target ads. Facebook also benefits from stronger "network effects", meaning that each additional subscriber makes the service more useful for others, which attracts more subscribers, and so on. Twitter cannot rely on such a turbocharged engine of growth: while having friends is a human need, maintaining a soapbox is non-essential even for the world's extroverts.

This goes a long way towards explaining why in 2019 Facebook boasted nine times the users, 21 times the revenue and 12 times the profit of Twitter (see table). More importantly, the strong network effects are a prime asset that Facebook has defended vigorously: it has spent vast sums on buying firms it considers likely future competitors, such as Instagram, acquired in 2012 for \$1bn, and WhatsApp, for which it paid \$19bn in 2014.

Facebook's size has made it the dominant outlet for political discourse in America and elsewhere. That means it has to be more wary than Twitter

when moderating content as it is more vulnerable to accusations of political favouritism and thus to scrutiny by lawmakers. Like Twitter, it faces growing pressure to do more to fight illegal content, hate speech and misinformation on its platform.

The company Mr Zuckerberg runs also has to manage the threat of becoming the target of antitrust investigations, particularly in America. The Trump administration would probably not hesitate to wield that weapon, should Facebook take action that it might regard as discriminating against what the president calls “conservative views”—such as fact-checking his online utterances—especially during this year’s presidential campaign.

Mr Zuckerberg’s caution is thus of a piece with his earlier decisions to not fact-check political advertisements or limit how finely such ads can be targeted. Twitter, on the other hand, has banned political ads altogether.

Yet the two firms share a trait that could put them on a similar trajectory. Tech firms, more than other companies, have to be careful not to antagonise their mostly millennial employees, particularly the best software engineers, who can easily find work elsewhere if they are unhappy. Their mostly left-leaning workers are increasingly upset that bosses are not doing enough to stop the spread of misinformation or worse by politicians and others.

If Mr Dorsey has had a change of heart and now allows tweets like Mr Trump’s to be flagged, it is partly because of constant pressure from employees. Mr Zuckerberg is now facing open wrath from his troops. On June 1st hundreds of employees staged a “virtual walkout” (by refusing to work and explaining this in automated email replies) for the first time, in protest against Facebook’s decision not to take action against the president’s posts. Perhaps Mr Zuckerberg, like Mr Dorsey, will end up

changing his tune—though he is likely to wait until he knows the outcome of the presidential election in November. ■



推特和Facebook

双社交网络记

不同的商业模式造就了不同的政治行为

自负的人互不对付是科技行业中一个不变的主题。在个人电脑问世之初，超级实用主义者、微软的比尔·盖茨与极端唯美主义者、苹果的史蒂夫·乔布斯就势同水火。在商业软件领域，甲骨文的拉里·埃里森（Larry Ellison）和思爱普（SAP）的哈索·普拉特纳（Hasso Plattner）后来展开了一场对决，两人因太过相似而打得难分难解。最新的冲突发生在社交媒体领域，一方是推特的杰克·多尔西（Jack Dorsey），另一方是Facebook的马克·扎克伯格。前者是个放手不干涉的新时代运动的信徒，喜爱斋戒和冰浴，后者则是以把世界拉得更近为使命的专制统治者。

当多尔西允许推特将美国总统特朗普最近的两条推文标记为不可接受时（一条是因为虚假，另一条是因为美化暴力），他们二人在个性以及政治行为上的差异无疑起到了一定作用。特朗普立即回击，并迅速发布行政命令，威胁要控制社交媒体。而在这之前，扎克伯格就在电视上抗议说，他不想充当“真相的仲裁者”，也绝不会效仿推特的做法。

不过，决定他们反应的因素中有一点不太引人注目，就是二者不同的“商业模式”。这个概念在硅谷比在世界其他地方更模糊，不仅描述一家公司如何赚钱，还描述公司经济引擎的基本运作方式。

乍一看，推特和Facebook很相似。两者都是社交网络，在线上把用户连接起来，并通过“信息流”向他们展示内容：无穷无尽的帖子、图片和宠物视频。两家公司都通过卖广告赚钱，因此都有兴趣用各种手段来吸引用户的注意力。两家公司都利用从用户行为中收集到的大量数据让广告主能够精准地命中目标，并为此支付不菲的广告费。

但仔细观察就会发现，这些相似的属性组合成了两家截然不同的公司，哈佛大学肯尼迪学院（Harvard Kennedy School）的研究员迪帕扬·高希

（Dipayan Ghosh）解释道。他也是讲述社交媒体的新书《帮倒忙条款》（Terms of Disservice）的作者。推特本质上是一个现代的“演说者之角”，任何人都可以在那里高谈阔论，其他人也可以反驳。社交媒体学者称推特为一对多的广播网络。Facebook本质上是一个一对一或一对几的网络，复制了朋友、家人或同事之间的那种社交关系。

这一差别看似微妙，却对两家公司的业务产生了一些影响。首先，Facebook能够收集更多的用户数据，因为其用户与其他用户之间的互动更密切，它也就更容易精准投放广告。Facebook还得益于更强大的“网络效应”，也就是每增加一个订户，所提供的服务对其他人就更有用，进而吸引到更多订户，以此类推。推特却无法依靠这样一个涡轮增压式的增长引擎，因为拥有朋友圈是人的基本需求，拥有演讲台却不是——即便是对外向的人而言。

这就很好地解释了为什么Facebook在2019年拥有推特九倍的用户，21倍的收入和12倍的利润（见图表）。更重要的是，强大的网络效应是Facebook极力捍卫的一项重要资产：它花费巨资收购了它认为很可能成为未来竞争对手的公司，比如2012年以10亿美元收购Instagram，以及2014年以190亿美元收购WhatsApp。

Facebook的规模让它成为美国等地政治言论的首要抒发渠道。这意味着它在审核内容时必须比推特更加谨慎，因为它更容易被指责存在政治偏袒而引来立法者审查。和推特一样，它也面临越来越大的压力去更多地打击平台上的非法内容、仇恨言论和错误信息。

扎克伯格经营的这家公司还必须妥善应对变成反垄断调查目标这一威胁，尤其是在美国。如果Facebook采取的行动可被政府指斥为对总统口中“保守派观点”的歧视，比如对他的在线言论进行事实核查，那么特朗普政府可能会毫不犹豫地使用这一武器，特别是在今年的总统竞选期间。

因此，扎克伯格的谨慎与他早先不对政治广告做事实核查或者限制这类广告投放的精准度的决定是一致的。而推特则完全禁止了政治广告。

不过，这两家公司还有一个共同的特点，可能会让它们走上相似的轨道。与其他公司相比，科技公司必须得格外小心，不要激怒它们以千禧一代为主的员工，尤其是那些最优秀的软件工程师——他们要是不开心，很容易就能在别处找到工作。以左倾为主的科技公司员工对老板越发不满，认为他们没有采取足够措施阻止政客等人传播偏颇失实甚至故意捏造的假新闻。

如果说多尔西改变了主意，现在允许对特朗普这样的推文做标记，那也是员工持续的施压起到了一定作用。扎克伯格现在要面对下属公开表达的愤怒。6月1日，数百名员工第一次举行了一场“虚拟罢工”（拒绝工作，并以自动回复邮件的方式解释此事），抗议Facebook决定不对总统的帖子采取行动。也许扎克伯格最终会像多尔西一样改变态度，尽管他很可能会等到11月大选结果出来之后。 ■



Buttonwood

Pumping iron

The material reasons behind the spectacular rally in metal prices

TOO SOON. That is the judgment a lot of investors apply to the recent across-the-board surge in asset prices. For it is not just the stockmarket that has rallied. The prices of industrial raw materials have also risen sharply in the past month or so. Iron ore has increased from \$80 a tonne to over \$100. Copper prices are also up 25%. This is remarkable. The global economy is only just reopening. It feels a bit early for a commodity boom.

It is tempting to see parables here. Perhaps the metals rally is a template for the post-virus economy, in which supply bottlenecks push prices up as activity gets going again. Perhaps it shows how mindlessly the ocean of liquidity created by the Federal Reserve and the European Central Bank has washed into financial markets of all kinds. For the “too-soon” school it is a sign that optimism is running ahead of reality. Perhaps it is. But quite a lot of the commodity story seems to be about China.

China’s role is both curious and obvious. It is curious because China’s economy is meant to have become more reliant on consumer spending and less on building booms financed by ever-larger dollops of debt. It is obvious because, notwithstanding this stated goal, China is still the world’s biggest buyer of industrial commodities. Almost all the seaborne trade in iron ore goes there. If metal prices are going up, it is a fair bet that something is happening in China.

And so it is. Steel mills are working flat out. In the first week of June, China’s steel blast furnaces were operating at 92% of capacity. That is a good deal above the 80-85% rates considered normal. Much of the steel manufactured in China is for buildings and for infrastructure, such as

bridges, railways and subway lines. Sure enough, indicators of construction activity look strong. Sales of excavators are up by a fifth so far this year, compared to a year earlier. A pipeline of orders had already been building before the pandemic struck. In its aftermath, construction has been given an extra push by the government's efforts to gin up the economy. China-watchers say lessons have been learned. There has been a greater focus than in the past on selecting worthwhile projects, says Sean Darby, a Hong Kong based analyst for Jefferies, an investment bank.

The supply response to this has been led by Australia, the world's largest exporter of iron ore. It swiftly took steps to contain the virus at the outset. It has managed, at the same time, to keep its mines in the ore-rich Pilbara region open. Exports of ore have risen this year. This contrasts with Brazil, where the spread of the virus has crippled production. Such bottlenecks are one reason for higher prices. And there is a bigger picture. The mining industry suffered a brutal reckoning in 2014-16, after a decade-long boom fuelled, yes, by China. Investment was cut; mines were closed; debts were paid. The result is that the industry does not have the chronic over-capacity of many other cyclically sensitive ones—think European banks or global carmakers.

There is a speculative element to the rise in metal prices, too. Buying or selling copper futures is a popular way to express a view about the world economy. Indeed copper can be all about belief, says Max Layton of Citigroup, a bank. Many of the bets laid on it are by trading algorithms, which mechanically respond to financial signals that have worked well in the past. The dollar, which has fallen by 6% against a basket of currencies since March, is usually part of the semaphore. A weaker dollar allows for easier terms of finance in emerging markets. Anything that helps emerging-market economies is generally good for commodity prices. So the algorithms buy.

The complex of price changes becomes self-reinforcing. Higher ore prices bring higher-cost producers back to the market. But their profit margins are then squeezed as their home currency appreciates, because that raises the cost of labour in dollars, in which commodities are priced. To restore margins, prices must go up. Moreover, marginal costs rise when the prices of steel (used for mining parts) and oil (used for energy and chemicals) go up. These higher costs push up prices further, says Mr Layton.

A pattern in markets is that a lot happens by rote. China's response to a weak economy is to build; investors' response to the Fed's easing is to buy stocks; the algorithms' response to a weaker dollar is to buy commodities. Higher prices beget higher prices. The sceptics, the too-sooners, note that this also works in reverse. Quite so. But the momentum is now with the believers. ■



梧桐

趁热打铁

金属价格暴涨背后的实质因素

太早了。这是最近资产价格全面飙升时许多投资者的看法。不仅股市回升，工业原材料的价格也在过去一个月左右急剧上涨。铁矿石的价格从每吨80美元突破100美元。铜价也涨了25%。升势惊人。全球经济才刚刚重启，大宗商品市场重现繁荣好像有点为时过早。

人们很容易会从中看到一些“寓意”。本轮金属价格反弹也许是后疫情时期经济的一个样板——随着各地复工复产，供应瓶颈会推高价格。这也许显示出，美联储和欧洲央行打造的流动性的海洋如何在不经意间涌入了各类金融市场。在认为“复苏太早”的人们看来，这表明乐观情绪超越了现实。也许的确如此。但大宗商品这股涨势似乎大多与中国相关。

中国在此中扮演的角色颇怪异，但却显而易见。说它奇怪是因为中国经济原本想要变得更依赖消费而不再是大举借债搞基建。而尽管有这样的目标，中国依然是全球最大的工业大宗商品买家，所以它的影响力显而易见。几乎所有铁矿石海运贸易都以中国为目的地。假如金属价格上涨，几乎可以肯定是中国发生了什么情况。

果不其然。中国的钢铁厂正在全速生产。6月第一周，中国的高炉产能利用率达到92%，比常规的80%至85%高出不少。中国生产的钢铁大部分用于建筑和基础设施，如桥梁、铁路和地铁。自不必说，建筑活动数据看起来很强劲。今年迄今挖掘机的销量相比去年同期增长了五分之一。疫情爆发前订单就已不断增加。疫情减退后，中国政府振兴经济的措施又为建筑业添了一把火。观察人士认为中国已经吸取了一些教训。投资银行杰富瑞驻香港的分析师肖恩·达比（Sean Darby）表示，相比以往，现在政府更注重选择有价值的项目。

全球最大的铁矿石出口国澳大利亚带头响应这一需求。澳大利亚一开始就

迅速采取措施遏制新冠病毒传播，同时设法保持了铁矿资源丰富的皮尔巴拉地区的矿山正常运作。铁矿石今年的出口量已出现增长。巴西的情况截然相反，疫情已导致生产瘫痪。这类供应瓶颈是价格上涨的原因之一。另外还有一些大环境因素。正是在中国的推动下，采矿业经历了长达十年的繁荣期，之后在2014年至2016年遭到了一轮残酷清算。投资削减，矿山关闭，债务清偿。结果就是该行业不像许多其他周期敏感型行业（如欧洲的银行或全球汽车制造商）那样长期产能过剩。

金属价格上涨也存在投机因素。买入或卖出铜期货通常反映了人们对世界经济走势的看法。花旗银行的马克斯·莱顿（Max Layton）表示，实际上，买卖铜可能完全是信念的问题。很多买卖决定是通过交易算法得出的，而这些算法不过是在机械地对以往表现良好的金融信号做出反应。美元走势（兑一篮子货币汇率自3月以来已下跌6%）通常是信号之一。美元走弱意味着在新兴市场融资变得更容易。任何有助于新兴市场经济体的因素通常都有利于大宗商品价格上涨。所以算法会决定买入。

价格波动中的复杂关系会产生自我增强的效果。铁矿石价格上升会吸引成本较高的生产商重回市场。但是由于本币升值，它们的利润率受到挤压，毕竟以美元（大宗商品的定价货币）计价的劳动力成本上升了。要保持利润就必须提高价格。而且，当钢（用于采矿设备零部件）和石油（用于能源和化工品）的价格上涨，边际成本也会升高。莱顿表示，这些成本上升进一步推高了价格。

市场的一个模式是，许多动静都是机械式反应。中国对经济疲软的反应是大兴土木；投资者对美联储宽松政策的反应是买入股票；算法对美元走弱的反应是购买大宗商品。价格上涨会推动价格进一步上涨。认为“复苏太早”的怀疑论者指出，反之亦然。确实。但目前的势头是应了相信复苏正当时的人的看法。■



The yuan

The 24-body problem

China's currency is enjoying a period of stability. But it will not last for ever

IN THE “Three-Body Problem”, a popular Chinese science-fiction novel, the planet Trisolaris lurches between climatic stability and chaos as it follows an unpredictable orbit around the three suns in its star system. The solution, the inhabitants conclude, is to invade the Earth, so as to enjoy its smooth single-sun orbit. China’s central bank has been making a similar monetary voyage, in reverse.

For years the yuan revolved around the dollar. That benefited China, but it also stored up problems, which were exposed most dramatically in 2015, when it suffered massive capital outflows. Since then the central bank has steadily moved the yuan to a multi-currency orbit, tracking 24 in all. In economic terms, this is known as a currency-basket regime. In Trisolaris terms it looks like a “long Stable Era”, desirable but ultimately doomed.

Our planet’s inhabitants tend to analyse the yuan in comparison with the biggest currency in our solar system. So its recent depreciation against the dollar attracted much attention, especially in late May, when the People’s Bank of China (PBOC) set the yuan’s daily reference rate at 7.13 to the dollar, the weakest since 2008. Amid ever-increasing tensions with America, many economists predicted further depreciation, though the yuan has strengthened against the greenback so far in June.

But the singular focus on the dollar misses something important. At the end of 2015 China started announcing the yuan’s exchange rate against a basket of currencies. It took a while to work out the kinks in the new system, but the evidence is that the yuan has been among the most stable currencies in the world since mid-2016. Its real effective exchange rate—its

value against the currencies of its trading partners, adjusted for inflation—has risen by just 0.2% over the past four years, anchored by the official basket (see chart).

The yuan's stability is partly by design. Every morning the PBOC sets its reference rate on the basis of two variables: the previous day's close against the dollar and the need to limit changes against the basket. The formula tends to push the yuan towards the middle of the pack. For instance, if the dollar is generally weak, the yuan will strengthen against it, but depreciate against other currencies—exactly what has happened in June. The PBOC also adds a third variable, the “counter-cyclical adjustment factor”, when it deems that the yuan is moving too much. This discretionary tweak is its way of leaning against what it defines as herd behaviour in markets.

Every day the yuan can move up or down by 2% from its reference rate against the dollar. Although it has never hit that limit, China has grown comfortable with allowing bigger swings within it. Over the longer term, this may have contributed to stability. On any given day, it is not obvious where the yuan will end up, pressing traders to take both sides of the market.

The basket regime seems to have allowed the PBOC to stop conducting heavy-handed intervention. Foreign-exchange reserves have held steady at around \$3.1trn since mid-2016, implying that the yuan faces no great appreciation or depreciation pressure. But the PBOC has also become more targeted in its intervention. When the yuan has been weak, it has called on state-owned commercial banks to sell forward dollars in foreign-exchange swaps, to signal that the yuan will strengthen in the future. One strategist is convinced, albeit without any hard evidence, that the PBOC also has a team of traders who push the yuan around, wrong-footing other investors. And the biggest intervention of all is China's capital controls, which remain very tight.

The yuan's stability of the past few years has also been partly the result of good fortune. In that time the dollar, the euro and the yen—the three biggest suns in the yuan's universe—have themselves been unusually stable against each other. If they were to veer off in wildly different directions, China's basket regime would be tested. A better course for the world's second-largest economy would be a truly free float, making the yuan one of the global monetary system's suns, not a mere planet. For now, Chinese officials show little inclination to undertake such a voyage. ■



人民币

24体问题

人民币汇率处于稳定期，但不会永远持续

在中国热门科幻小说《三体》（英文版名为“Three-Body Problem”）中，“三体”这颗行星围绕其星系内的三颗恒星旋转，运行轨道变幻莫测，因而气候在稳定和混乱之间交替突变。三体星人认为解决办法是入侵地球，享受其平稳的单恒星轨道的好处。中国央行一直在展开类似的货币“征程”，但方向相反。

多年来，人民币一直围绕美元变动。这对中国有利，但也累积了不少问题。2015年资本大规模外流时，这些问题尤为突出。自那以后，中国央行开始将人民币逐步转移到一个“多币种轨道”，共追踪24种货币。经济学术语称之为“货币篮子”制度。用三体星人的说法，这看似是一个“恒纪元”，这是人们向往的稳定年代，但最终会结束。

地球人在分析人民币时，往往会拿它跟太阳系内的第一大货币相比。所以人民币最近对美元的贬值引起了广泛关注，尤其是5月下旬，中国人民银行把每日人民币兑美元的中间价定为7.13，达到自2008年以来的最高位。眼看中美矛盾愈演愈烈，许多经济学家预测人民币将进一步贬值，尽管6月以来兑美元汇率一直在回升。

但只盯着美元会漏掉一些重要方面。2015年底，中国开始公布人民币兑一篮子货币的汇率。新系统花了一段时间才理顺，但证据表明，自2016年中以来人民币一直是世界上最稳定的货币之一。有了官方货币篮子的锚定，过去四年内人民币实际有效汇率（相对贸易伙伴货币的价值，经通胀调整）仅上升了0.2%（见图表）。

人民币的这种稳定性在一定程度上是有意造就的。人行每天早上都会基于两个变量来设定人民币中间价：前一天兑美元汇率收盘价，以及控制兑一篮子货币汇率波动的需要。这个公式一般会把人民币推向队伍的中间位

置。例如，当美元大体疲软，人民币对美元就会升值，但对其他货币会贬值，6月份的情况正是这样。人行在认为人民币汇率波动过大时还会添加第三个变量——“逆周期调节因子”。它用这种自行裁定的微调来对抗它认定的外汇市场上的羊群行为。

人民币兑美元汇率每天可以相对中间价上下波动各2%。尽管实际从未触及此界限，中国已能更放心地让汇率在此区间内有更大幅度的波动。从更长的时间区间来看，这可能是它之所以保持稳定的原因之一。但在任意一天，汇率会波动到哪个位置并不显而易见，迫使交易员考虑两个方向上的可能性。

一篮子货币制度似乎让人行可以不再实施强硬的干预手段。自2016年中以来，中国的外汇储备一直稳定在3.1万亿美元左右，意味着人民币升值或贬值的压力不大。但人行的干预也变得更有针对性。人民币走弱时，人行会呼吁国有商业银行出售外汇掉期中的远期美元，以发出人民币会在未来走强的信号。尽管没有任何确凿证据，但一位策略师确信，人行还有一个交易员团队来推动人民币汇率的涨跌，扰乱其他投资者的阵脚。而最大的干预莫过于中国一直都非常严格的资本管制。

人民币汇率在过去几年保持稳定还有运气的因素。期间，美元、欧元和日元（人民币宇宙中最大的三颗恒星）之间的汇率一直出奇地稳定。假如它们是各自朝着大不相同的方向运行，中国的一篮子货币政策就会经受考验。对于世界第二大经济体来说，更好的发展方向是真正的汇率自由浮动，让人民币成为全球货币星系的恒星之一，而非仅仅是一颗行星。目前来看，中国官员似乎无意朝此方向启航。■



Schumpeter

The warehouse king

Why industrial wasteland is the new battleground for property giants

IN THE LATE 1990s Hamid Moghadam, an Iranian-born property developer, made a \$5m bet on Webvan, an American online grocer. It was a bust. Webvan was one of the most spectacular casualties of the dotcom crash. More galling still, Mr Moghadam turned down the opportunity to invest in another e-commerce upstart called Amazon, thinking its focus on books was too narrow compared with groceries. Yet some people can win even by losing. Sensing a potential bounty in the online craze, the firm he co-founded, AMB, sold its portfolio of shopping centres and bought millions of square feet of warehouse space on the tarmac of American airports instead. “We got the company wrong, but we got the big trend right,” he says. Two decades later the company he heads, Prologis, is Amazon’s biggest landlord. Mr Moghadam, now 63, stands tall over the world’s warehouse business.

A Stanford graduate who got his start in property because no one else in America would hire him during the Iranian revolution, Mr Moghadam has made a career of bold bets. In 2011, with property still reeling from the financial crisis of 2007-09, he led a bumper deal to unite AMB and Prologis, a bigger rival, with a combined \$46bn of owned and managed assets. Since then the property-investment firm has expanded globally. It has assets of \$125bn and floor space of 1bn square feet (90 square kilometres, or a Manhattan-and-a-half). A surge of e-commerce during the covid-19 pandemic has helped underpin its share price; its market value of \$68bn is just below an all-time high. Yet Mr Moghadam is not alone in realising that the humble shed can be as good an investment in the e-commerce era as shovels were during the Gold Rush. Blackstone, the world’s largest

alternative-asset manager, invested more than \$25bn last year in warehouses in America and Europe. It calls logistics its “highest-conviction global investment theme”. A battle over industrial wasteland is under way.

It is hard to imagine Stephen Schwarzman, Blackstone’s high-society boss, talking as passionately about the nitty-gritty of logistics as Mr Moghadam (who has a fraction of Mr Schwarzman’s wealth). Yet a contest between the king of warehouses and the baron of private equity will be worth watching. It will not just shape the future of e-commerce. It will change the urban landscape, too.

To see why, cycle, as Schumpeter did on a recent weekend, up London’s Lea Valley, an idyll of canal boats and riverside vegetable gardens running from the graffiti-covered East End to the capital’s north. Stop at the Ravenside Retail Park, a place of shuttered stores like Mothercare, a well-known British brand, and Maplin, an electronics retailer. It is destined to become ground zero for the retail apocalypse. In January Prologis spent £51m (\$68m) acquiring the site, just before covid-19 accelerated the agony of its remaining tenants. In a few years, once they, or their leases, expire, Prologis hopes to turn the area into a multistorey warehouse for e-commerce firms like Amazon. That is part of a global pattern. In America such logistics hubs are rising from the rubble of dead shopping malls.

It is easy to dismiss the warehouse business. As one industry boss puts it, investors used to think of it as “four walls and a roof that you hope doesn’t leak”—in other words, highly commoditised. Yet Mr Moghadam says it is enthralling. The first task, he says, is to decide on which end of the supply chain to be. He settled on mass consumer markets around the world rather than serving producers, because, as he puts it, “Consumers do not move, factories do.” As a result, his warehouses sit close to huge urban areas where land is scarce. It also requires patience. In America it has taken decades for e-commerce to eke out a double-digit share of retail spending.

Lockdowns have turbocharged the shift. Before the pandemic about a fifth of Prologis's warehouse construction was for e-commerce, and the rest for other forms of logistics. The e-commerce share is now as high as 40%, Mr Moghadam says.

| *Storage-space race*

Two other challenges for warehouse developers are ensuring customer loyalty and a stream of financing. Stockmarket analysts play down Blackstone as a threat on the first count. They say private equity's "buy it, fix it, sell it" mentality prevents logistics firms from building the long-term relationships that enable them to move with their clients around the world. But Blackstone's staying power should not be underestimated. It started its warehouse portfolio a decade ago. It currently owns 850m square feet of logistics space globally. It has \$45bn of investor money earmarked for property transactions. Prologis says it has more than \$13bn in such "dry powder". It has also used stock in recent transactions.

The pandemic may make the warehouse business yet more attractive. As tenants struggle to pay rent, bad debts are rising. But unlike the slump a decade ago, pre-pandemic utilisation rates were high, and e-commerce increases demand for space, because online retailers must stock a wider variety of products. "This is the tightest real-estate market that I have ever seen," Mr Moghadam says. That will put a floor under rents in the future, he believes.

That future is likely to be ever closer to large urban or suburban areas, as online retailers strive to shorten delivery times. Until recently, the trend was constrained by a lack of land and labour. Neither city officials nor workers looked favourably on warehouses. The pandemic may change that. The blight on shops and hotels will free up space. Unemployment will make logistics jobs more attractive, as Amazon has recently demonstrated.

Moreover, Prologis wants to burnish the industry's image. To see how, cycle back down the Lea Valley to the heart of the East End, where it hopes to refurbish a listed four-storey warehouse dating back to the Victorian era. The aim is to include storage, light manufacturing, creative industries, a gym and a coffee shop. It will be solar-powered and surrounded by green space. A few decades ago abandoned industrial warehouses became trendy places to live. Those of the future may even be alluring places to work. ■



熊彼特

仓储之王

工业废弃地何以成为地产巨头的新战场

上世纪90年代末，出生于伊朗的地产开发商何慕德（Hamid Moghadam）向美国生鲜杂货电商Webvan投下了500万美元。这笔投资以失败告终。Webvan是互联网泡沫破灭时损失最惨重的公司之一。更令人恼火的是，何慕德拒绝了投资另一家名叫亚马逊的电商新贵的机会，他认为它专注于图书，与生鲜杂货相比业务过于狭窄。不过，有些人即使失败也是为了赢。在网络热潮中嗅到潜在商机之后，他共同创办的AMB公司卖掉手上的购物中心资产，转而买入了美国机场停机坪上数百万平方英尺的仓储空间。“我们押错了公司，但押中了大方向。”他说。20年之后，他掌管的安博（Prologis）已成为亚马逊最大的房东。现年63岁的何慕德也在全球仓储业务中独占鳌头。

从斯坦福大学毕业后，何慕德投身地产业，因为在伊朗革命期间美国没有其他公司肯雇他。他通过一系列大胆押注闯出了一番事业。2011年，房地产行业仍在2007至2009年的金融危机之后苦苦挣扎，他牵头完成了一桩大手笔交易，将AMB与体量更大的竞争对手Prologis合并，自有资产和管理资产总值合计达到460亿美元。自此，这家地产投资公司开始了全球扩张。它拥有1250亿美元的资产，建筑面积达90平方公里（相当于1.5个曼哈顿）。新冠疫情期间电子商务活动激增，推高了公司股价，目前市值达到680亿美元，仅略低于历史最高水平。不过，并非只有何慕德一人独具慧眼地意识到，在电子商务时代，简陋的库房也能成为极好的投资，正如淘金热时期的铁锹一样。世界最大的另类资产管理公司黑石集团

（Blackstone）去年在美国和欧洲的仓库投资逾250亿美元。黑石将物流称为“全球最令人信服的投资主题”。一场对工业废弃地的争夺战正在打响。

很难想象黑石集团的名流老板苏世民（Stephen Schwarzman）会像何慕德（身家只有苏世民的一个零头）一样热情洋溢地谈论物流的运作细节。但仓储之王和私募大亨之间的竞争值得关注。这不仅将塑造电子商务未来的

面貌，还会改变城市的景观。

要了解个中缘由，不妨像本专栏记者在近日的一个周末那样，跨上自行车，从涂鸦密布的伦敦东区出发，沿着伦敦的利河谷向北骑行，一路上是运河船只与河畔菜园的田园风光。在Ravenside零售园驻足，这里到处是门窗紧闭的店铺，例如英国知名品牌Mothercare和电子产品零售商Maplin。这里注定要成为零售业末日的原爆点。今年1月，就在新冠疫情令其余租户的困境雪上加霜之前，安博斥资5100万英镑（6800万美元）买下了这块物业。等再过几年这些租户倒闭或者租约到期，安博希望将这个地方改造成为服务像亚马逊那样的电商企业的多层仓库。这已经成为一种全球模式。在美国，这样的物流中心正纷纷从荒废的购物中心中崛起。

仓储业务很容易被人忽略。正如一位业内老板所言，以往投资者觉得仓库不过是“四面墙加一个屋顶，不漏水就好”——换言之，就是高度日常商品化的东西。但何慕德说它激动人心。他说，首先要决定靠近供应链的哪一端。他在全世界都选择了靠近大众消费市场而不是去服务生产商，他说这是因为“消费者不会动，但工厂会”。因此，他的仓库都紧邻土地稀缺的大都会地区。还需要有耐心。在美国，电子商务花了几十年时间才艰难拿下了零售支出的两位数份额。各地封城大大加速了这一转变。在疫情大流行之前，安博的仓库中只有大约五分之一用于电子商务，其余用于其他形式的物流。现在电子商务的占比已经高达40%，何慕德表示。

| 仓储空间竞赛

仓库开发商面临的另外两个挑战是确保客户忠诚度以及源源不断的融资。在第一点上，股市分析师并不认为黑石是一大威胁。他们表示，私募股权“买下，改善，出售”的思路让物流公司难以与客户建立起长期关系，然而只有长期关系才能让它们跟随着客户去到世界各地。但黑石的耐力不可小觑。它十年前就开始了仓储投资组合，目前在全球拥有8.5亿平方英尺的物流空间。它有450亿美元的投资者资金专门用于物业交易。安博表示拥有超过130亿美元的此类“干火药”。它还在近期交易中采用了换股的手法。

这次疫情可能会使仓储业务的吸引力进一步提升。随着租户无力承担租

金，坏账正不断增加。但是与十年前的经济衰退不同，这次疫情前仓储利用率就很高，而电子商务又增加了对仓储空间的需求，因为线上零售商必须为更多种类的产品备货。“这是我见过最紧俏的房地产市场。”何慕德说。他认为这将给未来的租金构筑一道底线。

随着线上零售商竭力缩短送货时间，这样的前景愈趋于在大城市或城郊地区成为现实。直至最近，这种趋势还受到土地和劳动力短缺的制约。无论市政官员还是劳动者，都对仓库缺乏好感。疫情可能会使情况改观。生意萧条的商店和酒店将会腾出空间。失业潮之下，物流工作会更有吸引力，正如亚马逊最近所展示的那样。

此外，安博还想美化这个行业的形象。想知道它怎么做，请再沿着利河谷骑行，回到伦敦东区的核心地带。在这里，安博希望翻新一个可追溯到维多利亚时代的受保护的四层仓库建筑。其目标是综合仓储、轻工业、创意产业，还有一家健身房和一个咖啡馆。该建筑将使用太阳能供电，四周绿地环绕。几十年前，废弃的工业仓库变成了时髦的居住场所。未来，它们甚至可能会成为诱人的工作场所。 ■



Human space flight

The shape of things to come

The Crew Dragon spacecraft will not change the world, but it will make getting humans away from it cheaper

THE ECHOES were obvious. The first launch of an Apollo spacecraft with a crew took place in 1968, an election year in which the country was reeling from assassination and riot, at war abroad and divided at home. To some on both sides of that divide, the Apollo programme remained an inspiration, a revelation of what the nation could do if determined to. It was “Man’s noblest venture”, declared Ralph Abernathy, a civil-rights leader, as he demonstrated outside the Kennedy Space Centre in Florida—but moving and heroic as it was, he went on, it threw into sharp relief the priorities of a nation which badly needed to improve the lot of its poorest people. Others were less magnanimous about what they saw as a distraction. “Was all that money I made last year”, asked the poet Gil Scott-Heron, “for Whitey on the Moon?”

On May 30th, in the most eagerly anticipated space mission for a decade or more, a Falcon 9 rocket launched a new space capsule, the Crew Dragon, from the same Florida launch pad that saw those Apollo missions blast off to the Moon. Less than a day later the spacecraft delivered her crew, Robert Behnken and Douglas Hurley, to the International Space Station.

America’s first crewed spacecraft since the space shuttle, which first flew in 1981 and was retired in 2011, had done its job perfectly. This coup for NASA, America’s space agency, which President Donald Trump wants to see land people on the Moon by 2024, might in other circumstances have been much ballyhooed. The return to space could even have been a boost to the morale of a nation reeling from disease—had it not been for protests and violence 400km below bringing to mind other aspects of 1968.

The mission was eagerly anticipated for two reasons. One is that it has been something of an embarrassment for America to go so long without the capacity to launch its own astronauts, relying instead on rides into space provided by the Russians (and paying handsomely for the privilege).

The other, deeper, reason for excitement was that the Crew Dragon programme proved that human space flight can be far cheaper than NASA's previous record would lead you to expect. The Planetary Society, which lobbies for space exploration, reckons the Dragon cost NASA just \$1.7bn, making it the cheapest crewed spacecraft developed in America (see chart).

Dragon is cheap largely because of the way it was procured. Previous NASA practice was to offer "cost plus" contracts for building rockets and spacecraft which met specific design requirements. There was little competition involved and few incentives to keep costs down, not least because the giant defence contractors which won such contracts have many friends in Congress happy to see NASA spend generously as long as it does so in their own districts and states.

This produces programmes like the Space Launch System (SLS), which has been made integral to NASA's Moon plans. The SLS is a very big rocket conceived as part of George W. Bush's plans for missions to the Moon and Mars. Barack Obama had no time for those plans, but the Senate made sure that a version of the rocket was kept in development regardless. According to NASA it will have cost at least \$17bn by the time of its first mission, slated for 2021. Developing the Orion spacecraft that the SLS is meant to launch has cost even more.

In the mid-2000s Mike Griffin, then NASA's administrator, began experimenting with a new approach. Instead of specifying what a rocket or spacecraft should look like, NASA would tell firms what it wanted and agree to pay for some of the R&D which might be required while allowing them

much more room for manoeuvre when it came to choosing technologies and making trade-offs in design.

That approach opened the door for companies beyond the established military-industrial complex—including SpaceX, a firm founded in 2002 by Elon Musk in order to further his dream of establishing a civilisation beyond the Earth. When Dr Griffin left NASA in 2009, SpaceX had launched just one small payload into orbit. But it had also become part of NASA's Commercial Orbital Transportation Services programme. By 2012 money from NASA, some earned by meeting specified R&D milestones, had allowed it to use a new rocket, the Falcon 9, to launch a new cargo spacecraft, the Dragon, to the space station. The investment by NASA had not only given SpaceX new capabilities, it had also helped build up a truly innovative company in an area sorely bereft of innovation.

| *Rewriting the rocket equation*

A spacecraft for humans was the next step. Not everything went to plan. The crewed version of Dragon was supposed to fly in 2015 but was delayed by technical problems and funding constraints. But NASA's new, cost-saving approach now has a human-rated spaceship to add to its list of accomplishments. It should soon add a second. The programme which saw SpaceX develop Crew Dragon has seen Boeing, a giant defence contractor, develop something similar, the Starliner. But a test flight last December went badly, and no crewed flight is expected until 2021. The next Crew Dragon flight—the first of six routine crewed flights that NASA has signed contracts for—is due in August.

Now NASA is applying a similar approach to its lunar ambitions. In April it announced it was spending \$1bn with three industry groups to develop the capacity to take humans from lunar orbit down to the surface. One group is led by Blue Origin, owned by Jeff Bezos, the founder of Amazon. Blue Origin has yet to fly a rocket to orbit, but its technology appears first-rate. Mr

Bezos, like Mr Musk, thinks that developing a human presence in space will assure him a place in the history books of a civilisation too grand for a single planet.

The second recipient of funds was a consortium led by Dynetics, a subsidiary of Leidos, a defence contractor formerly known as SAIC. The third was SpaceX, which offered a version of Starship, a new spacecraft it is developing off its own bat. The Starship and its booster are designed to be as capable as the SLS and also fully reusable. Things have not, so far, gone smoothly: four test vehicles have blown themselves apart, the most recent on May 29th.

None of these three lunar-lander options requires the SLS to get into orbit. Starship would be launched with a new booster SpaceX is designing for exactly that. The Blue Origin lander could be launched on the company's New Glenn rocket, somewhat more powerful than the Falcon 9, or on Vulcan, a similarly sized booster made by Boeing and Lockheed which is Dynetics's ride of choice: both launchers are due to make their debuts next year. But the SLS and its Orion capsule are still integral to NASA's Moon plans. They will fly the astronauts to lunar orbit before the new spacecraft takes them to the surface.

This looks even less sensible now than it ever did. With a big SpaceX rocket—the Falcon Heavy—already available, two new big boosters due to debut next year and Starship being developed, American industry offers a number of options for getting astronauts up to the Moon. A programme truly aimed at improving the state of the spacefaring art, demonstrating a unique national capability or providing a shared experience around which Americans could, in principle, unite needs no more. And it would cost much less. The idea that a trip to the Moon might heal national wounds looks even less likely now than it did half a century ago. But it could at least take less of the money that Scott-Herron's heirs earned last year. ■



载人航天

飞向未来世界

载人龙飞船不会改变世界，但会降低人类逃离这里的成本

历史俨然在重演。1968年，阿波罗飞船首次载人发射。暗杀和暴乱、在国外作战和国内分裂让这个选举年成为美国内外交困的一年。对分裂双方的一些人来说，阿波罗计划仍是一针强心剂，是这个国家有志者事竟成的体现。当时，在佛罗里达的肯尼迪航天中心外示威游行的民权领袖拉尔夫·阿伯纳西（Ralph Abernathy）宣称，它是“人类最崇高的探险”。但是，他接着说，尽管这是感人的壮举，但它也让人们清楚地看到，一个亟需改善其底层人口命运的国家把什么当成了要务。其他人则认为这纯粹就是为了转移视线，言辞更不客气。“我去年赚的钱，”诗人吉尔·斯科特-赫伦（Gil Scott-Heron）问道，“是不是都拿去给白鬼登月了？”

作为十年甚至更久以来最受期待的太空任务，5月30日，一枚猎鹰9号火箭发射了新的太空舱“载人龙”（Crew Dragon）。它在佛罗里达所用的发射平台正是之前阿波罗系列登月任务用过的。不到一天的时间，这艘飞船便将宇航员罗伯特·本肯（Robert Behnken）和道格拉斯·赫尔利（Douglas Hurley）送到了国际空间站。

这是自航天飞机于2011年退役（1981年首飞）之后美国首次发射载人航天器。它圆满完成了自己的使命。若不是当前这种局面，负责太空计划的美国航空航天局（以下简称NASA，特朗普希望它在2024年前实现载人登月）的这一辉煌成就本可能被大肆宣传。这次重返太空甚至本可能让这个饱受疫情之苦的国家提振士气——要不是400公里之下的地面上发生的抗议和暴力事件也让人想起了1968年的其他面貌。

这次太空任务之所以备受期待，有两个原因。一是美国这么长时间都没能自己把宇航员送入太空，而只能依靠俄罗斯人的飞船（还得为此支付巨款），这多少有失颜面。

令人兴奋的另一个深层次原因是，NASA之前的花费让人认为载人航天的成本十分高昂，而载人龙飞船计划证明它可以便宜得多。太空探索游说机构行星协会（Planetary Society）估计，NASA在龙飞船上只花费了17亿美元，是美国研发的成本最低的载人飞船（见图表）。

龙飞船之所以便宜，很大程度上是因为NASA采购它的方式。NASA以往一直签订“成本加成”合同来制造符合特定设计要求的火箭和宇宙飞船。其间几乎没有竞争，也没有降低成本的动力，特别是因为拿下这种合同的大型国防承包商在国会有很多朋友，这些议员乐于看到NASA慷慨撒钱——只要是在自己的选区或州。

像太空发射系统（SLS）这样的项目就是这么生成的。SLS已经被列为NASA登月计划中的固定组成部分。SLS是一种巨型火箭，最初是小布什登陆月球和火星计划的一部分。奥巴马无暇顾及这些计划，但参议院确保了SLS火箭的其中一个版本继续研发。NASA预计，到2021年SLS执行首次发射任务时将已用掉至少170亿美元。而研发SLS将要发射的猎户座（Orion）宇宙飞船已经花掉了更多钱。

在2005年前后，时任NASA局长的迈克·格里芬（Mike Griffin）开始尝试一种新做法。NASA不明确规定火箭或宇宙飞船要建成什么样子，而是告诉承包商它想要的结果，并同意支付部分可能会需要的研发费用，同时在技术选择和设计取舍等方面给予它们大得多的余地。

这种做法为老牌军工企业之外的公司打开了大门，其中包括伊隆·马斯克在2002年为推进自己的星际殖民梦想而创立的SpaceX。2009年格里芬离开NASA时，SpaceX还只是将很小的有效载荷送入了轨道。但它也入选了NASA的商业轨道运输服务计划（Commercial Orbital Transportation Services）。到2012年，SpaceX凭借NASA提供的资金（部分因如期完成了NASA规定的研发任务而获得），使用新型火箭猎鹰9号向空间站发射了新的货运宇宙飞船——“龙”（Dragon）。NASA的投资不仅赋予了SpaceX新的能力，还在一个严重缺乏创新的领域扶植了一家真正勇于创新的公司。

| 改写火箭方程

接下来就是载人飞船的阶段了。然而并非所有事情都按计划推进。载人版的龙飞船原本预计在2015年升空，却因技术问题和资金限制被推迟。而现在，通过节约成本的新做法，NASA的成就榜上增加了一艘载人飞船。它应该很快还会再增加一艘：资助SpaceX研发载人龙飞船的项目也投资了大型国防承包商波音开发类似载人龙的星际线（Starliner）宇宙飞船。但去年12月星际线试飞失败，预计在2021年之前不会开展载人飞行。根据与NASA的合同，载人龙飞船将执行六次常规载人飞行，第一次订于今年8月。

目前，NASA正将类似的做法运用于登月计划。今年4月，它宣布正斥资10亿美元与三个行业团体合作，研发把人从月球轨道送到月球表面的方法。其中一个团体由亚马逊创始人杰夫·贝佐斯拥有的蓝色起源（Blue Origin）牵头。尽管蓝色起源还没有向太空轨道发射过火箭，但它的技术看上去是一流的。和马斯克一样，贝佐斯也认为单单一个地球不足以承载人类的宏伟文明，把人类送入太空必会让自己被载入史册。

第二个获得经费的是由动力系统公司（Dynetics）牵头的财团。动力系统公司是国防承包商Leidos（前身为SAIC）的子公司。第三个是SpaceX，它拿出了正在自主研发的新型飞船——星际飞船（Starship）。根据设计，星际飞船及其助推器的功能和SLS火箭一样强大，并且可完全重复使用。不过截至目前进展并不顺利：四艘星际飞船在测试时爆炸，最近一次是在5月29日。

这三家公司的月球着陆器都不需要由SLS送入轨道。SpaceX正在专门设计一种新型火箭来发射星际飞船。蓝色起源可以使用自家的新格伦（New Glenn）火箭发射着陆器，它比猎鹰9号的推力略强一些；或者也可以使用波音和洛克希德公司联合制造的个头差不多的火神（Vulcan）火箭。动力系统公司就选择了火神。预计这两种火箭都将于明年首次亮相。但SLS和它的猎户座飞船仍然是NASA登月计划的组成部分，它们会把宇航员送到月球轨道，然后再由新设计的着陆器将他们送到月球表面。

这在今天看来比以往任何时候都更不合理了。SpaceX的大型火箭猎鹰重型（Falcon Heavy）已经投入使用，两种新的大型火箭定于明年亮相，星际飞船也在研发中——美国航天业为宇航员登月提供了多种选择。如果一项计划真的是为了提升最新的航天技术、展示独一无二的国力、创造一段原则上能让美国人团结起来的全民共同经历，那么这些选择已经足够了。而且成本会低得多。比起半个世纪前，认为登月或许能愈合国家创伤的想法看起来愈加不现实。但它至少可以从斯科特-赫伦的继承人去年的收入里少拿走一些了。■



Hong Kong's future

Electrical storm

Can a \$10trn financial centre survive a Sino-American financial decoupling?

THE BEST way to get your head around the role that Hong Kong plays in the global financial system, says a business figure there, is to think of it as an electrical transformer that connects two circuits with different voltages. One is the global financial system with its freewheeling capital flows, open dissemination of information and the rule of law. The other circuit is China's vast and growing financial system with its controls on capital, censorship and capricious enforcement of contracts.

Over the past two decades, as China has risen to become the world's second-largest economy, Hong Kong has skilfully cultivated its role in the middle, such that it has become the most important international financial centre after New York and London. Around Victoria Harbour, China's tech tycoons flog shares to Californian hedge funds, its state-run banks issue loans to fund Belt and Road projects and its authorities intervene to control its tightly managed exchange rate. Much of the business is denominated in the world's reserve currency, the dollar, organised by Western firms and overseen by independent courts and regulators that have more in common with their peers in the rich world than with their counterparts in Beijing or Shanghai.

Under the wrong conditions transformers can become less efficient or even, in extremis, blow up. This risk is growing for Hong Kong's position as a financial centre, as tensions build over China's interference in its government and legal system, which, under the formulation of "one country, two systems", are supposed to be largely autonomous until at least 2047. On May 28th China commissioned a national-security law to prevent sedition and terrorism in the territory. In response the White House has

proposed removing some of the legal privileges that Hong Kong enjoys—privileges that help it connect seamlessly with the global economy.

The most likely scenario is that Hong Kong's institutions face gradual decay and that it drifts away from being a globalised financial centre towards one that is more mainland Chinese. China would be left with more control over a less effective capital market, raising the cost of capital for its firms. The unlikely but not impossible worst case is that a miscalculation destabilises some of the \$10trn edifice of cross-border financial claims that sits in Hong Kong, causing a shock that ripples across China and Asia. Local executives and officials often call this the nuclear outcome.

When Hong Kong returned to Chinese sovereignty in 1997, it was a lively entrepot known for its rags-to-riches magnates and well-oiled expatriate bankers, but not a global powerhouse. Since then it has been transformed. It is nine times bigger than in 2000, using the median of a panel of four capital-markets measures, and ranks third among global financial centres (see chart 1). It has learned new tricks, including how to sell derivatives, private banking, fintech and life insurance. Financiers have leapt to offer the services that mainland China cannot provide and tolerates being offered offshore. In the 1990s and early 2000s Hong Kong courted initial public offerings of Chinese state-owned firms, and then shifted to listing private companies. Since 2014 it has hosted “Stock Connect”, a platform that allows limited cross-border trading in securities between it and the mainland, and which now accounts for 8% of share trading in Hong Kong. Even when Chinese firms have conspicuously declined to use Hong Kong's markets they have used legal structures engineered by its lawyers and accountants. When Alibaba, China's most valuable firm, listed in New York in 2014, its prospectus mentioned Hong Kong 72 times (in November last year it floated in the territory, too, after worries about America punishing Chinese firms listed on Wall Street).

Of course mainland China's financial markets have expanded, too. Shanghai has a stockmarket capitalisation that rivals Hong Kong's, and China's bond market is vast. Global bank chiefs love the entrepreneurial vim of Shenzhen, whose sizeable stockmarket hosts over 2,000 firms. But scale doesn't mean compatibility with the requirements of global investors. Disclosure standards are often terrible; the government sometimes rigs prices; moving capital across the border is hard; and even in some fairly plain-vanilla areas mainland China lacks critical mass. It hosts only 1.6% of global currency trading, for example, and a puny 0.2% of worldwide interest-rate-derivatives activity.

| *Tycoons and typhoons*

A frequently made point is that Hong Kong's markets have become more mainland Chinese. The share of local businesses in the stockmarket by value, for example, has dropped from 69% in 2000 to 24% now. A few, such as Li Ka-shing's empire and Jardine Matheson, have successfully and discreetly diversified away from Hong Kong and China. But most have faded away and, disconcertingly, no Hong Kong firm has hit the big time in the mainland. Meanwhile the share of mainland firms in the stockmarket has risen from 31% to 73%, with nine of China's ten most valuable firms listed in Hong Kong, including Tencent, a tech giant, and Ping An, the world's most valuable insurance firm. China's economy is not especially dependent on foreign capital. But, based on the total figures for equity and dollar-bond issuance, around two-thirds of the cross-border funds that it does raise are mobilised in Hong Kong.

Strikingly, even as Hong Kong has become more Chinese, its financial infrastructure has remained similar to that of an advanced Western economy. The constitutional formulation of "one country, two systems" has a cascade of benefits going beyond the rule of law. A layer down from the courts are world-class, independent regulators, including the Hong

Kong Monetary Authority (HKMA), the central bank, and the securities regulator. Their rules require companies and financial firms in Hong Kong, especially big ones, to achieve a reasonable standard of corporate governance, and have accurate accounts and timely disclosure. Freedom of speech means firms and securities are subject to scrutiny, an essential part of the price-formation process in well-run markets.

Such squeaky-clean credentials mean Hong Kong has been granted access to the heart of the West's financial systems, of a kind that China can only dream of. America's 1992 Hong Kong Policy Act, though vague, says that it should treat the territory as a distinct customs zone and guarantees currency convertibility. There is a mesh of other less well-known agreements. Hong Kong firms are treated similarly to American ones by America's derivatives regulator; Wall Street's securities supervisor has an enforcement agreement with Hong Kong; and the territory is on the oversight board of CLS, a global currency-settlement platform backed by the Federal Reserve which deals in Hong Kong's currency, among others. Most bank supervisors and risk officers treat a counterparty in Hong Kong like one in Heidelberg. These are all perks and symbols that China and the yuan do not have—and, perhaps, cannot get.

Of all Hong Kong's privileges, the most important is its role as the dominant offshore dollar funding centre in Asia, a status that the Fed has tolerated, if not encouraged. Since 1983 its currency has been pegged to the greenback, underwritten by foreign reserves of about \$440bn, over twice the value of the local money supply, narrowly defined. Firms dealing in Hong Kong's currency assume that it is perfectly fungible with the greenback.

More importantly, they also assume that an American dollar in Hong Kong is perfectly fungible with one in New York. This belief explains why so much activity is denominated in American dollars, including 97% of

foreign-exchange deals, 58% of cross-border loans and other bank instruments, 43% of cross-border derivatives and 37% of deposits (see chart 2). The stock of dollar cross-border claims is \$4trn, equivalent to a tenth of the value of America's stockmarket.

| *Chaps chat about chips*

To command the confidence of investors, Hong Kong relies on a home-grown payments infrastructure that links it to America's money markets. One monetary artery, called USD CHATS, allows banks in the territory to transact in dollars with each other and is then connected to New York by HSBC, a London-headquartered bank that does most of its business in Asia. Total payments pumped through this system amounted to \$10.4trn last year. Nine of the ten largest mainland Chinese banks piggyback off it, using USD CHATS accounts with HSBC. Though it is not possible to estimate what share of China's total dollar payments use this mechanism, it may be chunky. China does have alternatives. It can use bespoke arrangements with Western banks. Five mainland lenders participate in an American dollar-payments venue, known as CHIPS, although none is a member of the exclusive club of global banks that owns it.

Assured of Hong Kong's fair play, good standing in the rest of the world and fungible money, financial firms have been happy to locate there. The territory has 163 licensed banks, three of the five largest of which are Western-controlled, and 1,600-odd asset managers, most of which are global and source half of their money from America, Europe and non-Chinese Asia. While mainland investment banks dominate business on the mainland, Western firms still reign over complex cross-border deals. Four of the five underwriters for Alibaba's recent flotation were American or European, including Morgan Stanley and Credit Suisse. The participation of many global firms in Hong Kong is evidence that its markets are run well, and creates jobs: 13% of the territory's employment and 26% of its GDP

come from professional services and finance. For workers outside these gilded sectors, though, life is less easy. The high cost of living is one reason why protesters have repeatedly brought Hong Kong to a standstill.

Those at the pinnacle of Hong Kong's financial world say that its role in the global system is not threatened by social unrest and geopolitics. China's security law, though clumsy, will, they hope, dampen the protests. Both HSBC and Standard Chartered have voiced support for it. According to five sources, there is no sign of international bank depositors pulling money from Hong Kong in the past two weeks. A wave of Chinese firms, such as JD.com, are seeking listings in Hong Kong, drawing in capital.

The White House's threat to revoke Hong Kong's special status, according to this view, is bluster. Its status as a distinct customs zone might be withdrawn, but Hong Kong does not manufacture much any more. Doomsters have predicted the end of Hong Kong since the city began to be built in the 19th century.

Yet it is complacent to suppose that Hong Kong can be immune to worsening Sino-American relations and China's rising authoritarianism. If the territory's government has become a proxy of the Communist Party, it seems rational to worry about how long its independent institutions, including the courts and the central bank, can remain unaffected. HKEX, the thriving stock exchange, has long had government appointees on its board. The decline of free speech in Hong Kong may impede its efficiency as a financial market. Could an analyst's note inviting speculation against China's exchange rate, or identifying fraud at its banks, be designated as sedition?

The perception that Hong Kong is converging towards China could lead counterparties to apply a higher risk score to the territory. Stigma may become a problem: in the past Hong Kong firms have been able to buy

strategic assets, from European utilities to American banks. That may be changing. In 2019 HKEX abandoned a bid for the London Stock Exchange, which controls some of America's financial plumbing; it is possible that if it had gone ahead America's foreign-investment board would have blocked the deal. Israel has reportedly blocked a deal involving a Li Ka-shing-backed firm, at America's request.

| *No safe harbour*

In this base-case scenario there could eventually be a Hong Kong discount, instead of a halo. Firms doing business with China would still have nowhere better to be, but other activity could easily shift somewhere less controversial. This slice of mobile business could be material—almost two-thirds of currency trades involve neither the Hong Kong dollar nor the yuan; and over half of fund assets are invested in Europe, America and other parts of Asia.

If this global business shrinks, Hong Kong would still have China-related business to compensate. There will be many more public offerings. And as Chinese pension funds grow they may build up their efforts to invest globally: today only a fifth or so of asset managers in Hong Kong are controlled by mainland owners. The overall effect would be tolerable for Hong Kong and only modestly bad for China, which would lose some economic benefits from Hong Kong becoming less cosmopolitan.

But in the back of some minds is the nuclear scenario, in which Hong Kong's role as a financial hub is destabilised. By accident or design the American authorities could clog or cut the payments arteries by imposing sanctions, additional administrative requirements or penalties on individuals, firms or banks operating in Hong Kong. Any of these measures could seed concern that money parked in Hong Kong is no longer perfectly interchangeable with that in the West.

Viewed narrowly, America doesn't have much to lose: less than 1% of its banks' assets are in Hong Kong. But fully weaponising the financial system would be a huge escalation. Hong Kong might find it harder to protect its currency peg from capital outflows. On June 3rd Paul Chan, the territory's finance minister, said that if sanctions were imposed it would get help with dollar funding from China's central bank, according to Bloomberg. China might still find that without easy access to the West via Hong Kong it has to scramble to find workarounds to make dollar payments. This could be traumatic and expensive. Paying an extra 0.5% on its dollar debts, for example, would cost China \$7bn a year.

If the shock were severe China might lash out against American multinationals in China. Over time it might also seek to conduct cross-border finance on its own terms by coaxing more foreign financial firms to bulk up in mainland China on the condition that they accept China's way of doing business, and use the yuan. And it might have another go at promoting the yuan as a global payments currency by pushing digital-payments systems, where Chinese technology is world-leading. The goal would be to end once and for all its dependence on the West's financial system and, by implication, Hong Kong.

No one at the top of Hong Kong's financial establishment believes that this bad scenario is likely. But everyone thinks that moves by America or China to disrupt its role as a global dollar centre would be dangerous. Consider a selection of comments from bigwigs: it would be "incredibly dangerous"; "a really serious mistake"; "a very, very radical and extreme measure that would backfire"; "an act of war". That Hong Kong has become so important to global finance that people are terrified by the prospect of its being damaged is a backhanded compliment—and a reminder of how hard it is to absorb the jolts and shocks from two superpowers moving apart. ■



香港的未来

雷电交加

中美金融脱钩，10万亿美元金融中心能否安然无恙？

要理解香港在全球金融体系中扮演的角色——当地一位商界人物说——最好的方法是把它看成一个变压器，连接着两个不同电压的电路。一边是全球金融体系，奉行资本自由流动、信息自由传播和法治。另一边是庞大且不断发展的中国金融体系，实行资本管制和信息审查，不按合同办事。

在过去20年中，随着中国逐渐发展为世界第二大经济体，香港巧妙地发挥了连接中国和世界的作用，成为地位仅次于纽约和伦敦的最重要的国际金融中心。在维多利亚港周围，中国的科技大亨向加州的对冲基金出售股票，中国的国有银行发放贷款资助“一带一路”项目，中国政府实施干预以控制其受严格管理的汇率。这里的大部分业务以全球储备货币美元计价，由西方公司开展，并受独立的法院和监管机构监督。和北京或上海的法院和监管机构相比，香港的这些机构与富裕国家的共同点更多。

如果使用不当，变压器的效率可能会降低，极端情况下甚至会爆炸。根据“一国两制”的设计，至少在2047年之前香港的政府和法律体系应基本自主，但中央对其的干涉引发了紧张局势，香港金融中心的地位面临的风险与日俱增。5月28日，中国通过了一部国家安全法，防止香港出现煽动叛乱和恐怖主义。对此，白宫提出要取消香港享有的一些帮助它与全球经济无缝连接的法律特权。

最可能发生的情况是香港的制度将逐渐衰败，它将从一个全球化的金融中心变成一个更中国大陆化的金融中心。中国将对一个效率变低的资本市场拥有更多控制权，也增加了本国企业的资本成本。不太可能、却也并非绝无可能出现的最坏情况是发生误判，结果撼动了香港10万亿美元跨境金融债权大厦的根基，由此引发的震动将波及中国和整个亚洲。香港的高管和官员通常将此称为核爆式后果。

在1997年回归中国时，香港是一个充满活力的转口贸易港，以白手起家的大亨和如鱼得水的外籍银行家著称，但还不是全球重镇。自那之后它发生了巨大的转变。根据四大资本市场指标的中位数，香港现在的金融市场规模已是2000年时的九倍，在全球金融中心中排名第三（见图表1）。它掌握了新技能，包括如何出售衍生品、私人银行业务、金融科技和人寿保险。金融家们迫不及待地提供那些中国大陆无法提供但容忍在海外提供的服务。上世纪90年代和21世纪初，香港开始吸引中国国企在港上市，之后又转向吸引私营企业。自2014年起，香港开通了可以和大陆进行有限跨境证券交易的“股市互联互通”平台，目前已占到香港股票交易的8%。即使中国企业高调婉拒利用香港的金融市场，它们也还是会利用由香港的律师和会计师设计的法律结构。中国市值最高的公司阿里巴巴于2014年在纽约上市时，其招股说明书72次提到香港（去年11月，由于担心美国会惩罚在华尔街上市的中国公司，阿里巴巴又在香港上市）。

当然，大陆的金融市场也在扩大。上海股市的市值与香港相当，而中国的债券市场规模庞大。全球银行的老板们喜欢深圳的创业活力，这里规模可观的股市有2000多家上市公司。但规模大并不意味着能满足全球投资者的需求。信息披露通常极不规范，政府有时会操纵价格，跨境转移资本很难，甚至在一些比较普通的领域中国大陆也缺乏群聚效应，例如它仅占全球货币交易的1.6%，在全球利率衍生品交易活动中只占区区0.2%。

| 巨头与飓风

经常能听到的一个观点是香港的市场已变得更大陆化。例如，按市值计算，香港企业在香港股市中的占比已从2000年的69%下降到现在的24%。李嘉诚的企业帝国和怡和集团（Jardine Matheson）等少数企业已经成功并低调地将业务部分转移到了香港和中国大陆以外。但大多数香港公司光芒渐逝，而且令人不安的是，没有一家香港公司在大陆大获成功。与此同时，大陆公司在香港股市中的比例已从31%上升到73%，中国市值最高的十家公司有九家在香港上市，包括科技巨头腾讯和全球市值最高的保险公司平安。中国经济并不特别依赖外资。但是，根据股票和美元债券发行的总额，它的跨境融资中约有三分之二是通过香港实现的。

令人惊讶的是，即便香港已愈发像大陆，其金融基础设施却仍然更像发达的西方经济体。宪法规定的“一国两制”带来了除法治以外的大量益处。法院之下，香港有香港金融管理局（相当于央行）和证券监管机构等世界一流的独立监管机构。它们的规则要求香港的企业和金融公司（尤其是那些大型的）必须达到合理的公司治理标准，账目准确，披露及时。言论自由意味着公司和证券会受到严格监督，这是运作良好的市场中价格形成过程的重要组成部分。

凭借如此无可挑剔的资质，香港得以进入了西方金融体系的核心，而这种地位中国大陆只能是梦寐以求。虽然言辞并不明确，但根据美国1992年的《香港政策法》，香港应被视为独特的海关地区，并保证美元和港币可自由兑换。还有其他一些不太知名的协议。美国衍生品监管机构对香港公司的要求与对美国公司的相似；华尔街的证券监管机构与香港签有执法协议；香港在CLS的监督委员会中拥有席位，CLS是由美联储支持的全球货币结算平台，结算包括港币在内的各种货币。大多数银行监管机构和风控官对在香港和在海德堡的交易对手一视同仁。这些都是中国大陆和人民币所没有的待遇和象征——可能也是无法获得的。

在香港享有的所有特权中，最重要的是它作为亚洲主要离岸美元融资中心的角色，美联储虽没有鼓励但也默认了它的这一地位。自1983年起，港币与美元挂钩，由大约4400亿美元的外汇储备做保障，比狭义的本地货币供应量价值高出一倍多。用港币进行交易的公司认为港币与美元完全可互换。

更重要的是，它们还认为在香港的一美元与在纽约的一美元完全可互换。这种看法解释了为什么这里那么多的金融活动都以美元计价，包括97%的外汇交易、58%的跨境贷款和其他银行工具、43%的跨境衍生品和37%的存款（见图表2）。跨境美元债权的存量为四万亿美元，相当于美国股市市值的十分之一。

| 支付要找谁

为了博得投资者的信心，香港依靠本地发展的支付系统把自己和美国的货

币市场联系起来。一条名为“美元清算所自动转账系统”（USD CHATS）的货币“大动脉”让香港的银行彼此间可以用美元交易，然后通过总部位于伦敦、大部分业务在亚洲的汇丰银行与纽约清算。去年通过该系统完成的支付总额达到10.4万亿美元。中国大陆最大的十家银行中有九家借助汇丰银行的USD CHATS帐户间接进行美元清算。尽管无法估算中国的美元支付中有多少是使用这个机制，但占比可能很大。中国的确也有其他选择。它可以与西方银行定制清算方式。五家大陆银行参与了一个名为纽约清算所银行同业支付系统（CHIPS）的美元支付系统，尽管它们无一不是拥有CHIPS的全球银行小团体的成员。

由于相信香港具备公平的竞争环境，在全世界享有良好的声誉，并且可以自由兑换货币，金融公司一直很乐于在此落户。香港有163家持牌银行，最大的五家中有三家是西方控股；还有1600多家资产管理公司，其中大多数是跨国公司，一半的资金来自美国、欧洲，以及中国以外亚洲地区。尽管大陆投资银行主导着大陆的业务，但复杂的跨境交易仍由西方公司主宰。阿里巴巴之前在香港上市时，五家承销商中有四家来自美国或欧洲，包括摩根士丹利和瑞信。许多跨国公司在香港参与金融市场，这不仅证明了香港的市场运作良好，也创造了就业机会：香港13%的就业和26%的GDP来自专业服务和金融业。不过，在这些光鲜的行业之外，劳动者的日子就没那么容易了。高昂的生活成本是抗议者一再令香港陷入停顿的原因之一。

那些位于香港金融世界之巅的人说，香港在全球体系中的作用未受社会动荡和地缘政治的威胁。尽管中国的安全法不得体，他们仍希望它能遏制抗议活动。汇丰银行和渣打银行均表达了对安全法的支持。据五位消息人士称，过去两周中，没有迹象表明国际银行的储户正从香港撤资。京东等中国公司正寻求在香港上市，吸引了资本。

这种观点认为，白宫威胁撤销香港的特殊地位不过是虚张声势。香港特别海关地区的地位可能会被撤销，但香港已经没什么制造业了。自19世纪香港开埠以来，末日论者就在预言香港的沦落。

然而，如果以为香港能够免受中美关系恶化和中国威权主义抬头的影 响，那就太过轻忽自满了。如果香港政府成为共产党的代理人，那么似乎就有理由担心其法院和金管局等独立机构还能坚持多久不受影响。蓬勃发展的港交所长期都由政府任命部分董事。言论自由受限可能会拖累香港作为金融市场的效率。假如一名分析师的分析引发了针对中国汇率的投机行为，或识别出中国的银行存在欺诈行为，那会被认定是煽动叛乱吗？

认为香港正在趋同于中国大陆的看法可能会导致交易对手对香港采用更高的风险评分。污名化可能会成为一个问题：过去，香港公司可以购买从欧洲公用事业到美国银行等各种战略资产。这可能正在发生改变。2019年，港交所放弃了对控制着美国部分金融渠道的伦敦证券交易所的收购计划。如果这个收购计划进展下去，美国的外国投资委员会可能会否决这笔交易。据称以色列应美国的要求阻止了一项涉及李嘉诚支持的公司的交易。

| 没有避风港

在这种基准情景中，最终香港可能是打了折扣，而不是加了光环。与中国开展业务的公司仍然没有比留在香港更好的选择，但其他活动可以被轻易转移到争议更少的地方。这部分可转移的业务可能非常重要——香港近三分之二的货币交易都不涉及港币或人民币；超过一半的基金资产投资在欧洲、美洲和亚洲其他地区。

如果这部分全球业务萎缩，香港还有与中国相关的业务来弥补。会有更多中国公司赴港上市。随着中国养老基金的增长，它们可能会加大在全球投资的力度：目前香港只有五分之一左右的资产管理公司由大陆所有者控股。对香港来说总体影响尚可忍受，对中国而言也只会略有不利——随着香港的国际化程度降低，中国会失去一些经济利益。

但是，在一些人的内心深处还存在一个核爆式场景，即香港的金融中心地位被动摇。不管是出于偶然还是刻意为之，美国政府可能会对在香港经营的个人、企业或银行施加制裁、附加行政要求或罚款，从而堵塞或切断支付渠道。这些措施中的任何一项都可能令人们担忧放在香港的资金不再能与西方国家的货币完全自由兑换。

从狭义上看，美国不会有太多损失，它在香港的银行资产还不到0.1%。但是，把金融系统全面用作武器将会是问题的巨大升级。香港可能会更难以保护其联系汇率制度免受资本外流的影响。据彭博社报道，香港财政司司长陈茂波在6月3日表示，如果美国实施制裁，香港将得到中国央行提供的美元资金支持。中国可能仍会发现，因为不能通过香港便捷地连接到西方系统，它将不得不匆忙地另觅替代性的美元支付渠道。这个过程可能非常痛苦，而且代价高昂。例如，如果要为美元债务多支付0.5%的成本，中国每年就将损失70亿美元。

如果冲击严重，中国可能会拿在华的美国跨国公司撒气。未来，它可能还会劝诱更多外国金融公司在接受中国的营商方式并使用人民币的条件下在中国大陆扩张，以求按照自己的方式开展跨境金融。它还可能尝试通过推动数字支付系统来推广人民币用作全球支付货币——中国在数字支付领域里的技术领先世界。这样做的目的是一劳永逸地结束对西方金融体系的依赖，实际上也是结束对香港的依赖。

在香港的金融业高层中，没有人相信这种最糟的情况可能发生。但每个人都认为美国或中国破坏香港作为全球美元中心地位的行动是危险的。看看一些重量级人物的评论吧：这将“极其危险”；“一个非常严重的错误”；“非常、非常激进而极端的措施，只会适得其反”；“战争行为”。香港对全球金融体系的重要性令人们恐惧它地位受损的前景，这是一种间接的恭维，但也提醒人们，要承受两个超级大国脱钩带来的巨大冲击有多么困难。■



Scientific publishing

High-speed science

The pandemic has caused scientists to work faster. That should be welcomed

IT IS A testament to the machinery of science that so much has been learned about covid-19 so rapidly. Since January the number of publications has been doubling every 14 days, reaching 1,363 in the past week alone. They have covered everything from the genetics of the virus that causes the disease to computer models of its spread and the scope for vaccines and treatments.

What explains the speed? Much as in other areas of life, covid-19 has burnt away encrusted traditions. Scientific journals have done their best to assess and publish research in days rather than their customary months or years. But a bigger factor behind the breakneck pace of publication is the willingness of biomedical scientists to bypass journals altogether and share their work quickly in the form of preprints—research manuscripts that are posted freely online and which have not been peer-reviewed.

Preprints are not a new idea. They have been an important method of communication in physical sciences and mathematics for decades. Biologists and medical scientists, however, have long resisted them. Unlike number theory or astrophysics, biologists have argued, their findings often directly affect individuals and companies. Incomplete or unchecked studies could do them harm.

Arguments against preprints sound reasonable. Unless you are an expert in the field, it is hard to know whether a preprinted study is any good. Without peer-review before posting, the risk of shoddy science may well rise. The research contained in freely available preprints could be misinterpreted or abused by those hunting for scientific cover for their

actions.

The evidence, however, suggests such worries are overdone. A recent study found that an impressive 67% of the preprints posted on the bioRxiv server before 2017 were eventually picked up and published in scientific journals. A separate study showed that the difference in scientific value, as measured by other researchers, between a preprint and the final version of the same study in a journal was, on average, less than 5%.

Preprints do not avoid peer-review; it just happens after publication (informally and often in public) instead of beforehand (organised by editors and mostly in secret). Manuscripts attract the scrutiny of independent experts, who relish tearing apart bad work. Dissent is easily visible next to the original preprint or just a link away. Authors can update their manuscripts as comments come in or even withdraw them if they conclude they have big flaws. With traditional scientific journals retractions can take months or years, if they happen at all.

In the long run, exposing the messy, argumentative guts of the scientific process could bolster public trust in science itself. Researchers do not follow a straight road to the truth. Rather, they meander, disagree and fumble towards an understanding of the world. In this way all findings are provisional, standing only until later work modifies or overturns them.

Preprints are not perfect. As they grow more common, there may be unpleasant side-effects. If the recent history of other social media is a guide, some people will find ways to game preprint servers and spread disinformation through them. Hosts and users of preprints should prepare for that. To get the most out of them, non-expert users need to step up their scepticism. Policy or journalism based on their contents should identify the source and its limitations.

As the deluge of work on covid-19 has shown, fast, free-flowing scientific information is vital for progress. The virus has changed the way scientists do their work and talk to each other, we hope for good. ■



【首文】科学出版

高速科研

疫情促使科学家们加快了步伐。这是可喜的变化

人们这么快就对新冠肺炎有了这么多了解，这证明了科学机制的力量。自1月以来，论文发表数量每14天就翻一番，仅在过去一周就新增1363篇。它们涵盖新冠病毒的遗传信息、病毒传播方式的计算机模型、找到疫苗和疗法的机会等方方面面。

为什么会有这样的速度？和生活中其他领域发生的变化差不多，新冠肺炎打碎了顽固的传统。科学期刊竭尽所能，在几天、十几天里就评估完并发表研究成果，而不是通常的几个月甚至几年。但是，如此飞快的发表速度背后还有一个更大的因素，就是生物医学家愿意完全绕过期刊，以预印本的形式快速分享自己的成果，也就是在线上公开发布未经同行评议的论文初稿。

预印本并不是什么新点子。几十年来，它们一直是物理学和数学领域内重要的传播方式。但生物学家和医学家长期以来对此都很抗拒。生物学家指出，与数论或天体物理学不同，自己的发现往往会直接影响个人和企业，不完整或未经查核的研究可能会对其造成危害。

反对预印本的论点听起来合情合理。除非你是这些领域的专家，否则很难知道一份预印本研究是否有用。如果在发表前不经同行评议，劣质的科研成果很可能会增加。那些想为自己的行动找件科学外衣披一披的人可能会曲解或滥用公开可见的预印本中的内容。

然而证据表明这样的担忧过虑了。最近的一项研究发现，在2017年之前发布在bioRxiv服务器上的预印本有多达67%最终被采用并发表在科学期刊上。另一项研究表明，同一项研究的预印本和在期刊上发表的最终版本的科学价值（由其他研究人员评价衡量）平均相差不到5%。

预印本并不回避同行评议，只不过这一步是在发表之后（非正式且经常是公开地）进行，而不是在发表之前（由编辑组织，通常非公开）。稿件会吸引到独立专家们的注意，他们乐于“拆穿”糟糕的研究。不同意见很容易看到：就列在原稿旁边，或者点一下链接即可。收到评论后，作者可以更新文章；如果总结认为原稿有重大缺陷，甚至可以撤回。在传统科学期刊上，即便真能撤稿，可能也需要几个月甚至几年的时间。

从长远来看，让科研中混乱、充满辩论的内在过程暴露出来，或许能增加公众对科学本身的信任。研究人员并不是一路直达真理，而是历经迂回曲折、争论和摸索才愈趋了解世界。从这个角度来说，所有的发现都是暂时成立，总会有后来的研究去修改或推翻它们。

预印本并不完美。随着它们变得越来越普遍，令人不快的副作用可能随之而来。如果其他社交媒体近年的历史可以作为参考，一些人会想办法操纵预印本服务器，通过它们传播虚假信息。发布预印本的平台和阅读预印本的用户对此应有准备。为了最大程度地利用好它们，非专业用户需要提高警惕。根据预印本的内容制定政策或发布新闻时，应当确认其来源及局限性。

正如有关新冠肺炎的研究“洪流”所示，快速、自由流动的科学信息对进步至关重要。新冠病毒已经改变了科学家们工作和交流的方式——我们希望是永久性的。 ■



Instagram

The camera always lies

“No Filter” chronicles the rise of Instagram

ON A BEACHSIDE walk in Mexico in 2010, Kevin Systrom’s girlfriend explained the problem with his new photo-sharing app, then called “Codename”. Professionals might want the world to see their pictures, but her own phone snaps weren’t good enough. Back at the hotel, Mr Systrom coded a quick solution: a filter that gave even the most basic shot a hipster finish. He applied it to a snap of a dog by a taco stand, and uploaded it, making it the first image posted to what became Instagram.

A billion users later, the look in that filtered photo is ubiquitous. Square proportions, high contrast and darkened edges have instantly smartened up profile pictures, holiday albums and advertising campaigns around the world. In “No Filter” Sarah Frier, a technology correspondent at Bloomberg, uses close access to Instagram insiders to give a lively and revealing account of how the world came to see itself through Mr Systrom’s lens.

The tale of nerds who struck gold offers glimpses of Silicon Valley’s weirdness. In the early days Mr Systrom and his co-founder, Mike Krieger, patched errors with their laptops on camping trips and took a call from Justin Bieber when he forgot his password. Later, haggling over Instagram’s sale to Facebook, a crunch negotiation took place over a barbecue at Mark Zuckerberg’s mansion, with the Facebook founder grilling meat he boasted of shooting himself, though he was unsure if it was venison or boar. Mr Systrom went to the Vatican to persuade the ultimate influencer to sign up—and @franciscus obliged.

The sale, for a then-unthinkable \$1bn, went sour. At Facebook “every single activity...stemmed from a religious obsession with growth,” writes Ms Frier,

who is even-handed but seems closer to Instagram's founders than Facebook's high command. As its new owner steered Instagram towards taking ads and making money, some early employees, who had wanted to build "a community centred around the appreciation of art and creativity...instead felt that they had built a mall". Mr Systrom, a perfectionist who initially oversaw every ad carried on Instagram, personally editing one to make the French fries look crispier, was seen by Facebookers as a precious snob.

As Instagram grew bigger and cooler, Facebook began to act "like the big sister that wants to dress you up for the party but does not want you to be prettier than she is", complains one Instagram executive. Mr Zuckerberg limited how many people Instagram could hire. He even got cross that its new video app, IGTV, had a logo that looked a bit like that of Facebook Messenger. In 2018, after six years of this, Mr Systrom and Mr Krieger quit.

Within this business story are several subplots. One is how Instagram blurred the lines between the personal and the promotional. Snoop Dogg, a rapper, made what may have been the first paid Instagram post in January 2011, when he uploaded a picture of himself "Bossin up wit dat Blast", a new drink. At least before covid-19 struck, Kim Kardashian could make \$1m from a single post to her 157m followers; over 200m users had 50,000 followers or more, enough to make a living as "human billboards". America's Federal Trade Commission has said influencers should declare when they are being paid. They often don't.

Another subplot is how an app that people use to document their life turned into one that determines how they live it. At first this was a virtue. In the early days Instagram began encouraging wholesome outings to scenic spots for users to photograph. But it has become a problem. Some photogenic places, like Norway's Trolltunga cliff, have been overrun. Worse, the ability to edit photos to perfection has spread insecurity. "I don't know

what real skin looks like any more,” complains Chrissy Teigen, an Instagram star.

All this brought in \$20bn for Instagram in 2019, or a quarter of Facebook’s revenue. But perhaps encouragingly, some in the company have come to see perfectionism as a risk to Instagram’s business. Young people have embraced Snapchat and, more recently, TikTok, as networks where they can go unfiltered. There they can post even imperfect shots: of their ordinary selves, their ordinary lives, even an ordinary dog by a taco stand. ■



Instagram

照骗

《无滤镜》记录了Instagram的兴起【《无滤镜》书评】

二〇一〇年在墨西哥一处海滩散步时，凯文·斯特罗姆（Kevin Systrom）听女友说在使用他新开发的照片分享应用时遇到了一个问题，这个应用当时叫“代号（Codename）”。专业人士也许会想让全世界都看到他们的照片，但她用自己的手机拍出的照片不够好。回到酒店，斯特罗姆编写了一个快速解决方案：一个能把随手拍出来的普通照片变时髦的滤镜。他把这个滤镜加到一张抓拍的照片上——一个墨西哥玉米卷摊旁的一只狗狗，然后上传。这是上传到后来改叫Instagram的应用上的第一张照片。

有了10亿用户后，使用这个滤镜的照片已经无处不在。裁剪成正方形、提高对比度、加上暗角，转眼间让世界各地的个人头像、假日相册和广告活动焕然一新。在《无滤镜》（No Filter）一书中，彭博的科技记者莎拉·弗莱尔（Sarah Frier）通过和Instagram内部人士的近距离接触，生动地揭示了整个世界如何开始通过斯特罗姆的滤镜看自己。

那些挖到金矿的书呆子们的故事让人们一窥硅谷的离奇之处。一开始，斯特罗姆和他的联合创始人迈克·克里格（Mike Krieger）在露营途中用笔记本电脑修补错误，他们还接到了贾斯汀·比伯的电话，因为他忘了密码。后来，在把Instagram卖给Facebook的讨价还价中，一场关键的谈判在马克·扎克伯格大宅的烧烤会上进行，这位Facebook的创始人一边烤肉，一边吹嘘说这是他自己打来的肉，虽然他不确定到底是鹿肉还是野猪肉。斯特罗姆前往梵蒂冈说服教皇方济各（@franciscus）开设账号，这位终极意见领袖最后同意了。

这笔在当时难以想象的价值10亿美元的交易后来变了味。弗莱尔写道，在Facebook，“每一个行为……都源于对增长的虔诚痴迷”。作者不偏不倚，但相比和Facebook高层的关系，她似乎和Instagram的创始人走得更近些。新主人让Instagram刊登广告并赚钱，而一些早期员工原本想要建立“一个

围绕欣赏艺术和创造力而打造的社区.....结果却发觉自己盖了个购物中心”。斯特罗姆是个完美主义者，最初他会监督Instagram上的每个广告，还亲自编辑过一条，好让薯条看起来更脆。但在Facebook的人看来，他矫情又自命不凡。

Instagram的一位高管抱怨说，随着Instagram越来越大、越来越酷，Facebook开始表现得“像个姐姐，想把你打扮好了去派对，但又不想让你比她更漂亮”。扎克伯格限制了Instagram的员工人数。他甚至因为它的新视频应用IGTV的logo有点像Facebook Messenger而生气。就这么过了六年之后，2018年斯特罗姆和克里格双双辞职。

在这个商业故事里还有几条支线。一个是Instagram如何模糊了个人分享和广告促销之间的界限。说唱歌手史努比·狗狗（Snoop Dogg）在2011年1月上传了一张自己喝着新品饮料Blast的照片，配文说“Blast爽翻天”，这可能是Instagram上发布的第一条付费帖文。至少在新冠疫情爆发之前，金·卡戴珊向她的1.57亿粉丝发一条帖文能赚100万美元；超过二亿用户的粉丝数达到五万人以上，足以作为“人形广告牌”谋生。美国联邦贸易委员会（FTC）表示，网红们在有偿发帖时应该声明。他们通常都不会。

另一条支线是人们用来记录生活的应用如何变成了一个决定他们怎么生活的应用。一开始这是件好事。在早期，Instagram鼓励人们去风景优美的地方开展有益健康的户外活动，并拍照留念。但现在这已成了一个问题。一些适合拍美照的景点，比如挪威的恶魔之舌悬崖（Trolltunga cliff），已经人满为患。更糟的是，照片能够被美化到完美无瑕这一点让不安全感蔓延。“我都不知道真正的皮肤是什么样了。”Instagram上的红人克丽丝·泰根（Chrissy Teigen）抱怨说。

这一切在2019年为Instagram带来了200亿美元的收入，占Facebook年收入的四分之一。但或许让人欣慰的是，公司里的一些人已经意识到完美主义对Instagram的业务是一种风险。年轻人已经喜欢上了Snapchat和最近的TikTok（抖音国际版），他们在这些网络平台上发帖时无需加滤镜。他们甚至会发布不完美的照片，展示普通的自己、普通的生活，甚至是墨西哥

玉米卷摊旁一条普通的狗。■



Carmen Reinhart

No fear of floating

The World Bank lands a prescient and painstaking researcher

SOME OF THE best economists in the world have served as chief economist of the World Bank. But not all of them stay for long. Paul Romer, who subsequently won a Nobel prize, left after 15 months. His successor, Penny Goldberg, returned to academia just as quickly. And a new layer of management is soon to be inserted between the research department and the bank's president. It was not obvious, therefore, that the bank would find another chief economist as illustrious as past holders of the post. The institution might have had to settle for a safer, more mundane choice. Instead it has hired Carmen Reinhart of Harvard University, one of the most widely cited economists in the world (and the most cited female economist).

She is, according to Guillermo Calvo of Columbia University, an "original". Her family fled Cuba for America in 1966, when she was ten. A course on fashion merchandising at Miami Dade College introduced her to economics. Before she turned 30 she was chief economist of Bear Stearns, an investment bank, a post later occupied by her new boss, David Malpass, who became the World Bank's president last year. Her two stints at the IMF mean she is accustomed to working at Bretton Woods institutions.

An article she wrote with Mr Calvo and Leonardo Leiderman at the IMF anticipated Mexico's tequila crisis of 1994. It argued that capital inflows to Latin America reflected global conditions (including low American interest rates), not just domestic reforms. Any reversal of those conditions could trigger a reversal of flows, they warned. And in such a scenario, "policy options", they noted tersely, "are limited". The paper's argument applies equally well to the recent troubles of Argentina, which relied too heavily on

the passing enthusiasm of foreign investors from late 2016 to 2018.

Ms Reinhart's best known work is her history of financial folly written with Kenneth Rogoff of Harvard, which spans eight centuries (why only the last eight, joked Dennis Snower of the Kiel Institute when presenting her with the Bernhard Harms prize in 2018). The book drew on a variety of historical sources, including prices culled from monastery records, and reports from the League of Nations, which her husband, Vincent, who was then working at the Federal Reserve, gave her as a Valentine's gift. The authors' aim was to create a run of data long enough to understand the kind of rare but deep financial crises that rocked the world in the 1930s and again in 2007-09.

Her most controversial work with Mr Rogoff claimed that government debt exceeding 90% of GDP is correlated with weaker growth. Critics argued over causality; one found a spreadsheet error. The 90% threshold became a favourite statistic for advocates of austerity. But Ms Reinhart herself has highlighted the importance of writing off debt. She was one of three lead authors of a recent open letter, signed by about 150 economists, defending the Argentine government's offer to creditors to swap their bonds for new instruments with easier terms.

This concern with debt also animates a recent effort to fill in the statistical record. With Sebastian Horn and Christoph Trebesch of the Kiel Institute, Ms Reinhart has tried to measure China's lending to the rest of the world, combining and cross-checking prior piecemeal efforts. "To say that [Chinese lending] is opaque is an understatement," she has noted. Without a more accurate record, it is impossible to assess the macroeconomic vulnerabilities of many low-income countries, she argues. And any effort to relieve the debts of poor countries during the pandemic is likely to fall short if China's loans are not included.

Her concern overlaps with Mr Malpass's preoccupations. In his previous job

at America's Treasury, he voiced concerns that China was drawing countries into debt and thereby expanding its geopolitical influence. In his current role, he has insisted that countries should be more transparent about their lending and borrowing.

Ms Reinhart's investigations do not always reflect badly on China. Her list of the 50 countries most indebted to the Middle Kingdom (relative to their GDP) includes few places of great geopolitical significance (exceptions include Pakistan and Sri Lanka). And she and her colleagues have uncovered 140 examples of China restructuring or relieving the debts of poor countries, although it rarely co-ordinates with other creditors. (China has also signed up to the G20's recent initiative to suspend debt service on bilateral government loans to 73 poor countries.)

The World Bank, then, has found another world-class chief economist. Ms Reinhart's tenure is unlikely to be much quieter than her predecessors'. The hope is that it is a little longer. ■



卡门·莱因哈特

无惧浮动

世界银行请来了一位有先见之明且不辞辛劳的研究者

世界上最优秀的一些经济学家曾经担任世界银行的首席经济学家。但不是每个人都待得长久。后来获得诺贝尔奖的保罗·罗默（Paul Romer）待了15个月后离开。他的继任者佩妮·戈德堡（Penny Goldberg）也在任职差不多时间后回到了学术界。而且在研究部门和世行行长之间很快就会增设一个新的管理层。因此，原本看起来，世行不一定会再找一位像前几任那样声名显赫的人担任首席经济学家。这家机构或许不得不接受一个更安全、更平淡的选择。结果，它却聘请了哈佛大学的卡门·莱因哈特（Carmen Reinhart），她是世界上被引用最多的经济学家之一（也是被引用最多的女性经济学家）。

按哥伦比亚大学的吉列尔莫·卡尔沃（Guillermo Calvo）的说法，莱因哈特是个“怪咖”。1966年她十岁时，全家人从古巴逃到了美国。迈阿密达德学院（Miami Dade College）的一门时尚营销课程让她接触到了经济学。不到30岁，她就当上了投行贝尔斯登（Bear Stearns）的首席经济学家，她如今的新老板、去年成为世行行长的大卫·马尔帕斯（David Malpass）在她之后担任过这个职位。在国际货币基金组织（IMF）的两个任期意味着她已经习惯在布雷顿森林机构工作。

她和卡尔沃及莱昂纳多·莱德曼（Leonardo Leiderman）在IMF共同撰写的一篇论文预测到了1994年的墨西哥龙舌兰酒危机。文章认为，资本流入拉丁美洲反映的是全球经济形势（包括美国的低利率），而不仅仅是国内改革。他们警告说，这些形势发生任何逆转都可能引发资本流动的逆转。他们简明扼要地指出，在这种情况下，“政策选择是有限的”。这篇论文的论点同样适用于阿根廷近期的困境，从2016年末到2018年该国太过依赖外国投资者一时的热情。

莱因哈特最著名的作品是她和哈佛大学的肯尼斯·罗格夫（Kenneth

Rogoff) 合著的“金融荒唐史”，这本书跨越八个世纪之久（基尔研究所 [Kiel Institute] 的丹尼斯·斯诺尔 (Dennis Snower) 在2018年授予她“伯恩哈德·哈姆斯奖” (Bernhard Harms prize) 时开玩笑问她，为什么只有过去八个世纪)。这本书参考了各种各样的历史资料，包括从修道院记录中收集到的价格，以及国际联盟 (League of Nations) 的报告——她的丈夫文森特当时在美联储工作，把这些报告作为情人节礼物送给了她。作者的目的是建立时间跨度足够长的系列数据，以了解那类罕见但严重的金融危机，比如在上世纪30年代以及在2007年到2009年间爆发的震动世界的危机。

她和罗格夫最具争议的研究认为，政府债务占GDP的比例若超过90%，则债务与经济增长疲弱相关。批评者对两者间的因果关系争论不休，还有人发现电子表单有个错误。90%这个阈值成了紧缩政策的支持者最喜欢的统计数字。但莱因哈特本人也强调了勾销债务的重要性。近期约150名经济学家签署了一封公开信，她是三位主要作者之一。信中支持阿根廷政府向债权人提出以条件更宽松的新债务工具替换债券。

这种对债务的担忧也刺激了近期填补统计空缺的行动。莱因哈特与基尔研究所的塞巴斯蒂安·霍恩 (Sebastian Horn) 和克里斯托弗·特雷贝施 (Christoph Trebesch) 合作，想要计算中国对世界其他国家发放的贷款，综合并反复核对之前的零散研究。她指出，“说（中国的贷款）不透明是轻描淡写了。”她认为，如果没有更准确的记录，就无法评估很多低收入国家宏观经济的脆弱程度。而且，如果不考虑中国的贷款，在新冠疫情期间减轻穷国债务的任何努力都很可能功亏一篑。

她的担忧与马尔帕斯的关注点不谋而合。马尔帕斯之前在美国财政部工作时曾表示担心中国正在让一些国家负债，从而扩大其地缘政治影响力。在目前的职位上，他坚持认为各国在借贷方面应该更加透明。

莱因哈特的调查结果并不总对中国的形象不利。在她列出的对中国负债最多的50个国家（相对于其GDP）中，几乎没什么地方有突出的地缘政治重要性（巴基斯坦和斯里兰卡等除外）。而且她和她的同事们已经发现了

140个中国重组或减轻贫困国家债务的例子，尽管它很少与其他债权人协调行事。（中国还签署了G20近期提出的倡议，同意73个低收入国家暂停偿还双边政府贷款。）

所以，世行又找到了一位世界级的首席经济学家。莱因哈特的任期不太可能比她的前任们风平浪静很多。希望她能待得久一点。■



Global tourism

Summer break

Foreign adventure, discovery and hedonism are on hold. They will be back

TOURISM IS THE most popular and least controversial form of globalisation. For those travelling abroad it promises an infinite variety of pleasures, from admiring Titians in Venice to sipping piña coladas in Goa. For the host countries it brings in cash—lots of it. The industry accounts for 7% of world exports and 330m jobs. But business is on pause. Ticket sales at Angkor Wat in Cambodia are down by 99.5% compared with last year and countless Mediterranean sunbeds lie empty. Around the world a vital question is being asked: what will happen to the summer holidays? The answer is that tourism will be back—but not in exactly the same form, and only if NIMBYS and governments don't spoil the fun.

Over the past half-century the travel industry has grown faster than a beach-bar tab on a sunny afternoon. In 1970 fewer than 200m people went on holiday abroad; last year the figure was 1.5bn. Soaring incomes in China explain part of the increase. It has also become cheaper to fly and easier to browse for the perfect swimming pool online—Expedia lists 1m hotels and properties. Visa rules have been loosened. The average person in the rich world can travel to over 100 countries without a visa, compared with 50 half a century ago, and the rules have got easier for people in emerging economies, too. As the industry has boomed, small firms and workers have prospered from the business of holidays. Some 80 countries, including Tanzania, Thailand and Turkey, rely on tourism for a tenth or more of their exports.

These countries' need for foreign exchange means that they are desperate to ensure this summer is not a write-off. Hotel firms are keen to fill rooms and younger consumers are prepared to take risks, judging by the packed

beaches in America on Memorial Day. Nonetheless, caution is warranted. By jamming together people from around the world, tourism can be a lethal spreader of the virus. A single bar in an Austrian ski resort may have caused outbreaks across Europe, while cruise ships turned into floating biohazards. That means tourism in 2020 and 2021 will necessarily involve restrictions. One is filtering visitors by nationality. Cyprus plans to open on June 9th to most European tourists, but not those from Britain and Russia, two covid-19 hot-spots. America has just banned visitors from Brazil. Another fix is lower density. Brian Chesky, the boss of Airbnb, reports a surge in bookings for out-of-town dwellings. All told, the number of tourists this summer will be a fraction of normal levels.

In the long term, supposing a vaccine is found, the picture is brighter. Even if some consumers remain nervous, the industry will adapt. Marriott has appointed a cleanliness council and is introducing electrostatic disinfectant sprayers; Airbus is working on touchless bathrooms. Better testing will give travellers and governments confidence that outbreaks can be managed.

The big danger is that temporary barriers become hard to remove because of squabbling and lobbying. At the end of April more than 150 countries were closed to foreign tourists. Ongoing restrictions include quarantines and incompatible tracing apps. History suggests that it is complacent to assume these will just fall away. It took a global summit in 1920 to set rules on passports and travel after a world war and Spanish flu closed borders—and some western Europeans needed visas to go to America as recently as 1991. Already the politics of travel in Asia have caused tensions. Meanwhile, NIMBYS may seek to keep tourists out of the world's most beautiful but busiest cities.

This summer should be used to make tourism work better. That means taxes and more astute planning to tackle overcrowding. And as the global

travel and airline industries restructure, there is a chance to speed up the introduction of aircraft with lower carbon emissions. It must not take decades before the world returns to the levels of openness that it had as recently as January. Tourism makes the world wealthier and happier. It should be on only a temporary break. ■



【首文】全球旅游业

夏季小休

海外探险和享乐按下暂停键。它们会重启的

旅游是最受欢迎、争议最少的全球化形式了。在那些出国旅行的人看来，它能带来千变万化的乐趣，例如在威尼斯欣赏提香的画作，或者在果阿啜饮椰林飘香。而对于东道国来说，它带来了滚滚现金。这个产业贡献了全球出口的7%，创造了3.3亿个就业岗位。但现在业务暂停了。柬埔寨吴哥窟的门票收入比去年下降了99.5%，地中海边无数张日光浴床也空置着。全世界都在问一个至关重要的问题：今夏的假日季会发生什么？答案是旅游业会再度归来——但形式不会与以往完全相同，而且前提是“邻避者”和政府不来扫兴。

过去半个世纪里，旅游业的发展速度超过了午后明媚阳光下沙滩酒吧的涨价速度。1970年出国度假的人不到2亿，去年达到15亿。这一增长的部分原因是中国人收入猛增。此外坐飞机也变得更便宜了，在网上搜寻完美的泳池也更加容易——Expedia列出了100万家酒店和物业。签证规定已经放宽。富裕国家的普通人无需签证就可以去100多个国家旅行，半个世纪前能去50个。面向新兴经济体民众的签证也放宽了。随着旅游业蓬勃发展，小企业和劳动者靠假日生意把日子过得红红火火。包括坦桑尼亚、泰国和土耳其在内的约80个国家出口的十分之一或更多依赖旅游业。

这些国家需要外汇，因此不顾一切地想要确保今年夏天不会是一场空。酒店企业渴望把客房填满，而且从美国国殇日这天各处海滩的拥挤程度来看，较年轻的消费者也甘愿冒险。尽管如此，谨慎仍是必要的。旅游让世界各地的人们聚集在一起，因而可能成为致命的病毒传播途径。单是奥地利某个滑雪胜地的一家酒吧可能就引发了整个欧洲疫情，而邮轮也成了浮动的生物公害。这意味着今明两年旅游业不可避免地会实施限制措施。一种是按国籍筛选游客。塞浦路斯计划在6月9日向大多数欧洲游客开放，但不包括来自英国和俄罗斯这两个疫情重灾区的人。美国刚刚下令禁止巴西游客入境。另一个解决办法是降低人群密度。爱彼迎的老板布莱恩·切

斯基（Brian Chesky）报告称市郊房源的预订量激增。合计下来，今夏的游客数量将是正常水平的一小部分。

长远而言，假设能找到疫苗，前景将会更好。即使一些消费者仍旧很紧张，旅游业会做出调整来适应这种心态。万豪已经成立了一个清洁卫生委员会，引进了静电消毒喷雾器；空客公司正在研发无接触式卫生间。检测手段的改善也会给旅行者和政府以信心，相信疫情的局部爆发能被控制住。

一大危险是，争吵和游说会导致临时的壁垒变得难以撤除。4月底，150多个国家对外国游客关闭了国门。仍在实施的限制包括隔离和使用彼此不兼容的跟踪应用。从历史经验看，如果认为这些都会自行消失就太想当然了。一战和西班牙流感导致边境关闭，1920年召开了一次全球峰会才制定出有关护照和旅行的规则——而一些西欧人直到1991年都还需要签证才能去美国。在亚洲，旅游方面的政治角力已擦出火药味。与此同时，邻避者可能会设法让游客远离世界上最美丽也最繁忙的城市。

人们应该利用这个夏天改善旅游业。应该通过征税和更精明的规划解决过度拥挤的问题。而在全球旅游业和航空业重组之时，也有机会加速推出碳排放更低的飞机。切不可耗个几十年才让世界回归一直持续到今年1月份的那种开放的程度。旅游业让世界更富裕也更幸福。给它放个小假就行了。■



Universities in Australia

Bye degrees

The foreign-student bubble has burst

AUSTRALIA'S OLDEST university campus should be heaving on a sunny autumn afternoon. Before the pandemic, the University of Sydney hosted more than 70,000 students. At lunchtime they would cram into its cafés and crowd onto its lawns. Now its grounds are practically deserted. Although Australia has almost quashed covid-19, social-distancing rules forced the campus to close in March, and only a few stragglers have stayed on amid the historic sandstone and modern plate glass.

The abrupt halt to international travel is even more painful for Australian universities than their counterparts in other English-speaking countries, because they lean more heavily on revenue from foreign students. More than 440,000 such students enrolled in Australian institutes of higher education in 2019. At the last count, they took up roughly 30% of all places. Almost 40% of them came from a single country, China.

The foreign students are lucrative. In 2018 they brought in almost A\$9bn (\$5.8bn) in revenue—just over a quarter of all university funding, and far more per head than local students bring in through fees and government subsidies. The boom turned education into Australia's fourth-biggest export, behind coal, iron ore and natural gas. It funded world-class research centres, shiny new learning facilities and vast collections of art. Vice-chancellors' pay packets swelled (in big universities they rake in well over A\$1m). Campuses bulged to sizes, as an academic at La Trobe University puts it, "matched only by the epic institutions in India and China".

For years, this has been the subject of heated political debate. Universities say they were forced to woo foreign students because the government does

not give them enough money to cover their rising costs. Michael Spence, the vice-chancellor of the University of Sydney, says: “The education of domestic students doesn’t break even.” If Australia is “more dependent on student fees than comparable systems around the world,” he argues, “that’s a decision successive governments have made.”

Some in the current conservative coalition government retort that universities have brought the crisis on themselves. They “bet big on the international-student dollar” and “have become badly over-exposed”, James Paterson, a senator, recently declared. Vice-chancellors have “privatised the profits” from foreign students, “building Taj Mahals to themselves”, a conservative commentator complains. Even some of those employed by universities are critical. “It wasn’t a Ponzi scheme,” says the academic at La Trobe, “but it’s in that ballpark.”

Now, argues Salvatore Babones of the Centre for Independent Studies, a think-tank, “the chickens have come home to roost.” Australia’s academic year starts in January, so as covid-19 first appeared in China, a flight ban locked out an army of its students just as they should have been enrolling. Some wriggled back in through third countries, but Australia has since closed its borders to non-citizens, and they are not likely to reopen until at least the end of the year.

Universities Australia, which represents the industry, is not sure exactly how many foreign students it has lost. The University of Sydney has fallen 17% short of its enrolment target for 2020, according to Mr Spence, and now faces a budget shortfall of A\$470m. Across the industry, revenue could fall by A\$3bn-4.6bn, according to Universities Australia, putting 21,000 jobs at risk, many of them in research.

Since students who do not enroll this year will not pay fees in 2021 or after, a quick bounceback seems impossible. Peter Hurley of Victoria University’s

Mitchell Institute, another think-tank, estimates that the industry might lose A\$19bn over the next three years. Building projects and casual staff have already been axed.

So far, the government has been disinclined to help. It says it will still fund the places of domestic students, even if they drop out rather than embrace online learning. But it has excluded universities from its A\$6bn wage-subsidy scheme, JobKeeper. Dan Tehan, the education minister, has called for “a greater focus on domestic students”.

Few seem to think universities will fail. Smaller, regional institutions are in the most danger, but since they are an important source of jobs, state and federal governments might be persuaded to prop them up. They will, however, have to shrink to survive. Universities will be “smaller in staffing and smaller in revenue”, says John Dewar, La Trobe’s vice-chancellor. There could be “a massive change in the types of courses they offer”, Mr Hurley predicts. That seems to be just what the government wants. ■



澳洲的大学

拜拜，学位

留学生泡沫破裂

在一个阳光明媚的秋日午后，澳大利亚历史最悠久的大学校园内本应是一派人头攒动的景象。疫情发生前，悉尼大学有七万多名学生，午餐时间他们会一窝蜂地涌向学校的餐厅和草坪。而现在，到处都空荡荡的。尽管澳大利亚差不多已经遏制住了新冠肺炎，但在保持社交距离的规定下，悉尼大学不得不在3月关闭，只剩少量散兵游勇穿行在古老的砂岩建筑和现代的玻璃屋之间。

与其他英语国家的大学相比，突如其来的国际旅行禁令让澳大利亚大学的处境更加艰难，因为它们更加依赖来自留学生的收入。2019年，超过44万名留学生在澳大利亚高校就读。根据最新统计，留学生约占高校学生总数的30%。其中近四成来自一个国家——中国。

留学生就是摇钱树。2018年，他们带来了近90亿澳元（58亿美元）的收入，是大学所获总资金的四分之一略多，按人均计远高于本地学生通过学费和政府补助贡献的收入。留学生激增使教育成为澳大利亚仅次于煤炭、铁矿石和天然气的第四大出口产品。它为建成世界一流的研究中心、崭新的教学设施和大量的艺术品收藏提供了资金支持。校长们的工资袋鼓了起来（一些大型院校校长的年薪远超过100万澳元）。大学纷纷开疆扩土，用拉筹伯大学（La Trobe University）一名教师的话说，校园面积已经“唯有印度和中国那些庞大的学府可相提并论”。

多年来，这一直在引发激烈的政治辩论。大学表示，吸引留学生是无奈之举，因为政府没有提供足够的经费来支付不断上涨的成本。悉尼大学校长施迈克（Michael Spence）表示：“本国学生的教育经费不足以维持收支平衡。”如果说澳大利亚“对学费的依赖度比世界其他有着类似教育制度的国家更甚，”他指出，“那也是历届政府的决策使然。”

而当前保守党联合政府中的一些人反驳说是大学自己惹火烧身。参议员詹姆斯·佩特森（James Paterson）最近公开表示，大学“在国际学生带来的收入上押下重注”，因而“风险极高”。一名保守派评论员抱怨说，校长们把来自留学生的“收益私有化”，“为自己打造泰姬陵般的奢华住所”。就连大学的一些雇员也持批评态度。“这不是庞氏骗局，”上文提到的那名拉筹伯大学的教师说，“但也差得不多。”

智库独立研究中心（Centre for Independent Studies）的萨尔瓦托雷·巴伯恩斯（Salvatore Babones）认为，现在已到了“自食其果”的时候。澳大利亚的学年从1月开始，因此当新冠肺炎最初在中国爆发时，飞行禁令正好将大批本应入学的学生挡在了门外。一些人通过第三国辗转入境，但此后澳大利亚对非本国公民关闭了边境，并且至少在今年年底之前都不太可能重新开放。

行业组织澳洲大学联盟（Universities Australia）表示，不确定这次到底流失了多少留学生。施迈克估计，悉尼大学的注册入学人数比2020年的目标低了17%，现在面临4.7亿澳元的预算缺口。澳洲大学联盟的数据显示，整个行业的收入可能会减少30亿到46亿澳元，导致2.1万人面临失业的风险，其中很多是研究人员。

由于今年没有注册的学生不会支付2021年或者之后的学费，大学的财务状况看来不可能很快好转。另一家智库维多利亚大学米切尔研究所（Victoria University's Mitchell Institute）的彼得·赫尔利（Peter Hurley）估计，未来三年，整个行业可能损失190亿澳元。一些建筑工程被取消，临时工被解雇。

截至目前，政府还无意伸出援手。它表示仍会提供资助以保证本国学生的入学机会，即使他们选择退学而不是上网课。但政府已将大学排除在600亿澳元的“保住工作”（JobKeeper）工资补贴计划之外。教育部长丹·特翰（Dan Tehan）呼吁“加大对本国学生的关注”。

似乎没有人认为大学会倒闭。最危险的是规模较小的地方性大学，但由于

它们是重要的就业源泉，州政府和联邦政府可能会被说服，为它们提供支持。然而它们将不得不瘦身以求生存。拉筹伯大学校长约翰·杜瓦（John Dewar）表示，大学的“人员配备和收入都会减少”。“大学提供的课程类型可能会发生巨大的改变。”赫尔利预言。这似乎正中政府的下怀。■



Asian business dynasties

Godfathers depart, too

Why some family empires struggle with succession

MACAU WILL become the “Las Vegas of the Far East”, predicted Sheldon Adelson, an American casino magnate. In 2019 the Chinese territory’s \$30bn in annual casino revenue was five times Vegas’s. Despite a slump in turnover this year as covid-19 emptied parlours, Macau’s rise looks poised to resume. It owes much to Stanley Ho, the charming scion of an illustrious Hong Kong clan. Thanks to the monopoly gambling licence he secured from Macau’s former Portuguese administrators in 1961 and held until 2002, STDM, his family’s main holding company, grew into Asia’s largest gambling empire.

Mr Ho died on May 26th, aged 98, leaving behind 14 children and a \$6bn-plus fortune. A decade ago his last wife fought a bitter public battle against his second and third wives for control of SJM Holdings, the group’s publicly traded arm. His elder children joined the acrimonious spat, which ended in a truce.

Many Asian firms face similarly complex successions. Family concerns make up over half of all big businesses in Asia. Other recently departed patriarchs include Eka Tjipta Widjaja of Indonesia’s Sinar Mas Group, Henry Sy of SM Group in the Philippines and Shin Kyuk-ho of South Korea’s Lotte Group. Many other businesses have ageing leaders. Experts foresee a wave of turbulence.

Many patriarchs fear that anointing an heir apparent would weaken their grip on power or bring bad luck. Because Asian business dynasties tend to be quite new, many lack the institutional structures of European or American ones.

A deeper problem is their relationship-based management model. Bosses cultivate a personal rapport with politicians and financiers, which does not easily transfer from one generation to the next. Joseph Fan of the Chinese University of Hong Kong finds that family firms in Hong Kong, Singapore and Taiwan lose some 60% of their value during generational transitions.

Some of Asia's geriatric bosses are keen to avoid this fate. Before retiring two years ago, Li Ka-shing, the 91-year-old doyen of corporate Hong Kong, simplified his web of businesses. He gave one of his sons clear control of CK Hutchison Holdings and CK Asset Holdings, which contain most of his empire. ■



亚洲商业王朝

又见教父离去

为何一些家族王朝面对继承难题

美国赌业大亨谢尔登·阿德尔森（Sheldon Adelson）曾预测澳门将成为“远东的拉斯维加斯”。2019年，中国这个特别行政区的博彩年收入达到300亿美元，是拉斯维加斯的五倍。尽管受新冠疫情影响，今年赌场营业额大幅下降，但看起来澳门必然会重拾上升势头。这在很大程度上要归功于出身香港望族、魅力非凡的何鸿燊。他在1961年从澳门的前葡萄牙政府手中取得了博彩专营权牌照，并一直持有至2002年。凭借这块赌牌，其家族的主要控股公司澳门旅游娱乐公司成长为亚洲最大的博彩王国。

何鸿燊于5月26日去世，享年98岁，身后留下14名子女和超过60亿美元的财产。十年前，他的四房太太对二房和三房公开发起了激烈的争产战，争夺对家族集团的上市公司澳博控股（SJM Holdings）的控制权。年长的子女们也加入了这场尖锐的纷争，最后以和解收场。

许多亚洲公司面临同样复杂的继承问题。亚洲的大公司有半数以上是家族企业。近期离世的其他家族企业大家长有印度尼金光集团（Sinar Mas Group）的黄奕聪、菲律宾SM集团的施至成，以及韩国乐天集团的辛格浩。其他许多企业的领导人也已老迈。专家预测将有一轮动荡。

许多家族领袖担心指定继承人会削弱自己的权力或者不吉利。由于亚洲的商业王朝往往历史不长，许多都欠缺欧美同类企业那种制度性结构。

一个更深层次的问题是这类企业基于人情关系的管理模式。老板们与政客及金融家建立的个人交情难以代代相传。香港中文大学的范博宏发现，香港、新加坡和台湾的家族企业在世代传递的过程中会损失掉约60%的价值。

亚洲一些年迈的老板们很想摆脱这种命运。现年91岁的香港商界教父李嘉

诚在两年前宣布退休之前便简化了自己的商业网络，明确地把自己商业帝国的主要部分——长江和记实业和长江实业集团——的控制权交给了他的一个儿子。■



Chinese diaspora Inc

High-wire act

South-East Asia's tycoons balance competing demands from their adopted homes and their newly assertive ancestral land. Billions in profits are at stake

IN 1919 CHIA EK CHOR moved to Bangkok and set up a small shop importing seeds from his home Chinese province of Guangdong. Two generations later the business, Charoen Pokphand (CP) Group, is Thailand's pre-eminent conglomerate, peddling everything from chickens and pigs to cars and phones. The founding patriarch, who died in 1983, adopted a Thai version of the family name, Chearavanont. But he maintained a deep affection for his ancestral home. When recited in Mandarin, the first characters of his four sons' names—Zhengmin, Daimin, Zhongmin, Guomin—spell out “fair, great China”.

The family's bonds with China are not just emotional. Two-fifths of CP's \$68bn in annual revenues come via hundreds of Chinese subsidiaries running animal-feed factories, supermarkets and much else besides. CP holds a big stake in a Chinese technology-and-insurance giant, Ping An. And it is a favourite partner of Chinese investors in Thailand, including SAIC, a carmaker with which CP makes fancy MG sports cars and pickups.

The Chearavanonts' past and present mirror those of other wealthy ethnic-Chinese clans in South-East Asia. Although they make up less than 10% of the region's 650m or so people, they dominate swathes of its \$3trn economy. Many have prospered thanks to familial ties with China—and vice versa. “China cultivates them and they cultivate China in turn,” says George Yeo, a former foreign minister of Singapore.

According to *The Economist's* analysis of data from *Forbes* magazine, last year more than three-quarters of \$369bn in South-East Asian billionaire

wealth was controlled by *huaren* (a Mandarin term for “overseas Chinese” who are citizens of other countries). A lot resides in Singapore, a rich majority-*huaren* city-state. But plenty is spread from Indochina and Indonesia to the Philippines (see chart).

Malaysia’s Robert Kuok oversees an empire that spans everything from sugar to Shangri-La hotels. In Indonesia Lippo Group, owned by the Riady family, is active in banking, property and health care. On last year’s list 15 of 17 Filipino billionaires were ethnic Chinese; SM Group, run by the Sy clan, has high-end malls across China. Myanmar is too poor for billion-dollar fortunes, but many of its leading businessmen are Chinese-Burmese, like Serge Pun of Yoma, a property-to-banking concern, or Aik Htun of Shwe Taung Group, with interests in infrastructure and real estate.

These businesses have helped the region become China’s largest trading partner this year, surpassing the European Union. Slowing globalisation and anti-Chinese sentiment in the West—worsened by China’s early mishandling of covid-19 and now its power grab in Hong Kong—create an incentive for *huaren* and China to tighten their bonds.

It won’t be easy. President Xi Jinping’s ill-defined “Chinese dream” project to revive China’s greatness demands more fealty from the diaspora. At the same time the *huaren*’s adoptive polities are growing a bit more suspicious of their huge neighbour to the north. Forging new commercial ties in the land of their ancestors without drawing fire at home will require every ounce of the *huaren*’s famed political skills.

Although Chinese settlers first arrived in South-East Asia in the 15th century, many founders of today’s top *huaren* business dynasties fled south to escape poverty and violence in the early 1900s. Most assimilated culturally and, like Chia, took local names. They prospered first as traders, then in some cases by cosyng up to power. Liem Sioe Liong of Salim Group,

a noodles-to-finance conglomerate, enjoyed famously close ties with Suharto, Indonesia's dictator from 1967 to 1998, picking up lucrative monopolies and licences in areas from flour-milling to clove imports.

Around the region such links helped the tycoons build vast, vertically integrated groups as Asia boomed in the 1990s. Together these constituted what has sometimes been described as a "bamboo network" of firms with Chinese roots, united by Confucian values of diligence and thrift. Trading and feuding with one another in turn, their bosses ended up dominating industries from farming to finance.

They also benefited mightily from China's opening up. When this process began in the 1980s China's Communist leaders turned to *huaren* tycoons for money and expertise. If Western capital played a part in China's rise, diaspora investment mattered as much. In 1979 CP became the first foreign enterprise to set up in the Shenzhen special economic zone, where businesses could toy with a freeish market. As well as selling sugar, Mr Kuok soon began opening Shangri-La hotels in China, offering comfy, familiar rooming to business travellers. He now runs dozens of them there. Genting Group, another *huaren* house from Malaysia, is building a fancy hotel for China's winter Olympics in 2022. All the while, China has been buying South-East Asia's commodities, like rubber and palm oil, often from *huaren* groups. Indonesia's Sinar Mas, run by the Widjaja family, is among China's largest paper suppliers (it also sells instant noodles and protein bars).

Today China wants to move beyond such basics, says John Riady, whose grandfather, Mochtar, founded Lippo (which derives a fifth of its sales from China). Mr Riady, who heads the group's property arm, speaks of a new stage in relations between China and ancestrally *huaren* businesses like his. China covets upscale investments, especially from companies with advanced technology. And *huaren* firms see Chinese tie-ups as a source of

new ideas.

| *Nesting behaviour*

Take CP. It has built a gigantic state-of-the-art poultry-processing plant outside Beijing, where millions of fowl are minded by robots. Suphachai Chearavanont, the Thai group's (third-generation) chief executive, says it has poured roughly \$400m into Chinese startups in areas like biotechnology, data and logistics. Lippo has taken a small stake in Tencent, a Chinese internet giant.

As China has grown richer the *huaren* have also sought to bring Chinese investment back home. CP has struck deals with giants such as China Mobile, which bought a minority stake in the Thai firm's mobile division. CP's digital-payments business counts Ant Financial, an arm of Alibaba, the biggest of China's technology titans, among its shareholders. Ant has also teamed up with Emtek, a media group controlled by Eddy Sariaatmadja, another *huaren*, to invest in mobile-payments and e-commerce businesses.

Chinese money is flowing to a new generation of *huaren*, too. Grab and Sea Group, two Singapore-based technology "unicorns" founded by ethnic-Chinese entrepreneurs, have been backed by Didi Chuxing, a ride-hailing firm, and Tencent, respectively. Alibaba has invested in Tokopedia, an Indonesian tech darling with *huaren* co-founders.

China is also pouring cash into South-East Asian infrastructure, as part of Mr Xi's Belt and Road Initiative (BRI). Most BRI projects are built by Chinese state firms, but that still leaves opportunities for sharp-eyed locals. In Indonesia the Riadys are working with Chinese partners to erect an \$18bn township outside Jakarta, next to a planned Chinese-built high-speed railway. In Myanmar Yoma's Mr Pun is overseeing the construction of a new city outside the commercial capital, Yangon, with Chinese help. CP will soon begin laying big new tracks in Thailand with China Railway

Construction Corporation. Although Chinese private lenders are, in the words of one tycoon, “very stingy” when it comes to bankrolling non-Chinese firms abroad, different rules are said to apply to Mr Xi’s pet projects. One “branded ‘BRI’ is more likely to get money”, says Mr Pun.

Such initiatives—and commercial ties with China more broadly—now draw more attention from the *huaren*’s home countries, not all of it positive. South-East Asian Chinese have long been accused of divided loyalties. After the Asian crash of 1997, when some overindebted groups folded leaving legions of unemployed, anger at the *huaren*-dominated monied elite sometimes boiled over into violence. In 1998 native Indonesians’ calls to curb KKN—short for “corruption, collusion and nepotism” in the local vernacular—led to race riots directed at ethnic-Chinese businesses.

Mercifully, ugly incidents like those are no longer common. But *huaren* wealth still breeds resentment. Malaysia’s long-standing *bumiputera* (“sons of the soil”) system of quotas and subsidies favouring poorer ethnic Malays did not stop some of the predominantly Muslim majority from launching a nasty “buy Muslim” campaign against ethnic-Chinese-owned businesses last year. Around the same time Indonesian security forces stymied a plot to bomb Chinese business centres in Jakarta. As the region grapples with deep coronavirus recessions, Chinese minorities could again become the object of popular ire.

Besides averting a backlash from their compatriots, *huaren* tycoons dealing with China must also take care not to upset Beijing. First Pacific, a financial firm partly owned by Salim Group, learned this the hard way when Albert Del Rosario, a Filipino former diplomat, flew to Hong Kong last year to attend its board meeting. A critic of China’s political system, Mr Del Rosario was turned back at Hong Kong’s airport. He subsequently resigned from the board.

During political unrest against Hong Kong's Beijing-backed government last year, CP's elderly patriarch (and Mr Suphachai's father), Dhanin Chearavanont, took an unusual step and ran front-page ads in three Hong Kong newspapers condemning weeks of "violence and turmoil" caused by street protests. Many Hong Kong tycoons had been cajoled into making similar declarations. But the fact that a normally tight-lipped Mr Dhanin, who is semi-retired, did so may be seen as evidence of how sensitive dealing with China has become.

"We all need a kind of foreign policy to deal with big countries like China," says Mr Riady, referring to big South-East Asian business houses like his own. Striking the right balance between their adopted countries and the ancestral land has been complicated further by Mr Xi's designs for the diaspora. The Overseas Chinese Affairs Office was recently folded into the Communist Party's shadowy United Front propaganda division. Many suspect that Mr Xi wants to muddy the distinction between *huaren* and *huaqiao* (Chinese nationals living abroad). Some *huaren* business leaders are handed roles on Chinese state bodies, such as the Chinese People's Political Consultative Conference, a talking shop. Politicians in South-East Asia worry in private about "influence operations" from Beijing.

In fact, ties between China's state and diaspora businesses are mostly the result of happenstance, not a master plan. Many tycoons, for instance, have roots in the southern province of Fujian. A hive of entrepreneurship and Mr Xi's former fief as provincial leader, it is the perfect place to nurture relations with China's business and political power-brokers. And for every affectionate Chearavanont there is a tycoon critical of China, whose ancestors fled persecution or revolution.

Some tycoons think that Chinese links make life easier. "Of course it helps," says one. "It builds trust. We are all *huaren* after all." Mr Yeo, who until recently worked at Kerry Logistics, part of the Kuok empire, sees "ethnic-

Chinese businesses overseas benefiting hugely from China's growth”.

Others deny Chinese heritage provides a business edge, and see themselves solely as Indonesians or Malaysians. “Chineseness” is seldom the main reason why one foreign firm makes money in China and another does not, says Marleen Dieleman, a scholar of family businesses at the National University of Singapore.

| *Flying the coop*

Indeed, most *huaren* are pragmatists who see a Chinese family history as useful but not predestining. Many are thinking beyond China. Their groups have become integrated into the world economy. CP employs 325,000 workers in 21 countries and, says Mr Suphachai, no longer recruits executives mostly from Bangkok's bustling Chinatown but from elite American and Chinese universities. He boasts of foreign tie-ups from Japan to Britain. CP is expanding at home, too. In March it bought Tesco's Thai and Malaysian supermarkets for \$10.6bn. Mr Riady says Lippo is today best compared to multinationals like Ford or Goldman Sachs, which thrive in China without cultural connections.

This is more important now that many patriarchs are passing on. The younger generation, mostly educated in America and speaking patchy Mandarin, may find it harder to flit as deftly between their ancestral and adopted homes. Still, scions of *huaren* dynasties inherit connections and, often, commercial acumen—as well as caution. Salim Group's founder, who died in 2012, liked to cite a Chinese proverb that “tall trees attract the wind”. As Chinese influence blows across South-East Asia, expect its business empires to watch their sprawling canopies carefully. ■



海外华人企业

走钢丝

东南亚大亨努力平衡他们的入籍国和近年变得更强势的祖籍国之间竞争性的需求。亿万利益悬于一线

谢易初在1919年移居曼谷，开了一家小店，从他的家乡中国广东省进口种子。经过两代人的努力，正大集团现在是泰国知名企业集团，从鸡和猪到汽车和电话，什么都卖。开创了家族事业的谢易初于1983年去世，他在泰国改用有“谢”这个音的泰文姓氏Chearavanont。但他对故土仍怀有深厚的感情。他四个儿子的中文名字分别是正民、大民、中民、国民，连起来就是“正大中国”。

连接谢家与中国的不仅是情感上的纽带。正大集团680亿美元的年收入中，有五分之二来自几百家在中国经营饲料厂、超市及其他许多业务的子公司。正大是中国科技和保险巨头平安的大股东。它还是中国投资者在泰国的首选合作伙伴，比如上汽集团，它与正大合作生产炫酷的名爵跑车和皮卡。

谢家的过去和现在映照出东南亚其他富裕华裔家族的特点。尽管华裔在东南亚约6.5亿人口中的占比不到10%，但他们却在该地区3万亿美元的经济中呼风唤雨。很多华裔因为家族与中国的渊源而繁荣发展，反过来中国也从中受益。新加坡前外交部长杨荣文说：“中国扶持他们，他们也扶持中国。”

根据本刊对《福布斯》杂志数据的分析，去年，东南亚亿万富翁总共3690亿美元的财富中超过四分之三由“华人”（汉语中对属其他国家公民的“海外华人”的称法）控制。很多华人生活在人口以华裔为主的富裕城市国家新加坡，但中南半岛、印度尼西亚、菲律宾等地也有很多华人（见图表）。

马来西亚的郭鹤年掌管的帝国业务广泛，从白糖到香格里拉连锁酒店无所不包。在印尼，李氏家族的力宝集团活跃于银行、房地产和医疗领域。去

年登上《福布斯》榜单的17位菲律宾亿万富翁有15位是华裔。由施家经营的SM集团在中国各地开有高档商场。缅甸太穷，培育不出亿万美元身家的富豪，但该国许多商界领袖都是华裔，例如涉足房地产到银行等多个领域的祐玛战略控股公司的潘继泽，还有主营基建和房地产的金山集团的李松枝。

今年，这些企业帮助东南亚超越欧盟成为了中国最大的贸易伙伴。全球化放缓，加之西方的反华情绪——因为中国在新冠疫情早期处置不当以及目前强权控制香港而进一步加剧——都为华人和中国加强连接提供了动力。

但要做到并不容易。习近平主席为中华民族的伟大复兴而提出的定义含混的“中国梦”要求海外华人对中国更加忠诚。与此同时，华人的入籍国对它们北方的这个庞大邻国正心生猜忌。要在祖先的土地上建立新的商业纽带，又不能在入籍国引火上身，将需要华人充分发挥他们著名的政治手腕。

尽管华人移民东南亚始于15世纪，但如今许多顶尖华人商业王朝的创始人是在20世纪初为摆脱贫困和战乱而南逃的。他们中的大多数融入了当地的文化，并和谢易初一样取了当地人的姓名。他们先是靠贸易发家，之后有时是靠讨好结交权贵。林绍良的三林集团（Salim Group）经营从面条到金融等多种业务，他与在1967年至1998年独裁统治印尼的苏哈托（Suharto）关系密切，广为人知，这让他获得从面粉加工到丁香进口等领域的垄断经营权和许可，获利丰厚。

在整个东南亚，这种关系在上世纪90年代亚洲腾飞时期帮助华人大亨建立起庞大且垂直整合的企业集团。由此构成的网络有时被称为“竹子网络”，指那些有中国血统、由勤劳节俭的儒家价值观团结在一起的企业。这些企业互相交易又彼此竞争，最终它们的老板称雄于从农业到金融的各行各业。

他们也从中国的对外开放中受益匪浅。中国在上世纪80年代开始改革开放时，共产党领导人向华人大亨们寻求资金和技术支持。如果说西方资本在

中国的崛起中发挥了作用，那么海外华人的投资同样重要。1979年，正大集团成为在深圳经济特区成立的首家外资企业，在特区的企业可以享受相对自由的市场。除了白糖生意外，郭鹤年很快就开始在中国开设香格里拉酒店，为商务旅客提供舒适、熟悉的住宿空间。他现在在中国经营数十家香格里拉酒店。马来西亚的另一家华人企业云顶集团正在为2022年中国冬奥会建造一家豪华酒店。中国一直在购买东南亚的橡胶和棕榈油等大宗商品，经常是与华人企业集团交易。由黄奕聪家族经营的印尼金光集团是中国最大的纸品供应商之一（也卖方便面和蛋白棒）。

如今中国希望合作超越这类基本商品的层面，李川表示。他的祖父李文正创立了力宝集团，这家公司销售额的五分之一来自中国。李川负责力宝的房地产业务，他说中国与像他们这样的“祖传”华人企业之间的关系进入了一个新的阶段。中国渴望获得更高端的投资，特别是那些拥有先进技术的公司的投资。而华人企业把和中国的连结视为新想法的来源。

| 你中有我

以正大为例。它在北京郊外建了一个庞大的高科技畜禽养殖基地，由机器人看管成百上千万只家禽。正大第三代首席执行官谢镕仁表示，集团已向中国生物技术、数据和物流等领域的创业公司投资约四亿美元。力宝已经收购了中国互联网巨头腾讯的一小部分股份。

随着中国变得更富裕，华人也试图将中国投资带回自己的入籍国。正大已与中国移动等巨头达成交易，后者收购了正大旗下通信公司的少数股权。正大数字支付业务的股东包括中国最大的技术巨头阿里巴巴的子公司蚂蚁金服。蚂蚁金服还与另一家由华人艾迪·萨里特阿麦迪加（Eddy Sariaatmadja）控制的媒体集团Emtek合作，投资移动支付和电子商务。

中国的资金也在流向新一代海外华人。由华裔企业家创立的两家新加坡科技独角兽Grab和Sea Group分别得到了网约车公司滴滴出行和腾讯的投资。阿里巴巴投资了由华人联合创立的印尼科技宠儿Tokopedia。

中国还向东南亚的基建项目注入大量资金，这些项目是习近平提出的“一

带一路”倡议的一部分。大多数“一带一路”项目都由中国的国企承建，但仍给敏锐机灵的本地人留有机会。在印尼，李家正在与中国企业合作，在雅加达郊外兴建一处投资180亿美元的新城区，毗邻一条中国计划建造的高速铁路。在缅甸，祐玛控股的潘继泽正在中国的协助下在商都仰光的外围建设一座新城。正大即将与中国铁建一起在泰国修建大段高铁。尽管用一位大亨的话来说，中国的私人贷款机构在向海外非中国企业放贷时“非常小气”，但据说在习近平中意的项目中据说就是另一回事了。潘继泽说，“挂着‘一带一路’牌子的项目更可能筹到钱”。

现在，这些项目以及更广泛层面上与中国的商业联系引来了华人入籍国更多的关注，但并非所有反应都是正面的。东南亚华裔长期以来都被指责怀有二心。1997年亚洲金融风暴后，一些负债累累的华人集团倒闭，大批员工失业，对以华人为主的富有精英阶层的愤怒情绪有时升级为暴力。1998年，本土印尼人呼吁遏制KKN（印尼语中“贪污腐败、官商勾结和裙带关系”的缩写），引发了针对华裔企业的种族骚乱。

所幸，那样的骇人事件不再常见。但华人的财富仍然会滋生怨恨。马来西亚长期实行优待原住马来人的配额和补贴制度，但在去年，一些以穆斯林为主的多数族裔还是针对华人企业发起了不友好的“优先购买穆斯林商品”运动。大约在同一时间，印尼安全部队阻止了一场用炸弹袭击雅加达华人商业中心的阴谋。如今，该地区正努力应对新冠疫情引起的严重经济衰退，华人少数族裔可能会再次成为民众泄愤的对象。

除了要防范入籍国民众的排华行为，华人大亨在同中国打交道时也得小心谨慎，以免让北京不快。三林持股的金融公司第一太平洋（First Pacific）去年就有一次惨痛教训。菲律宾前外长阿尔伯特·德尔·罗萨里奥（Albert Del Rosario）对中国的政治制度持批评态度，去年他飞往香港参加该公司的董事会议时，在香港机场被拒绝入境。后来他辞去了董事职务。

去年，在香港爆发抗议受北京支持的港府的政治动乱期间，正大的大家长谢国民（谢镕仁之父）做出罕见举动，在三家香港报纸上买下头版广告，

谴责几周以来街头抗议造成的“暴力与混乱”。在这之前许多香港大亨已被诱导做出了类似的声明。但谢国民已半退休，且通常谨言少语，他的举动或许可以说明和中国政府打交道已经变成了多么敏感棘手的事。

“我们都需要类似外交政策一样的方法来和中国这样的大国打交道。”李川说。他说的是像力宝集团这样的东南亚大型企业集团。习近平对海外华人的设想让他们在入籍国与祖籍国之间取得恰当平衡的努力变得更加复杂。国务院侨务办公室最近被并入了统战部，这是共产党一个较隐蔽的宣传部门。许多人怀疑习近平是想混淆华人和华侨（在海外生活的中国公民）之间的区别。一些华人商业领袖接受了中国国家机构中的职务，例如没有实权的政协。东南亚的政客私下里很担心北京的“影响力行动”。

实际上，中国政府和华人企业之间的关系大多事出偶然，而不是总体规划的结果。例如，许多华人大亨都来自中国南部的福建省。福建经商意识浓厚，习近平又曾在此担任省长，这里是与中国的商业和政治权力掮客培养关系的理想之地。而有多少对故土充满深情的谢家人，就有多少对中国持批评态度的华人大亨（他们的祖先是为躲避迫害或革命而逃离中国的）。

一些大亨认为与中国的关系让日子更好过。“这当然有好处，”其中一位说，“能建立互信，毕竟大家都是华人嘛。”直到最近还在郭鹤年帝国旗下的嘉里物流（Kerry Logistics）任职的杨荣文认为，“海外的华人企业正在从中国的增长中获得巨大利益。”

另一些大亨则否认与中国的渊源带来了商业优势，并把自己视为纯粹的印尼人或马来西亚人。有没有“中国性”很少是一家外国公司在中国赚钱或不赚钱的主因，新加坡国立大学研究家族企业的学者马琳·迪勒曼（Marleen Dieleman）说。

| 大逃亡

的确，大多数华人都很务实，他们认为家族的中国渊源有一定好处，但并不决定命运。许多人的眼界不限于中国。他们的集团已融入世界经济。正大在21个国家和地区雇有32.5万名员工，谢镕仁说，集团已经不再主要从

曼谷热闹的唐人街招募高管，而是转向美国和中国的精英大学。他说正大与日本、英国等多个国家都有合作关系。同时它也在本土扩张。今年3月，正大以106亿美元收购了乐购（Tesco）在泰国和马来西亚的超市。李川说，如今力宝更像是福特或高盛这样没有文化关联也能在中国蓬勃发展的跨国公司。

这一点在眼下更加重要，因为许多家族的大家长正在传位给下一代。年轻一代大多在美国接受教育，中文不流利，可能会觉得越来越难像他们的长辈们那样，在祖籍国和入籍国之间八面玲珑。尽管如此，华人王朝的接班人仍然继承了广泛人脉，往往也继承了商业头脑，以及谨慎的态度。三林的创始人于2012年去世，他喜欢引用“树大招风”这句中国俗语。随着中国的影响力之风吹袭整个东南亚，预计那里的商业帝国将要小心避风了。■



The Economist film

Why is sand in short supply?

The world uses 40 billion tonnes of sand each year to build cities and towns. But global reserves are running low as demand continues to rise.



经济学人视频

为什么沙子不够用了？

全世界每年使用400亿吨沙子用于城镇化建设，但全球储量正在出现短缺，而需求持续攀升。



John Maynard Keynes

Alive in the long run

The enduring legacy of John Maynard Keynes

ANY BIOGRAPHER of John Maynard Keynes must labour in the shadow of Robert Skidelsky's magisterial three volumes about the great economist. Zachary Carter, a journalist at the *Huffington Post*, has tackled the problem in an ingenious way, by focusing on the development of Keynes's ideas and how they fared after his death in 1946. The result is an entertaining summary of 20th-century economic history that will appeal to the general reader.

The key to Keynes, Mr Carter shows, is to place him in his time and class—a well-heeled British intellectual who moved effortlessly between the worlds of academia, government and the arts. Born in 1883, he grew up at a time when the British Empire was at its peak, which, for people like Keynes, was an age of peace and prosperity.

The idyll was destroyed by the first world war and, in part, Keynes's life was a bid to restore the better parts of that lost world. He first made his name by raging against the terms of the Versailles peace treaty; his economic views were shaped by the experience of Britain in the 1920s, which was marked by deflation and high unemployment. Then came the Great Depression, which seemed to show the folly of the classical view of an economy as a machine which, if left to its own devices, would return to equilibrium.

For Keynes, this was a call to action. He perceived “the real struggle” to be between liberalism, in which the primary objectives of government were peace, freedom of trade and economic wealth, and a militarist school “which thinks in terms of power, prestige, national or personal glory, the imposition of a culture and hereditary or racial prejudice”. In a sense, he

wanted to save capitalism from itself. Mr Carter sees Keynes's career as an attempt "to make the practical risk-averse anti-revolutionary conservatism of Burke fit the radical democratic ideals advanced by Rousseau".

Given Keynes's standing today, it is easy to forget how often his advice was ignored during his lifetime. In spite of his opposition, Britain's Conservatives restored the gold standard in 1925. He backed Lloyd George's Liberals in the election of 1929, just as the party was descending into irrelevance. While some elements of Franklin Roosevelt's new deal were Keynesian, the president regarded the economist as an indecipherable mystic. And at the Bretton Woods conference of 1944 many of Keynes's plans for the post-war economic order were overruled by the Americans.

His greatest influence was exerted after his death, as the economics profession overwhelmingly adopted his ideas in the three decades after the war. As Mr Carter says: "Keynesianism took on a life of its own Keynes himself could scarcely have predicted." His legacy was affected by the style of his intellect and writing, which had been honed in Cambridge common rooms and Bloomsbury salons; he expressed his ideas more in arresting *bons mots* than in mathematical equations. Partly as a consequence, his magnum opus, "The General Theory of Employment, Interest and Money", is a confusing read. Keynes recommended that governments should manage aggregate demand or purchasing power, but did not say precisely how they should do so. He enshrined full employment as the main measure of success but did not define the term.

Instead, Keynesianism was defined by his colleagues, such as Joan Robinson and John Hicks, and intellectuals like J.K. Galbraith. That philosophy was in turn attacked in the 1960s and 1970s by Milton Friedman, Friedrich Hayek and others, who argued that Keynesianism had resulted in government playing too big a role in the economy and a chronic tendency towards inflation. Ronald Reagan and Margaret Thatcher presided

over a big shift away from the use of fiscal policy to manage the economic cycle, with monetary policy taking the strain.

Mr Carter is dismissive of these anti-Keynesian reactions. Still, you have to wonder whether Keynes, who relied on his investment income to fund his lifestyle, would have been enthusiastic about the economic policies of the mid-1970s, which in Britain yielded a top rate of income tax of 83% and inflation of over 25%.

For a while, as the profession moved away from his ideas, it looked as if Keynes might become one of the “defunct economists” he once quipped about. But the 21st century has restored his reputation. In 2009, in response to the financial crisis, G20 governments agreed on the kind of co-ordinated fiscal stimulus that Keynes would surely have recommended. The pandemic has led to yet another round of government action to stave off depression. Meanwhile, increasing use of automation has revived interest in Keynes’s thoughts about a shortened working week, which he expounded in “Economic Possibilities For Our Grandchildren”. The world will be debating, and learning from, the work of Keynes for many decades to come. ■



约翰·梅纳德·凯恩斯

活力长存

凯恩斯的不朽遗产【《和平的代价》书评】

不论谁要为约翰·梅纳德·凯恩斯立传，都会被笼罩在罗伯特·斯基德尔斯基（Robert Skidelsky）关于这位大经济学家的三卷权威著作的阴影之下。《赫芬顿邮报》的记者扎卡里·卡特（Zachary Carter）用一种巧妙的方式冲破了阴影——专注于凯恩斯思想的发展和它在1946年凯恩斯去世之后的影响。这本书对20世纪的经济史做了一番有趣的总结，应该会得到大众读者的喜爱。

卡特表示，认识凯恩斯的关键是把他放回他所处的时代和阶层中——一位富裕的英国知识分子，在学术界、政府和艺术家圈子之间穿梭自如。他生于1883年，成长于大英帝国的鼎盛时期。这一时期对于凯恩斯这样的人来说，是和平与繁荣的年代。

这种田园诗般的生活毁于第一次世界大战。在某种程度上，凯恩斯的一生就是在努力恢复那个失落的世界中美好的部分。他先是因为反对凡尔赛和约的条款而声名鹊起。他的经济学观点深受20世纪20年代英国历史的影响，那个时期以通缩和高失业率为特点。而后发生了大萧条，这似乎暴露了古典经济学观点的谬误。这种观点认为经济好比一部机器，任其自由运转，自然会恢复到均衡状态。

对于凯恩斯来说，大萧条就像是一道行动号令。他认为“真正的斗争”是在自由主义和军国主义之间，奉行前者的政府将和平、贸易自由及经济财富作为主要目标，而后者思考的“出发点是权力、威望、民族或个人荣耀、将一种文化强加于他人，以及世袭的或种族的偏见”。从某种意义上说，他想把资本主义从自身的不足中拯救出来。卡特认为凯恩斯的一生是努力“让伯克（Burke）务实及规避风险的反革命保守主义与卢梭提倡的激进民主理想相融合”。

鉴于凯恩斯今天的地位，人们很容易忘记在他活着的时候他的意见经常被无视。尽管他强烈反对，英国保守党还是在1925年恢复了金本位制。在1929年的选举中，他支持劳合·乔治（Lloyd George）领导的自由党，而当时该党正滑入衰败。罗斯福新政中的某些要素符合凯恩斯的主张，但这位总统却视凯恩斯为难以理解的神秘主义者。而在1944年的布雷顿森林会议上，凯恩斯对战后经济秩序的许多设想都被美国人否决了。

他最大的影响力产生于他去世之后。二战后的30年里，经济学界一边倒地采用了他的理念。正如卡特所说：“凯恩斯主义呈现出凯恩斯本人几乎都无法预料的生命力。”他的遗产受到他在剑桥大学的公共休息室和布鲁姆斯伯里沙龙（Bloomsbury）中磨练出来的才智和写作风格的影响。他表达自己的想法更多是用连珠的妙语，而不是数学公式。这在一定程度上导致他的代表作《就业、利息和货币通论》读来令人困惑。凯恩斯建议各国政府管理总需求或购买力，但并未确切说明该怎么做。他将充分就业奉为衡量政策成功的主要标准，但又没有定义何为充分就业。

明确界定凯恩斯主义的实则是他的同事，比如琼·罗宾逊（Joan Robinson）和约翰·希克斯（John Hicks），还有加尔布雷思（J.K. Galbraith）等学者。这套思想体系在上世纪六七十年代遭到了弥尔顿·弗里德曼、弗里德里希·哈耶克等人的抨击，他们认为凯恩斯主义导致政府对经济干预过多并长期存在通胀趋势。里根和撒切尔夫人主导了一个重大的转变，不再用财政政策来管理经济周期，而转向依靠货币政策。

卡特对这些反凯恩斯主义的做法嗤之以鼻。但是，读者肯定会想知道，本身靠投资收益维持自身生活方式的凯恩斯是否会赞成上世纪70年代中期的经济政策，那时英国的所得税最高达到83%，通胀超过25%。

在一段时间里，凯恩斯的主张曾被经济学主流摒弃，凯恩斯似乎将要沦为他本人曾经调侃的“过气经济学家”之一。但在21世纪，他的声望又得以重振。2009年，为应对金融危机，二十国集团（G20）政府达成一致，制定出协调统一的财政刺激方案——凯恩斯如果在世一定也会这样建议。新冠肺炎又带来了另一轮政府为避免经济萧条而做的干预。同时，自动化的普

及让人们对凯恩斯在《我们后代的经济前景》（*Economic Possibilities For Our Grandchildren*）一文中阐述的缩短工作时间的想法重新产生了兴趣。在未来几十年中，世界将继续就凯恩斯的著作展开辩论并从中学习。





Bartleby

Zoomers, zeros and Gen Z

The pandemic has widened divides in the labour market

COUNTRIES ARE beginning to emerge from economic lockdown. As they do, the statistics show how different segments of the population have been affected by the pandemic. And the evidence is clear that the virus has widened existing divides between professionals, low-paid workers and the young.

Start with the most fortunate. Many professionals can easily work at home, replacing one-to-one meetings with phone calls and group meetings with Zoom gatherings or Google hangouts. These “Zoomers” are mostly working on full pay and are currently being spared the daily commute. For them, the lockdown may be an inconvenience (particularly if they have children) but it is not a threat to their standards of living.

For many others, however, the pandemic is a serious threat. Some are key workers, who have to attend their jobs and are at more risk from the virus. Others cannot work from home and have either lost their jobs or seen their incomes cut (despite help from government schemes). Many in this group were already in a weaker position than the Zoomers, because they were in jobs with lower wages or less security.

Some people in this less fortunate group can be dubbed the “zeros”. In Britain, almost three-quarters of those on zero-hours contracts are key workers or work in shut-down sectors, says the Resolution Foundation, a think-tank.

A further clue to the toll on the low-paid came from the latest American non-farm payroll figures. Average hourly earnings rose by 4.7% in April, the

biggest monthly gain on record. That sounds like good news but isn't. It is the result of low-wage workers losing jobs in sectors like hospitality. The same trend can be seen in Britain, where the average wage of those in shut-down sectors is less than half of those working at home, according to the Resolution Foundation.

The mortality rates make even grimmer news. The low-paid (and ethnic minorities) have suffered most. Figures from Britain's Office for National Statistics showed that death rates of security guards, care workers and bus drivers were much higher than average, while those in "professional occupations" had death rates well below the mean.

Another great divide is between those already established in the workforce and Generation Z—those born in the late 1990s and early 2000s who are now coming of age. They are entering a job market extremely hostile to their prospects. Around 30% of British employees aged under 25 worked in one of the shut-down sectors, according to the Institute for Fiscal Studies, another think-tank, compared with 13% of those aged over 25.

Those in university education are also badly affected. For a start, it is harder to get work experience. In America 22% of employers have cancelled internship offers, according to the National Association of Colleges and Employers. In the first week of May just under 2,500 internships were posted on Monster.com, a recruitment website, compared with over 18,000 in the same week last year. Many of the remaining internships were in roles which could be done remotely. In Britain firms have cut entry-level jobs by 23%, says the Institute of Student Employers, a recruiters' association.

The short-term shock of the pandemic will leave long-term scars. The Resolution Foundation estimates that the pandemic means those emerging from education this year will be less likely to have jobs in three years' time. The likelihood of being in employment would fall by 13% for graduates and

37% for those with the fewest qualifications.

The effect could last into the 2030s. A study of the effect of recessions on younger workers by Bart Cockx of Ghent University in Belgium found that it takes about ten years for cohorts that enter the labour market during a downturn to catch up with cohorts that did not.

At least young people are far less likely to suffer severe symptoms from the virus than older generations. But the economic hit comes at a time when many already worry about the burden of student debt and the lack of well-paying jobs: a survey last year by Deloitte, a consultancy, found that a third of Gen Z-ers who planned to move jobs felt there were not enough opportunities to advance in their careers.

That the low-paid and the young are the hardest hit economically by the pandemic is a dark echo of the King James Bible: “But whosoever hath not, from him shall be taken away even that he hath.” The social and political consequences may be huge. ■



巴托比

Zoom族、zero人和Z世代

新冠疫情加剧了劳动力市场的分化

各国正开始重启经济。与此同时，相关统计显示，不同群体受疫情影响的程度各有不同。结果清楚表明，新冠病毒扩大了专业人士、低收入劳动者与年轻人之间已有的差距。

先说最幸运的那群人。很多专业人士可以轻松地在家里办公，用电话代替一对一面谈，用Zoom视频会议或谷歌环聊代替线下团队会议。这些“Zoom族”大多领着全薪，暂时还免去了每天的通勤之苦。对他们来说，禁足令可能会带来不便（尤其是有孩子的人），但不会影响自己的生活水平。

然而对其他很多人来说，疫情对他们的生活造成了严重威胁。其中一些是关键岗位人员，必须外出工作，因此感染病毒的风险更高。另一些人没法在家办公，要么失业，要么被减薪（即便有政府援助计划的帮助）。这个群体中的很多人在疫情之前就已经比Zoom族弱势，因为他们薪水较低，工作更不稳定。

在这个更不走运的群体中，一些人可以被称为“zero人”。据智库Resolution Foundation称，英国签订“零工时契约”（zero-hours contracts）的人群有近四分之三是关键岗位人员，或在因疫情关停的行业里工作。

最新的美国非农就业数据也反映出低收入者遭受重创。4月，平均时薪上涨了4.7%，创有记录以来的最大月度涨幅。这听上去像是好消息，实则不然。这是接待等行业的低收入劳动者失业所致。英国也呈现了同样的趋势，据Resolution Foundation称，那些停工行业的员工平均工资不到远程办公者的一半。

死亡率方面的消息更是令人沮丧。低收入者（和少数族裔）是最大的受害

者。英国国家统计局的数据显示，保安、护工和公交车司机的死亡率远高于平均水平，而“专业性职业”人员的死亡率远低于平均值。

另一个巨大分化出现在已在职场立足的人和“Z世代”之间。出生于上世纪90年代末到本世纪初的“Z世代”刚成年不久，正在进入一个对其前途极为不利的就业市场。据另一家智库英国财政研究所（Institute for Fiscal Studies）称，在英国，25岁以下雇员约有30%就职于陷入停工的行业，而25岁以上雇员的这一比例为13%。

受到严重影响的还有大学生。首先，他们更难获得工作经验。根据全美大学和雇主协会（National Association of Colleges and Employers）的数据，美国22%的雇主已经取消了实习岗位。5月的第一周，招聘网站Monster.com上发布的实习岗位不到2500个，而去年同期有1.8万多个。被保留的实习岗位的工作很多都可以远程完成。招聘者组织英国学生雇主协会（Institute of Student Employers）表示，在英国，公司已经削减了23%的初级岗位。

疫情的冲击虽然短暂，留下的创伤却会持续很久。Resolution Foundation估计，受疫情影响，今年的应届毕业生在三年内找到工作的可能性更小。毕业生的就业率将下降13%，而最低学历群体的就业率将下降37%。

这种影响可能会持续到本世纪30年代。比利时根特大学（Ghent University）的巴特·考克斯（Bart Cockx）研究了经济衰退对年轻劳动者的影响，发现在衰退期进入劳动力市场的人大约需要十年时间才能赶上在非衰退期进入的人。

好在“后浪”们成为新冠重症患者的可能性要比“前浪”小得多。但是，此次经济冲击来袭之时，很多年轻人已经在为沉重的助学贷款和缺乏待遇好的工作发愁：咨询公司德勤去年的调查发现，打算跳槽的Z世代中有三分之一感觉没有足够多的职业发展机会。

低收入人群和年轻人在经济上受疫情打击最重，这不幸地应了钦定版《圣经》中的那句话：“但凡没有的，连他所有的，也要夺去。”疫情的社会和

政治后果可能是巨大的。■



Sovereign-wealth funds

Raid on the piggy banks

Government kitties have gained clout in the past two decades. Now they face lean years—and potential cash grabs at home

EVERY OTHER Monday Kirill Dmitriev, the boss of the Russian Direct Investment Fund (RDIF), dials in to Zoom to chat with 15 peers from around the world. The hours-long calls often yield precious nuggets of information, both about the state of the pandemic and of financial markets.

Mr Dmitriev says he was convinced early on that the outbreak would be severe. RDIF, which manages \$50bn on behalf of the Russian state, has since invested in vaccine research and testing. It has also injected cash into private ventures like uchi.ru, an online-education platform, and ivi.ru, Russia's Netflix. Meanwhile other sovereign funds, such as Saudi Arabia's Public Investment Fund (PIF), have taken advantage of bargains in stockmarkets. In the first three months of the year PIF spent \$8bn buying up stakes in companies ranging from Boeing to Uber.

The world's 90-odd sovereign-wealth funds (SWFs) have gained significant clout in markets over the past two decades (see chart 1). Together they oversee more than \$8trn in assets, equivalent to around 10% of global GDP. The downturn presents them with an opportunity. Free of the liabilities burdening insurers or pension funds, they are immensely patient investors, and can snap up bargains. But the pandemic also introduces strains. As governments at home battle economic collapse, the SWFs are being urged to chip in, just as, for many, inflows from oil and commodity earnings have dried up. Such pressures could lead funds to change how they invest.

Cash-rich countries have been stashing their excess foreign currency in

kitties since the 1950s, when Kuwait launched its fund. SWFs often have two aims: to smooth out fiscal policy, by releasing cash when the weather turns, and to pass wealth on to future generations, in case luck (or oil) runs out. They grew fast in the 2000s, as China's hunger for raw materials and other goods fed surpluses in oil-rich states and export champions, and in the 2010s, when funds posted strong returns. Since 2015, for instance, PIF has made returns of nearly double its target of 4-5% a year, according to a source familiar with the fund.

SWFs have largely weathered this year's market rout. Most are notoriously opaque, but calculations by Javier Capapé of IE University for *The Economist* indicate that the biggest 15 funds, responsible for 80% of transactions, have made \$62bn in paper losses on their largest public-equity stakes so far. Two-thirds of that, though, is accounted for by China Investment Corporation, through which Beijing owns stakes in its top four banks. Other big funds have seen losses of less than a third of those in 2008. When asset prices peaked in early 2019, many started holding more cash than usual. A correction seemed due, says Angela Rodell, who runs Alaska's Permanent Fund (APF).

It helps that policymakers have, in effect, put a floor under stock prices. Governments have unveiled stimulus worth 3.8% of global GDP, more than twice that in 2008. But SWFs have grown savvier, too. The drubbing they took in 2008 led them to diversify, making portfolios resilient. Once obsessed with glitzy towers and football clubs, some have hired armies of investment bankers to make wiser picks. PIF has grown from 40 staff in 2016 to 700 today (though that has not stopped an iffy investment in Softbank's Vision Fund).

Markets now offer buying opportunities. SWFs have stuck to their "allocation targets", which dictate how much of their total assets they can invest in a given type of security. When listed stocks collapsed in March,

they rushed to buy some more. Bid-ask spreads—the gap between the prices at which investors want to buy and sell—widened, but transaction volume did not dry up, says Yngve Slyngstad, who runs Norway's \$1trn Government Pension Fund Global (GPF), the world's largest SWF, which owns 1.5% of all shares issued in the world.

PIF's recent purchases include a stake in Carnival, a cruise operator (whose share price jumped by 30% when the stake was disclosed in April). Others are betting on Chinese stocks, or privately held assets. James Burdett of Baker McKenzie, a law firm, saw a fund finalise a property-investment platform worth hundreds of millions of dollars weeks into the lockdowns.

Involvement in private markets carries risks, though. In recent years SWFs have piled into such illiquid assets (see chart 2). Where stocks go, unlisted assets often follow. Valuations are uncertain. Matt Whineray of NZ Super Fund, which owns farms and forests, says price ranges for these are now much wider. Low interest rates should push prices up; but investors are also more cautious, which pulls them down.

Another, bigger threat comes from governments. Gulf funds confess to having been asked to assist with covid-related bail-outs. An asset manager says some Asian funds have been coerced to fire-sell assets. Norway's fund expects to inject cash worth 4.8% of its assets into public coffers in 2020, above its usual limit of 3%. APF, from which the government already plans to withdraw \$3.1bn (about 5% of its assets), faces pressure to support struggling firms and pay three dividends to Alaskans this year, up from one.

The onslaught has yet to start in earnest. Instead of dipping deep into long-term savings, Gulf states, which enjoy good credit ratings, have issued billions of dollars in debt, says Jihad Azour, a former finance minister of Lebanon now at the IMF. But the longer the crisis, the greater the need, and the bigger the temptation.

The squeeze on SWFs is exacerbated by losses in revenues. GPF, which had expected to receive oil proceeds worth 2.5% of its assets going into the crisis, will see these fall to 1%. That implies net outflows in 2020, a situation Mr Slyngstad describes as “unusual”. Gulf SWFs are expected to slim down by more than \$300bn (roughly 15% of their assets) in 2020.

The pressure on incomings and outgoings could change the way the funds invest. SWFs will have to post nominal returns of 6-8% to avoid shrinking in the coming years, estimates Max Castelli of UBS, a bank. Slow growth and low interest rates make that a tall order. “If returns are not sufficient, we will see some liquidations,” says Mahmoud Mohieldin of the UN, who considered setting up a SWF for Egypt in the 2000s. Returns could also turn volatile if SWFs are nudged to invest more at home, making portfolios less diversified.

Large funds may also become more active investors. Because of their size, many tend to use a “core/satellite approach”. This allocates most of their assets to low-cost funds tracking indices and uses active investments to insulate their portfolios against long-term risks, like climate change, at the margin. The need for extra returns will demand more of the latter.

In one respect, at least, SWFs are ahead of the curve. Since 2014 one-fifth of their venture-capital investments have backed health-care startups—appetite for which is now proving contagious. ■



主权财富基金

抢砸储蓄罐

过去20年里政府储蓄罐的影响力日益增强。如今遇上了荒年，它们可能会被自家人抢砸

每隔一周的周一，俄罗斯直接投资基金（RDIF）的老板基里尔·德米特里耶夫（Kirill Dmitriev）都会拨入Zoom，与来自世界各地的15位同行聊天。长达数小时的通话通常能产生有关疫情和金融市场现状的宝贵信息。

德米特里耶夫说，他很早就深信疫情会很严重。RDIF也一早就投资了疫苗研究和测试，这个基金代表俄罗斯政府管理500亿美元资金。它还向在线教育平台uchi.ru和俄罗斯版奈飞ivi.ru等私营企业注资。与此同时，其他的主权财富基金，比如沙特阿拉伯的公共投资基金（PIF），则在股市抄底。今年前三个月，PIF斥资80亿美元购入了从波音到优步等公司的股份。

过去20年中，全球90多只主权财富基金在市场上获得了巨大的影响力（见图表1）。它们管理的资产总计超过八万亿美元，大约相当于全球GDP的10%。经济衰退为它们提供了机会。它们没有保险公司或养老基金背负的义务，是极为耐心的投资者，可以大举“捡便宜”。但疫情也带来了压力。由于各国政府都在努力防止国内经济崩溃，主权财富基金被敦促拿出钱来，而此时很多基金来自石油和大宗商品的收入又已枯竭。这种压力可能导致这些基金改变投资方式。

自1950年代科威特推出主权财富基金以来，现金充裕的国家一直在将多余的外币存放在这些基金中。主权财富基金通常有两个目标：在情况有变时释放现金来理顺财政政策，以及在好运（或石油）耗尽之时将财富传递给后代。它们在本世纪头十年迅速发展，当时中国对原材料和其他商品的巨大需求增加了产油和出口大国的盈余。在之后的十年里，它们收获了强劲回报，进一步扩张。举例来说，据知情人士透露，自2015年以来，PIF的回报率几乎两倍于其每年4%至5%的目标。

主权财富基金大体上经受住了今年的市场崩溃。众所周知，这些基金大多透明度很低，但本刊委托IE商学院（IE University）的经济学家哈维尔·卡帕佩（Javier Capapé）所做统计显示，迄今为止最大的15只主权财富基金（占交易总量的80%）在它们持股最多的上市公司股票方面有620亿美元的账面亏损。不过其中的三分之二都是中投公司的亏损（中国政府通过该公司持有其四大行的股份）。其他大型基金的亏损不到2008年的三分之一。资产价格在2019年初触顶时，许多基金开始持有比平时更多的现金。掌管阿拉斯加永久基金（APF）的安吉拉·罗德（Angela Rodell）说，看起来要开始调整了。

政策制定者对股市的托底实际上提供了帮助。各国政府推出的经济刺激措施总值占全球GDP的3.8%，是2008年的两倍多。但主权财富基金也变精明了。2008年遭受的打击促使它们展开多元化投资，让自己的投资组合更具韧性。这些基金曾经痴迷于投资浮华的摩天大厦和足球俱乐部，如今有些雇用了大批投资银行家，以期做出更明智的选择。PIF的员工从2016年的40名增至现在的700名（尽管这并没有阻止它对软银的愿景基金做出前途未卜的投资）。

现在市场上有很多买入的机会。主权财富基金一直坚守它们的“配置目标”，这决定了它们对某类证券的投资在总资产中的占比。3月上市股票暴跌时，它们蜂拥增持。买卖价差（即投资者愿意买入和卖出的价格之间的差距）扩大了，但交易量并未枯竭，英韦·斯林斯塔（Yngve Slyngstad）说。他管理的挪威政府全球养老基金（GPF）规模达一万亿美元，是全球最大的主权财富基金，持有全球1.5%的股票。

PIF最近买入的股票包括邮轮运营商嘉年华（该笔交易在4月披露时，嘉年华股价暴涨了30%）。其他主权财富基金选择押注中国的股票，或者私有资产。各地陆续封城的几周后，贝克·麦坚时律师事务所（Baker McKenzie）的詹姆斯·伯德特（James Burdett）协助某只基金敲定了一个价值数亿美元的房地产投资平台项目。

但是，参与私人股权市场也有风险。近年来，主权财富基金大量涌入此类

低流动性的资产（见图表2）。股市往哪里走，未上市资产往往也会跟上。估值飘忽不定。拥有农场和森林的新西兰超级基金（NZ Super Fund）的马特·惠纳瑞（Matt Whineray）表示，这些资产的价格范围现在扩大了很多。低利率会推高价格，但投资者也更谨慎了，这又压低了价格。

另一个更大的威胁来自政府。海湾各国的主权财富基金承认曾被要求协助针对疫情的纾困计划。一位资产经理说，一些亚洲的主权财富基金被强迫打折出售资产。挪威的主权财富基金预计2020年将把相当于其资产4.8%的现金注入政府财政，高于通常3%的上限。阿拉斯加政府已经计划从APF中提现31亿美元（约占其资产的5%）。该基金还面临压力，既要支持陷入困境的公司，又要在今年向居民分红三次（原本每年分红一次）。

大放血尚未真正开始。曾任黎巴嫩财政部长的IMF官员吉哈德·阿祖尔（Jihad Azour）说，享有良好信用评级海湾国家没有向长期储蓄伸手，而是发行了数十亿美元的债务。但危机拖得越久，需求就越大，动用这些储蓄的诱惑就越大。

主权财富基金受到的压力因收入流失而加剧。疫情之前，GPIF原本预计将获得相当于其资产2.5%的石油收益，但这项收益将降至1%。这意味着2020年将出现资金净流出，斯林斯塔认为这种情况“不同寻常”。预计在2020年，海湾国家的主权财富基金将缩水逾3000亿美元（约占其资产的15%）。

收入和支出的双头压力可能会改变主权财富基金的投资方式。瑞银的马克斯·卡斯特利（Max Castelli）估计，在未来几年内主权财富基金必须实现6%至8%的名义收益率才能避免缩水。缓慢的增长和低利率让这一任务显得十分艰巨。“如果回报不足，一些基金将面临清算。”联合国的马哈茂德·穆希丁（Mahmoud Mohieldin）说，本世纪初他曾考虑为埃及设立主权财富基金。如果主权财富基金被迫在国内开展更多投资，降低了投资组合的多元化程度，投资回报也可能变得不稳定。

大型主权财富基金也可能成为更活跃的投资者。由于规模大，它们中的许多常使用“核心/卫星策略”。这种策略把大部分资产分配给追踪指数的低成本基金，同时利用小部分主动投资来保证其投资组合免受气候变化等长期风险的影响。要提高回报就将需要增加主动投资。

主权财富基金的表现至少在一个领域领先于市场。2014年以来，它们五分之一的风险资本投资流向了医疗创业公司，而现在对这类企业的兴趣已经广泛蔓延。■



Schumpeter

The gathering swarm

Is now a good time to start a business?

A STRUGGLING Airbnb was still called AirBed&Breakfast when its founders decided to bet its future on the Democratic National Committee in Denver in 2008. Their air-bed idea was not popular with the 80,000 people congregated to select a presidential candidate. So they focused on breakfast instead, peddling \$40 boxes of cereals called Obama O's and Cap'n McCain's (their quip: "Be a cereal entrepreneur"). The timing was as bad as the pun. The event came just weeks before Lehman Brothers collapsed at the height of the financial crisis of 2007-09. Yet shortly afterwards they obtained their first-ever funding. The angel investor who backed them dubbed them "cockroaches" for their survival skills. That may not be the most tasteful way to describe people in the hospitality trade. The founders, though, considered it the best compliment they had ever received.

Like Airbnb, some of the best-known names in business started during steep slumps, including Uber (2009), Microsoft (1975), Disney (1923), General Motors (1908) and General Electric (1890). Disruptive products and services, too, have emerged in times of crisis, notably Apple's iPod as the dotcom bubble burst in 2000 and Alibaba's Taobao, an online-shopping mall, during China's SARS epidemic of 2003.

Such stories loom large in startup folklore as evidence of entrepreneurial true grit. Yet they are rarities. Our calculations indicate that among almost 500 of today's biggest listed firms in America, whose origins date as far back as 1857, a much larger number started life in expansionary years than during recessions. Of those founded since 1970, more than four-fifths were born in good times (see chart). That, of course, overlooks innumerable firms created along the way that have either not made it to the top, or fallen

by the roadside. But it suggests that however hard it is for the enterprising to build a lasting business, it is even harder for those who start off with the economic winds blowing in their faces.

Save for a few industries such as health care, it is safe to assume that investment in innovation will plummet during the covid-19 pandemic. It usually does in times of crisis. Venture capital (VC) will also dry up as everyone keeps their heads down and tries to preserve cash. In 2007-09, VC funding in America fell by almost 30%. Yet this column would not be named after Joseph Schumpeter, the father of creative destruction, if it did not believe that following a slump, a burst of entrepreneurial activity will eventually emerge. As he wrote in “The Theory of Economic Development”, published in 1911 (itself a recessionary year), “the very logic of the capitalist system [is that] after some time of depression, new entrepreneurs would emerge. And then there would be a new ‘swarm’ of entrepreneurs. A wave of prosperity would start up and the whole cycle would roll on.” Assuming this remains the case, will the protagonists be tiny startups coming out of nowhere? Will they be better-funded entrepreneurs who have long prepared for such a moment? Or will they be the titans of tech?

With the world in upheaval, enterprising minds are already whirring. Some of them are altruistic: schoolchildren, for instance, have been 3D-printing plastic visors for front-line workers. Some of them are saucy, such as the Thai bodybuilders, put out of work by lockdown, who last month set up Bsamfruit Durian Delivery, promoting it on Facebook not only with photos of durians and mangoes, but of taut abs and bulging bosoms. Some of them will simply be hungry for fame and fortune, believing, like Michael Moritz of Sequoia Capital, a VC firm, that social changes accelerated by the crisis, such as food delivery, telemedicine and online education, will eventually generate lucrative business opportunities. They will also expect the economic slump to wipe out incumbents, muting competition and freeing up space and manpower—provided governments do not interfere with the

inevitable by propping up zombie firms.

But even with the best ideas in the world, first-time entrepreneurs will struggle to convince investors to give them capital in the depths of the crisis, not least if they can only pitch to them over Zoom. Instead, the more likely standard-bearers of creative destruction will be existing firms, albeit small ones, which raised enough money before the crisis to survive it and will maintain their flair for innovation throughout, says Daniele Archibugi of Birkbeck, University of London. There may be plenty of such firms. According to Crunchbase, a data gatherer, startups raised about \$600bn worldwide in 2018 and 2019. That provides a cushion of support. They will, however, have to be quick at shifting from growth to survival and back again, and at embracing new business plans if their old ones are no longer viable.

| *Betting on an accumulator*

Yet it is not just small, scrappy firms that push innovation forward. Big firms have a critical role to play, too. Alongside creative destruction in times of crisis, Schumpeterian academics point to “creative accumulation” in economic upswings, when incremental innovation is carried out in the research-and-development labs of giant firms. In Europe during the global financial crisis such corporations increased investment into new products and ideas, as did the most innovative small firms. The cash-rich tech giants, such as Microsoft, Amazon, Apple and Alphabet, have become examples of creative accumulation, helping foster innovation during the good times. They will probably continue to do so during the crisis. As they expand into health care, fintech and other industries, they could even be part of a new wave of creative destruction.

That is the optimist’s scenario. A more pessimistic one is that big tech will use its moneybags and muscle to stifle competition, by buying or scaring off more enterprising rivals. What is in little doubt, though, is that the

covid-19 crisis, which has turned so many people's lives upside down, will eventually produce a wealth of new business opportunities. If it attracts swarms of entrepreneurs crawling over cosy oligopolies so much the better. But even if the tech titans prevail for now, they will inevitably find themselves victims of the forces of change. Schumpeter's "perennial gale of creative destruction" will one day blow them away, too. ■



熊彼特

蜂拥而至

创业正当时？

回到2008年，艰难求生的爱彼迎当时还叫作AirBed&Breakfast（充气床垫和早餐），几名创始人决定把公司的未来押注在民主党全国代表大会（Democratic National Committee）上。当时有八万人汇集在丹佛选举民主党总统候选人。然而充气床垫的创意并没有受到这些人的青睐。于是他们把重点转向早餐，把麦片取名为“奥巴马奥氏麦片”和“麦凯恩队长麦片”，以40美元一盒的价格兜售（他们打趣说要“做麦片创业者”）。“麦片创业者”（cereal entrepreneur）正好和“连续创业者”（serial entrepreneur）谐音，他们的创业时机正应了这倒霉的双关语。几周后，也就是2007到2009年金融危机最严重的时候，雷曼兄弟破产。但不久之后，他们终于获得了第一笔投资，那位天使投资人称他们为“（打不死的）小强”。对于本身是做招待行业的人来说，这可能不是什么雅称。但几位创始人却认为这是自己受到的最高赞誉。

和爱彼迎一样，商业界一些最知名的公司都起步于经济急剧下滑的时期，包括优步（2009年）、微软（1975年）、迪士尼（1923年）、通用汽车（1908年），以及通用电气（1890年）。一些颠覆性的产品和服务也兴起于危机时期，突出的例子有2000年互联网泡沫破裂时的苹果iPod，以及2003年中国非典期间阿里巴巴旗下的在线购物商城淘宝网。

这类故事是关于创业公司的传说中重要的篇章，显示了创业者的勇气和毅力。然而这种情况只是凤毛麟角。根据本专栏的统计，在当今美国最大的近500家上市公司中（其中历史最久的可追溯到1857年），起步于经济扩张期的远多于经济衰退期。而在1970年以后创立的公司中，超过五分之四都诞生在繁荣期（见图表）。当然，这里忽略了期间成立的大量没能成为翘楚或半途夭折的公司。但这表明，满怀开拓精神的人们要打造一家长寿的公司固然万分艰难，但更难的还是那些一起步就迎面遭遇了经济寒风的创业者。

可以肯定的是，除了医疗保健等少数行业外，新冠肺炎疫情期间对创新的投资会大幅下降。这是危机时期的惯例。所有人都保持低调，并尽可能持有现金，风险投资因而也会越来越少。2007到2009年，美国的风险投资下降了近30%。然而，如果本专栏不认同在衰退期之后最终会涌现一波创业潮，就不会以“创造性破坏之父”约瑟夫·熊彼特为自己命名了。正如熊彼特在1911年（也是一个衰退的年份）出版的《经济发展理论》（The Theory of Economic Development）一书中所说：“资本主义的逻辑正是一段时期的萧条过后，就会出现新的创业者。然后就会有‘一大群’新的创业者。一波繁荣会开启，整个经济周期会继续下去。”如果这个说法仍旧成立，那么主角会是那些不知道从哪里冒出来的小创业公司吗？或是那些早就在为这一刻做准备的资金更充足的企业家？抑或是那些科技巨头？

在这个剧变的世界里，那些有开拓精神的人已经开始忙活起来。有些无私地帮助他人，比如为一线工作人员制作3D打印塑料面罩的小学生。有些很调皮，比如因禁足令而停业的泰国健身教练4月创立了外卖网站Bsamfruit Durian Delivery，他们发在Facebook上的宣传照中不仅有榴莲和芒果，还有紧实的腹肌和凸起的胸肌。还有一些就是为名为利，比如风险投资公司红杉资本（Sequoia Capital）的迈克尔·莫里茨（Michael Moritz），他们认为外卖、远程医疗和在线教育等因疫情而加速发展的社会变革最终会带来利润丰厚的商业机会。他们还预计，如果政府不通过扶持僵尸企业来干预自然过程，经济萧条将会摧毁既有企业，进而减少竞争，释放出市场空间和劳动力资源。

但是，即便拥有世界上最好的创意，首次创业者还是很难说服投资者在疫情深重之时给自己投钱，尤其是如果他们只能在Zoom上自我推销的话。更有可能成为创造性破坏领袖的是那些已经存在而规模不大的公司，它们已经在疫情来袭前筹集了足够的资金来扛过危机，又能自始至终保持自己的创新天赋，伦敦大学伯贝克学院（Birkbeck, University of London）的达尼埃尔·阿尔基布吉（Daniele Archibugi）表示。这样的公司可能有很多。数据公司Crunchbase估计，2018和2019年，创业公司在全球筹集了大约6000亿美元。这为它们提供了缓冲。不过它们必须快速从扩展转向生存再转回，并在旧的商业计划不再可行的情况下快速采取新计划。

| 累积下注

不过，推动创新的并不仅仅是那些斗志昂扬的小公司。大公司也扮演着关键角色。除了危机时期的创造性破坏，熊彼特主义的学者还提出经济上升时期的“创造性积累”，即在巨头企业的研发实验室中展开渐进性创新。在全球金融危机时期的欧洲，这些大公司像那些最具创新精神的小公司一样加大了对新产品和新创意的投资。微软、亚马逊、苹果和Alphabet等现金充裕的科技巨头已经成为“创造性积累”的典范，在繁荣时期帮助促进创新。而在此次疫情期间它们很可能也会继续扮演这种角色。随着它们向医疗保健、金融科技等其他行业扩张，它们甚至可能加入到新一波创造性破坏的浪潮之中。

这是乐观主义者的设想。更悲观的预期是，大型科技公司会利用自己的财力和影响力，通过收购或吓跑更多有开拓精神的手对手来扼制竞争。但几乎毋庸置疑的是，令很多人的生活完全乱了套的新冠疫情最终会带来大量新商机。如果它能让大批创业者蜂拥而至，和养尊处优的垄断寡头展开竞争，那就更好了。但即便科技巨头暂时占了上风，它们也会不可避免地发现自己沦为变革力量的牺牲品。熊彼特所谓的“创造性破坏的永恒风暴”总有一天也会将它们吹翻。 ■



The World Trade Organisation

Trading places

A memo to Roberto Azevêdo's prospective successor

SO YOU WANT to be the next director-general of the World Trade Organisation (WTO). If successful, you will lead one of the world's big multilateral institutions and rub shoulders with heads of state. The tax-free salary and benefits are cushy. But that is where the perks end. Here is what you can expect from the job.

Trade in goods could fall by as much as a third this year. Even before covid-19, the trade rule book was in tatters. The pandemic seems set to make protectionist barriers rise even faster. Australia and China are squaring off. This, you might think, is your moment to shine. You might hope to broker grand deals, or, at the very least, to fix the WTO's system of settling disputes.

We suggest you manage those expectations—all the way down. Roberto Azevêdo, the departing director-general, was respected by members. But he found his diary emptying faster than a shipping broker's order book. "There's nothing happening in terms of regular work" at the WTO, he told Bloomberg recently. He is leaving a year before his term's up. Forget building a new architecture of the global trading system, or haranguing members into lowering tariffs. If the WTO's members do not want something, it will not happen. Your job instead is to focus on the smaller fry. Talks to limit subsidies for fisheries were the only ones going anywhere in recent months. Full steam ahead? Afraid not. They stalled on May 7th.

You will discover that the WTO would be a marvellous institution were it not for its members. The poor ones want exemptions from rules that have not yet been written. The rich ones are loth to make the concessions

needed to get anything done. Some of America's lawmakers want to withdraw from the organisation (a "relic") altogether. You might find yourself wishing they just got on with it. But their heft makes them useful, when they choose to be.

Be cautious, like Mr Azevêdo, and you will be accused of getting too little done. Be ambitious, and, like his predecessor Pascal Lamy, you will be attacked for alienating members—and also for getting too little done. Best to expand your definition of success to include vaguely worded joint statements calling for free and fair trade.

To become a candidate, a member must put you forward before July 8th. The winner must be agreeable to America, Europe and China. If such a person even exists, it probably won't be one of their own. Perhaps that clears the way for the first African boss. Names being floated include Amina Mohamed, Kenya's former WTO ambassador, and Yonov Frederick Agah, a Nigerian and Mr Azevêdo's deputy.

The Americans and the Europeans say they want to arrange a speedy replacement for Mr Azevêdo, who leaves on August 31st. But if the WTO's past trade rounds are a guide, resolution won't be swift. Many members will stall, in case Donald Trump loses America's presidential election. Prepare to wait for months, even years.

A quick approval, against those odds, could mean that members want to save the institution. Or it could mean that you are bland enough that no one could rouse themselves to object to your appointment: a sorry form of comparative advantage. ■



世贸组织 换位子

给罗伯托·阿泽维多未来继任者的一份备忘录

想成为WTO下一任总干事？若成功争取到这份工作，您将领导世界大型多边机构之一，与各国元首打交道。工资免税，福利也很优厚。但好处也就这么多了。以下是您做这份工作将要面对的。

货物贸易今年可能缩减三分之一之多。甚至在新冠疫情爆发之前，贸易规则就已被冲击得支离破碎。疫情似乎势必会进一步加速保护主义壁垒上升。澳大利亚和中国正在拉开架势。您也许认为这正是自己发光发亮的时刻。你可能希望能斡旋其中，协助打造大型贸易协议，或者最起码修复WTO的争端解决机制。

我们还是建议您控制住这样的期望——把它们放到最低。即将离任的总干事罗伯托·阿泽维多（Roberto Azevêdo）过去受到成员们的尊重，但他发现自己日程本的清空速度比货运经纪的订单还快。近期他对彭博社表示：“WTO在常规工作方面毫无进展。”他将提前一年结束任期。请您放弃打造全球贸易体系新架构的想法，也别想着能靠长篇大论、慷慨陈词说服成员国降低关税。成员国不想要的东西实现不了。相反，您的工作应该是专注于一些小鱼小虾。限制渔业补贴的谈判是近几个月来唯一有所进展的工作。是全速前进了吗？恐怕没有。这些谈判在5月7日也陷入了停滞。

您会发现，要不是成员国的缘故，WTO会是一个了不起的机构。穷国希望从尚未制定的规则中获得豁免。富国讨厌要用让步换取任何进展。美国一些议员说WTO是旧时代的“遗物”，主张退出该组织。也许您希望他们干脆就退了，但他们的影响力又很有用，如果他们愿意配合的话。

如果像阿泽维多那样谨慎行事，您会被指责无所作为。如果像他的前任帕斯卡尔·拉米（Pascal Lamy）那样雄心勃勃，您又会因为开罪成员国而遭受攻击——以及被指责无所作为。最好拓宽对政绩的定义，把措辞含糊的

呼吁自由公平贸易的联合声明也算在里头。

要成为总干事候选人，必须有一个成员国在7月8日前提名您。胜出的必须是美国、欧洲和中国都认可的人。如果真有这样的人，大概不会来自这三个地方。也许这为WTO选出首位非洲总干事扫除了障碍。被提出的人选包括肯尼亚前WTO大使阿米娜·穆罕默德（Amina Mohamed）和阿泽维多的副手、尼日利亚人尤努夫·弗雷德里克·阿加（Yonov Frederick Agah）。

美国人和欧洲人说，他们想要安排迅速落实人选，接替将于8月31日离任的阿泽维多。但如果是按WTO过去的贸易谈判回合的节奏，达成决议不会一蹴而就。许多成员国会拖延时间，看看特朗普是否会在总统大选中落败。这一拖可能就是几个月，甚至几年。

假如面对种种不利因素，继任人仍被迅速确定，那可能表明成员国希望拯救这个机构。不然就是因为您乏善可陈到谁都懒得反对：一种可怜的优势。■



Covid-19's many faces

The body snatcher

Why does covid-19 have such varied manifestations?

ACCORDING TO England's National Health Service the signs that someone has contracted the novel coronavirus SARS-CoV-2 are a high temperature or a new, continuous cough. This is certainly true for a majority of patients, but it is not so for a sizeable minority. Papers published in recent weeks present the new virus as having many faces. This is in stark contrast to the way in which influenza, another primarily respiratory disease, behaves—and it makes SARS-CoV-2 all the more dangerous. It also raises the question of why this virus's symptoms are so protean.

For decades, influenza has been referred to as “an unvarying disease caused by a varying virus” because of its tendency to mutate every year and yet still cause the same symptoms of rapid-onset fever, malaise, headaches and coughing. Indeed, a review of influenza papers published in 2018 by John Paget of the Netherlands Institute for Health Services Research, showed that even when all of the different influenza types (A or B) and subtypes (H1N1, H3N2, etc) were analysed, there were few differences in the ways they presented clinically. Literature on SARS-CoV-2 suggests, by contrast, that this virus is a master of disguise.

For example, Anthony DeBenedet, a doctor at St Joseph Mercy Health System in Michigan, reports in the *American Journal of Gastroenterology* that in early March, following a trip down the Nile, a 71-year-old woman arrived at his emergency department with bloody diarrhoea. She suffered with this condition for five days, while also experiencing abdominal pains and nausea. But her temperature was normal and her breathing good, so covid-19 was not suspected. Yet when he and his colleagues examined samples of her stools for signs of the sorts of bacterial infections that are

likely to be picked up in Egypt, they found none. They also saw no beneficial effects from the antibiotics they were administering. They therefore started to wonder whether something else might be going on. It was only on the fourth day of the woman's stay at the hospital, her ninth day of illness, when she developed a cough, that they tested her for SARS-CoV-2 and confirmed the virus's presence in both her nasal tissues and her stools.

Dr DeBenedet's findings are far from unique. Patients brought into hospital with all the symptoms of a heart attack have later been found to be suffering from cardiac inflammation caused by the virus. It has also demonstrated that it can begin as a kidney infection, or even as meningitis, before sometimes going on to cause its characteristic respiratory problems.

| *Variations on a theme*

Precisely why SARS-CoV-2 manifests itself in so many ways while all of the various strands of influenza present the same symptoms is not clear. But there are several theories. One proposed by Stanley Perlman, an immunologist at the University of Iowa, is that in actual fact, nothing odd is really going on. The novel virus's many faces are being noticed merely because it is a new disease and dangerous, and so is being studied intensely. He postulates that if influenza were looked at with equal intensity, it might also be shown to manifest in other ways—as a mild winter stomach infection, for example.

An idea suggested by William James, a virologist at the University of Oxford, is that the two-phase activity of SARS-CoV-2, whereby it starts in the upper respiratory tract and then migrates deep into the lungs, is the critical factor that allows it to travel around the body. "Influenza rarely gets deep into the lungs," he says. "This new virus gets down there all the time." Since the lungs are designed to move gases in and out of the bloodstream (their highly vascularised air sacs have a collective surface area of about 50

square metres), viruses find it easy to make a similar journey.

Dr Perlman agrees that this notion may be correct, but points out that the only way to be sure is to take samples from places other than the respiratory tract, in people suffering from early stages of the infection, to see if virus migration depends on getting to the lungs first. As for why the disease sometimes makes its initial appearance in the digestive system, as it did in Dr DeBenedet's patient, this is probably because ACE2, the cell-surface protein that SARS-CoV-2 binds to, is abundant in the gut as well as the lungs. How the virus gets through the highly acidic stomach unharmed is unknown. But clearly it can, and does.

ACE2 is also found in the kidneys and the heart, which may help explain why symptoms manifest there, as well. By contrast, the entry molecules preferred by influenza viruses are almost exclusive to the upper respiratory tract. Knowing all this may make identification of the early stages of covid-19 easier, and thus help to ease the plight of future cases like that of Dr DeBenedet's patient. ■



百变新冠

变形附体

新冠肺炎的症状为何如此多变？

根据英国国家医疗服务体系（NHS）的说法，感染新冠病毒的症状是发烧或新发的持续咳嗽。大多数患者确实有这些症状，但相当一部分患者不然。最近几周发表的论文表明这种新病毒有很多面相。这与另一种主要呼吸道疾病流感的特点形成了鲜明对比——也让新冠病毒愈发危险。这同时也引发了疑问：为什么这种病毒的症状如此变化无常？

几十年来，流感一直被称作“由一种不断变异的病毒引发的症状不变的疾病”，这是因为尽管流感病毒往往每年都发生变异，它引发的症状却仍然是急性的发热、乏力、头痛和咳嗽等。荷兰卫生服务研究所

（Netherlands Institute for Health Services Research）的约翰·佩吉特（John Paget）回顾了2018年发表的有关流感的论文后发现，即使把不同的流感类型（甲型或乙型）和亚型（H1N1、H3N2等）都一起分析，它们的临床症状也没什么差异。相比之下，有关新冠病毒的文献表明这种病毒是伪装大师。

例如，密歇根州圣约瑟夫·梅西医疗系统（St Joseph Mercy Health System）的医生安东尼·德本尼德（Anthony DeBenedet）发表在《美国胃肠病学杂志》（American Journal of Gastroenterology）上的文章中有这样一个病例：3月初，一位71岁的妇人从尼罗河沿线旅行回来后，因血性腹泻来到他的急诊室。她的这个症状已持续了五天，同时伴有腹痛和恶心。但她体温正常，呼吸顺畅，因此没有怀疑到新冠肺炎上面去。但是，当他和同事化验了她的粪便样本后，并没有发现任何在埃及容易“中招”的那些细菌感染的迹象。而且给她开了抗生素也没什么用。因此他们开始怀疑是其他问题。直到这位女患者住院的第四天，也就是患病的第九天，她开始咳嗽了，他们这才对她做了新冠检测，并证实她的鼻腔组织和粪便中都存在这种病毒。

德本尼德的发现远非特例。有的病人因为全然是心脏病发作的症状送医，后来却发现是新冠病毒引起的心脏炎症。感染的初期症状还可能是肾脏感染、甚至是脑膜炎，之后一些人才会出现典型的呼吸系统问题。

| 主题变奏曲

究竟为何新冠病毒的症状如此多种多样，而所有不同类型的流感症状相同，目前尚不清楚原因。但有几种理论。爱荷华大学的免疫学家斯坦利·珀尔曼（Stanley Perlman）认为实际上这并不奇怪。人们会注意到新冠病毒面孔百变，仅仅是因为它是一种新的疾病而且危险，因而被深入研究。他推测，如果对流感也做同样细致的研究，可能也会发现其他症状，例如冬季轻度的胃部感染。

牛津大学的病毒学家威廉·詹姆斯（William James）的看法是，新冠病毒的活动分两个阶段，从上呼吸道开始，然后深入到肺部，这是它能到达全身各处的关键原因。“流感很少发展到肺部，”他说，“而新冠病毒总是能进入肺部。”由于肺的功能是运输气体进出血液（被血管环绕的肺泡的总表面积约为50平方米），病毒很容易展开相同的旅程。

珀尔曼认为这种看法可能是对的，但他指出，若要完全确定这一点，唯一的方法是从处于感染早期的患者的呼吸道以外的地方取样，以查看病毒在迁移前是否一定会先进入肺部。至于为什么有时这种病会像德本尼德的患者那样先出现消化系统的症状，则可能是因为ACE2这种新冠病毒与之结合的细胞表面受体蛋白在消化道和在肺部一样广泛存在。尚不清楚病毒如何能经过酸性很高的胃部而不受损伤，但显然它有这个能力，也确实发生了。

ACE2还存在于肾脏和心脏中，这可能有助于解释为什么那些地方也会出现症状。相反，流感病毒在进入人体时的受体分子几乎是上呼吸道所独有的。了解这些也许会让医生更容易识别新冠肺炎的早期症状，从而帮助像德本尼德的病例那样的患者。■



Television

Medium and message

How technology and business models shape what TV shows look like

“LES AMOURS de la reine Élisabeth” (The Loves of Queen Elizabeth), starring Sarah Bernhardt, had four acts. So do many dramas—but in this case the narrative arc was partly dictated by pedestrian concerns. When the film opened in New York’s Lyceum theatre in 1912 it came in four reels. Projector operators needed intervals to switch from one to the next. In the past century technology and business models have helped shape the message in moving pictures—nowhere more so than in television. Online streaming is no different.

As TV conquered Western homes in the 1950s shows came in two main durations: half-an-hour and an hour. In America this gave producers 20-odd or 40-odd minutes to play with after setting aside time for ads; of the 173 episodes of “Seinfeld”, a sitcom that ran from 1989 to 1998, all but the two-episode finale were 22 or 23 minutes long. Commercial breaks, for their part, shaped episode cadence: you could expect a mini-cliffhanger ahead of one. Like HBO and other pay-TV channels, most streaming services earn money from subscriptions, not ads, so creators enjoy more artistic licence to determine episode length and structure, says Jonathan Dunn of McKinsey, a consultancy. “Tiger King”, Netflix’s latest hit true-crime series, about exotic-cat breeding, comes in chunks lasting anywhere between 40 minutes and 48 minutes.

The medium also determines the structure and number of shows’ seasons. As the number of American commercial TV stations increased from fewer than 600 in 1965 to 1,600 in 2000, they needed more shows to fill schedules. Since new ones are risky bets, broadcasters preferred to stick to existing programmes. Episode counts went up, boosted by syndication

contracts, which generally stipulated that after a show had aired for a certain number of episodes, usually 88 (or four seasons), the rights to air it could be sold to third parties.

Streaming services like Netflix take the opposite tack to syndication, luring viewers with fresh content that cannot be found elsewhere. Many of the 10m people who signed up for Disney's new streaming platform by its first day last November probably did so to watch "The Mandalorian", a Star Wars spin-off. In the first nine months of 2019 seven of Netflix's ten most-watched original shows were in their debut season. Unless a show is a mega-hit like HBO's "Game of Thrones", explains Leigh Brecheen, an entertainment lawyer in Hollywood, it now makes more financial sense to produce something new rather than renew something old.

The upshot of the shift away from syndication and towards streaming has been a decline in the average number of episodes per season. Based on figures for 34,000 TV shows worldwide that debuted between 1955 and 2018, compiled by the TVDB, a website, this fell from over 20 to under 11 (see chart). The number of seasons per series dropped, too, by nearly 70%.

Many actors, producers and writers love these abridged runs because they give them the flexibility to take other jobs. Creators also no longer need to worry that their shows will one day be aired sporadically through syndication, so are free to let plots unspool over multiple episodes. Sitcom episodes remain mostly self-contained but serialised drama is "uniquely suited" for streaming, says Sandra Stern of Lionsgate, a production company. The internet has also enabled "binge-watching", which Netflix pioneered with the release of the entire first season of "House of Cards", a political thriller, on February 1st 2013. Binge-friendly platforms allow viewers to skip the opening and final credits—and encourage creators to start with a bigger bang and end hanging on a steeper cliff. ■



电视

媒介与讯息

技术和商业模式如何塑造电视节目的面貌

由萨拉·伯恩哈特（Sarah Bernhardt）主演的《伊丽莎白女王情事》有四幕。许多戏剧也是如此。但这部影片之所以会有这样的叙事结构，一定程度上却是由很庸常乏味的因素决定的。1912年它在纽约的吕克昂剧院上映时有四卷胶片，放映员从一卷换到下一卷会使得播映中断一小会儿。在过去的一个世纪里，技术和商业模式帮助塑造了移动影像的内容，尤其是电视。在网上看剧也不例外。

随着电视在上世纪50年代征服了西方家庭，电视节目主要以两种时长呈现：半小时和一小时。在美国，留出广告时间后，制片人就有了20几分钟或40几分钟的时间来播放节目。1989年至1998年播出的情景喜剧《宋飞正传》有173集，除了最后一集分上下两集外，其余都是22或23分钟。而广告时间也影响了单集节目的节奏：在进入广告前，你一般都会看到一个小悬念。咨询公司麦肯锡的乔纳森·邓恩（Jonathan Dunn）表示，与HBO和其他付费电视频道一样，流媒体服务大多是靠订阅而不是广告来赚钱，创作者因而享有更大的发挥空间来决定单集的长度和结构。奈飞（Netflix）关于驯养稀有猫科动物的最新热门真实犯罪剧集《养虎为患》（Tiger King）单集时长在40分钟到48分钟之间。

播放媒介也决定了剧集全季的结构和季数。美国商业电视台的数量从1965年的不到600家增长到2000年的1600家，它们需要更多的内容来填满节目表。押注新剧有风险，因此广播公司倾向于固守现有的剧集。在分销（syndication）合同的推动下，剧集的集数增加了。这类合同通常规定，一部剧播出一定集数后——通常是88集（或四季）——播出权可以出售给第三方。

像奈飞这样的流媒体服务采取了与分销相反的策略，用别处找不到的新鲜内容来吸引观众。去年11月，迪士尼的新流媒体平台在上线第一天吸引了

1000万人注册，其中许多人可能是为了观看《星球大战》的衍生剧《曼达洛人》。2019年的前九个月，奈飞观看量前十的原创剧集有七部是新剧。好莱坞的娱乐业律师利·布雷肯（Leigh Brecheen）解释说，从赚钱的角度来讲，如今制作新东西比炒冷饭更明智，除非是像HBO的《权力的游戏》那样的大热剧。

从分销向流媒体转变的结果是每季的平均集数减少了。从TVDB网站汇编的在1955年至2018年间首播的全球3.4万部剧集的数据来看，每季平均集数从20多降至不到11（见图表）。每部剧的季数也减少了近70%。

集数缩减受到许多演员、制片人和编剧的欢迎，因为这给了他们接受其他工作的灵活性。创作者也不用再担心自己的剧某天会通过分销断断续续地播出，因此可以自由地让情节在好几集内徐徐展开。制作公司狮门

（Lionsgate）的桑德拉·斯特恩（Sandra Stern）说，情景喜剧单集的剧情大多仍旧是独立的，但连续剧“特别适合”流媒体。互联网也让“刷剧”成为可能。奈飞在2013年2月1日将政治惊悚片《纸牌屋》第一季整季放出，率先开创了这一观剧形式。方便刷剧的平台让观众可以跳过片头和片尾的演职员表——并鼓励创作者在开局激起更大的水花，并以更扣人心弦的悬念收尾。■



After covid-19

The dark side

Can China be trusted to be a responsible financial power?

CAUSEWAY BAY is back in business. Even as the world shuts down, the retail heart of Hong Kong, which enforced an early lockdown, is beating again. Yet normality is not complete. The local branch of ICBC, a symbol of Beijing's sway, remains barricaded. Its managers fear that pro-democracy protesters, free after weeks of quarantine, might target it again. This points to a tension within China's global ambitions. Its political system can suppress problems fast by mobilising everything in the pursuit of one goal. But it also creates crises—and lets them fester.

Trust is what binds the financial system together. Economic agents need to be convinced, not coerced. But like many China watchers in other spheres, they remain both awed by its formidable rise and doubtful it cares about the common good. "People think it is like the Death Star from "Star Wars". It is this massive, inscrutable thing sitting up in the sky that has the potential to destroy us all," says Jan Dehn of Ashmore Group, a fund manager. Can they trust the regime whose attempted cover-up let the virus escape in the first place?

A partial schism in the world's financial system will be hard to arrest. Economic weapons are cheap and require few permissions, so American presidents will continue to like them. The longer they last, the more workarounds get entrenched. Until recently these were too haphazard to really matter, but China, whose economy could soon surpass America's, has the muscle to create the markets and norms that bring alternative worlds to life. And it is concentrating its charms on the emerging world, whose lesser sense of loyalty to Western structures could make it easier to peel off.

Sceptics doubt a country with both a current-account surplus and strict capital controls can provide the world with a reserve currency. But China's surplus has shrunk vastly since its peak in 2007. A deficit is likely to become the norm. Its ageing population is saving less. Beijing wants more domestic consumption, which will boost imports. And stagnant Western economies will mean sluggish exports. Morgan Stanley reckons China will require \$210bn a year in net foreign inflows between now and 2030 to plug the gap.

That, in turn, should push it to further liberalise its financial markets. Blanket deregulation is unlikely, but steps to boost liquidity, like better market infrastructure and fairer pricing, will help. And China's capital controls are already easing. Domestic savers are still caged in, but foreign investors say they have no trouble getting money out, even during market routs. Reserve managers see value in the currency stability that limited controls afford. So full convertibility may not be needed for the yuan to gain fans. In time party leaders in Beijing may well decide for it, especially if it has attracted enough sticky money to feel comfortable.

A more diverse financial system has benefits. Relying on a single dominant currency threatens the world with cash crunches in times of crisis. More efficient cross-border payments drive down costs. Duplication makes the overall infrastructure more resilient.

| *Decoupling or deglobalisation?*

There are also encouraging shifts in how China connects with the system. It has become the world's third-largest creditor, up from 16th in 2005. And though foreign-exchange reserves were its largest type of investment overseas until 2016, its private foreign investment assets—worth \$4.2trn—now beat its central bank's stash of FX. This is a more productive use of money. The opening of its financial industry will allow its troves of savings to be better allocated. The growth of its financial markets provides

more choice to international investors. Short of over-reaction in Washington, a decoupling of finance need not mean full deglobalisation.

Nevertheless it brings three dangers. The first is that it accelerates the balkanisation of financial markets initiated a decade ago. Most countries reacted to the financial crisis by enacting new regulations. Many have made the system safer. Yet watchdogs have sometimes seemed more motivated by a will to restore local control than foster global resilience. “Ring-fencing” forces global banks to establish subsidiaries, which are under the watch of local regulators, rather than just branches. Extraterritoriality imposes layers of obligations on foreign banks.

More divided markets may help stem contagion during crises. But they also prevent financial institutions from diversifying portfolios, which can concentrate risks. And they trap excess savings, blocking the money from being invested where there is a shortage of it, says Jose Viñals of Standard Chartered, a British bank.

Geopolitical tensions have supported that drift. Covid-19, which focuses minds and money closer to home, could give it another push. That will not come cheap. A survey in 2018 found that fragmentation already shaves nearly 1% off global GDP. Policies that compel firms to relocate their data within a country’s borders, which already exist in China, India and others, could reduce future gains from digitalisation and fragment markets further.

“Localisation” rules also prevent data-sharing for risk-management purposes, pointing to the second danger: that a broken-up system will be less secure. Multiple links between banks and fintech firms offer more points of entry for cyber-crooks. Dependencies are building upon nodes that are not regulated and are poorly understood, creating room for systemic breakdowns.

The third, and biggest, risk lies in relying on an apparatus with two heads but without a benevolent leader. Notwithstanding crises, the dollar system enabled decades of sustained growth. Yet America sometimes appears less interested in the common good than the rent it can extract from its dominance of the system. Last August several lawmakers sponsored a bipartisan bill proposing that the Fed taxes foreign capital inflows to help weaken the dollar. Such actions hint at the fraying consensus in Washington about the trade-offs that come with being a financial hegemon.

In contrast China says it is ready to embrace leadership. It responds to Washington's attacks with offers of collaboration. Despite huge balance-sheets, its banks have shied away from trying to buy European rivals. Yet as in business, diplomacy and most terrains where China's footprint looms large, questions linger. It is opening up its markets, but new entrants are unsure if unwritten rules might block them. Regimes allowing foreign investors to recoup collateral if companies default are untested. China lacks a free press, common law and a judiciary that might protect the public interest and restrain land grabs by the state.

Left unaddressed, those doubts could limit Beijing's sphere of financial influence to being a satellite system, as many market participants choose to stick with the devil they know. That world would be suboptimal in many ways. Porosity between that Chinese sphere and the dollar system would be limited, obstructing capital flows. Feeling more anxious about China, America may try to tilt the current structure even further in its favour.

There is a different path. China can choose to reassure the financial community that it will not seek to hide truth when there are problems in the system, and that it will act promptly—but within commonly accepted rules—to solve them. It must show that it is ready to respect the rights of those who choose to trust it, even when they run contrary to its interests. Western-led institutions can help, by recognising the status it is owed. So

will time, as finance folks exposed to Chinese assets and systems find out not just that profits are good, but also that promises are met.

By many measures, America is becoming an ever smaller part of the global economy. The laws of gravity dictate that its ability to be the world's sole central banker, sooner or later, will ebb, and that China will fill part of the vacuum. Much better for both powers to peacefully coexist and collaborate than barricade themselves in their own incomplete universes. ■



新冠肺炎之后 阴暗面

可以信赖中国成为负责任的金融大国吗？【专题报道《国际银行业》系列之五】

铜锣湾重新开张了。虽然世界停转，香港这颗早早实施了封锁的零售心脏又开始跳动。但还没有完全恢复常态。工商银行在香港的分支机构——北京影响力的象征——依然被路障阻隔。它的管理者担心，经过数周的隔离后重获自由的民主派示威者可能会再次将它作为目标。这表明中国的全球野心内部也存在矛盾。它的政治制度可以集中力量办大事，迅速压制问题。但它也造成危机——并任其恶化。

把金融体系凝聚起来的是信任。经济行为者需要被说服，而不是被强迫。但是，就和其他领域的许多中国观察家一样，他们依然既对中国惊人的崛起感到敬畏，也对是否关心公共利益抱持怀疑。“人们觉得它就像《星球大战》中的‘死星’——一个巨大莫测的东西浮在空中，有可能摧毁我们所有人。”基金公司安石集团（Ashmore Group）的扬·德恩（Jan Dehn）说。他们是否能够信任那个试图隐瞒实情而使得病毒在一开始传播开来的政权？

世界金融体系的局部分裂将难以遏制。经济武器相对便宜，也不需要什么许可，因此美国总统还会继续热爱它们。使用经济武器的时间越长，确立起来的变通手段就越多。直到最近，它们都太过杂乱无章而无关大局。但中国的经济总量可能很快将超越美国，它的影响力足以创造市场和规范，把平行世界变成现实。而且，它正集中向新兴市场施展魅力，这些国家对西方结构的忠诚度较低，可能更容易被吸引过来。

怀疑论者担心，一个拥有经常账户盈余和严格资本管制的国家能否为世界提供储备货币。但是，自2007年达到顶峰以来，中国的顺差已经大幅减少。逆差很可能成为常态。它不断老龄化的人口储蓄得更少了。北京希望增加国内消费，这将增加进口。而停滞的西方经济将意味着出口疲软。据摩根士丹利估计，从现在到2030年，中国每年将需要2100亿美元的净外资

流入才能补上缺口。

这反过来应该会促使它进一步开放金融市场。全面放松管制的可能性不大，但提高流动性的措施（如改善市场基础设施和更公平的定价）会有帮助。而且中国的资本管制已经在放松。国内储户仍在笼中，但外国投资者说即使在市场暴跌期间他们也可以毫不费力地把钱抽走。储备管理者认为有限的控制带来的货币稳定有其价值。因此人民币也许不需要完全可兑换就能吸引拥趸。随着时间的推移，党中央领导人很可能会决定放开，特别是如果能吸引到足够多有粘性的钱，而让他们感到安心的话。

更加多元化的金融体系有其好处。在危机时期，依靠单一主导货币给世界带来了现金紧缩的威胁。更有效的跨境支付可以降低成本。带有副本使整个基础架构更具弹性。

| 脱钩还是去全球化？

中国与这个系统的连接也发生了令人鼓舞的变化。它已成为世界第三大债权国，2005年时还在第16位。而尽管外汇储备直到2016年都是它最大的海外投资类型，它的私人外国投资资产（价值4.2万亿美元）现在已经超过了其央行的外汇储备。这是对金钱更有效的利用。金融业的开放将使其丰富的储蓄得以更好地分配。金融市场的增长为国际投资者提供了更多选择。除非华盛顿反应过度，否则金融脱钩并不一定意味着完全去全球化。

不过，它也带来了三个危险。首先是它加速了十年前开始的金融市场的巴尔干化。大多数国家通过制定新法规来应对金融危机，其中许多法规令系统变得更加安全。但监督者有时似乎更有动力重掌本地控制权，而不是增加全球弹性。“围栏”迫使全球银行建立受本地监管机构监督的子公司，而不仅仅是分支机构。治外法权让外资银行负上多层责任。

更加分裂的市场可能有助于在危机期间阻遏危机蔓延。但是，它们也阻止了金融机构分散投资组合，从而导致风险集中。英国渣打银行的何塞·比尼亚尔斯（Jose Viñals）表示，这还会困住过多的储蓄，阻碍钱被投到资金短缺的地方。

地缘政治的紧张局势支持了这种转变。新冠肺炎使注意力和金钱集中在离本土较近的地方，可能又再推上一把。付出的代价不会小。2018年的一项调查发现，市场分裂已经使全球GDP减少了近1%。中国和印度等国已经实施了迫使企业把数据迁回本国的政策。这类政策可能会减少未来从数字化中获得的收益，并让市场更加分裂。

“本地化”规则还阻止了为管理风险而共享数据，带来了第二个危险：零碎的系统会降低安全性。银行与金融科技公司之间的多重连接为网络犯罪分子提供了更多切入点。倚赖不受监管又不甚了解的节点会带来系统性崩溃的风险。

第三个风险，也是最大的风险，是依靠一个没有“善意的领袖”的双头体系。尽管曾有危机，美元体系仍然驱动了数十年的经济持续增长。然而，比起公共利益，美国有时似乎更有兴趣利用它在这个体系中的主导地位来寻租。去年8月，几位议员发起了一项两党法案，提议美联储对外国资本流入征税，以帮助拉低美元。从这类行动可以看出，华盛顿关于拥有金融霸权所固有的代价的共识正在分崩离析。

相反，中国表示它已做好了担任领袖的准备。它以提议合作回应华盛顿的攻击。尽管资产负债表庞大，但其银行已避免并购欧洲的竞争对手。然而，就像在商业、外交和大多数中国的足迹日益突显的领域一样，疑问依然存在。它正在开放其市场，但是新进入者不确定是否会有不成文的规则来阻止它们。公司违约时允许外国投资者收回抵押品的制度未经测试。中国缺乏新闻自由、普通法和会保护公共利益并限制政府抢夺土地的司法系统。

如果这些疑虑得不到解决，许多市场参与者只会继续守着自己“已经熟悉的恶魔”，这样北京的金融影响力圈子可能只会成为一个卫星系统。这样的世界从许多方面来说都不理想。这个中国势力圈和美元体系之间的相互渗透将会是有限的，从而阻碍资本流动。美国对中国更加担忧，因此可能会尝试让当前的结构进一步向自己的利益倾斜。

还有一条不同的道路。中国可以选择向金融界保证，当系统出现问题时，它不会寻求掩盖真相，而是会迅速采取行动（但要在公认的规则之内）来解决问题。它必须表明，它已经准备好尊重选择信任它的人的权利，即使这和他自己的利益相悖。西方领导的机构可以通过承认中国应得的地位来提供帮助。而随着接触中国资产和系统的金融业人士发现自己不仅获利丰厚，而且被承诺的也得以兑现，时间也会帮中国的忙。

从许多方面来看，美国在全球经济中的份额会越来越小。引力定律决定了它作为世界上唯一中央银行的能力早晚要衰落，而中国将填补部分空白。比起它们各自把自己封闭在不完整的宇宙中，两个大国和平共处并合作要好得多。■



Health data and privacy

Looking without looking

The pandemic has sparked a new way to study sensitive medical records

ON MAY 7TH an article appeared on medRxiv, an online repository for medical research. It showed, for England at least, the degrees to which SARS-CoV-2, the virus that causes covid-19, discriminates in its deadliness between various groups of people. Men are more likely to die than women. The old and the socially deprived more likely than the young, well-off and well-connected. Those with uncontrolled diabetes or severe asthma, more likely than those without. And members of the country's ethnic minorities more likely than those of its white majority.

None of these, even the first (for men are more vulnerable than women to quite a wide range of infections), is exactly a surprise. Even the finding that current smokers actually have a lower risk of death from the illness than do non-smokers, though superficially arresting, is in line with the results of other studies that used different methods—though a possible protective effect on asthma patients of steroid inhalers looks worth following up. But the actual results of this study are not really the remarkable thing about it. That, according to its lead author Ben Goldacre, a clinician and data scientist at the University of Oxford, is the method of analysis by which they were obtained. Instead of extracting sensitive patient records from the databases of the company which manages them on behalf of general practitioners (GPs, Britain's network of family doctors), the team behind the paper developed a suite of software that lets them run their massive analysis on the data *in situ*.

The research was carried out by studying the medical records of some 17m people on the books of GPs in England and the 5,683 covid-attributable deaths therein. GPs are the first port of call in England's National Health

Service (NHS) for any non-emergency matter, and thus hold the most complete records of patients' health. Studying these at this scale and degree of detail, with individual records linked up to causes of death, has never been done before. Merely making plans to meddle with such primary-care data has been a cause of great national concern in Britain in the past. Dr Goldacre's research was possible only because of the incentives created by the pandemic, and the ingenuity of the group of epidemiologists and data scientists he assembled, who call themselves the OpenSAFELY Collective.

| *The bottom of a locked filing cabinet*

In normal circumstances, merely obtaining permission to look at such a trove of sensitive health data would take months, perhaps years, of jumping through hoops held by ethics committees, computer-security checkers and so on. Running the analysis and getting it published might take months more. These are not, though, normal circumstances, and in fact it took OpenSAFELY a mere 42 days to go from idea to publication.

Three factors made this pace possible. The first is the existence of notices, signed by the country's health minister, Matt Hancock, which give a wide range of people within the NHS broad licence to have access to and process health data in connection with fighting covid-19. These Control of Patient Information (COPI) notices make it much easier to get data wrangling done. Numerous people close to the government's digital efforts to fight the disease tell tales of COPI notices being waved in the faces of anyone who offers resistance to a particular data transfer. The OpenSAFELY team was acting on behalf of the NHS, and so had the power of the COPI notice behind its actions, speeding its way.

More important though, was the political heft arrayed under the OpenSAFELY banner. Academic expertise on electronic health records was provided by a team at the London School of Hygiene and Tropical Medicine, renowned for such work. The nitty gritty was covered by the Phoenix

Partnership (TPP), a British company which stores, on behalf of GPs, the electronic health records of some 50m people. And Dr Goldacre himself is one of Britain's foremost medical glitterati. He was once a columnist on a national newspaper and has nigh-on half a million followers on Twitter. His personal brand completed the picture, along with the data scientists and coders at his Evidence-Based Medicine DataLab in Oxford.

| *Beware of the leopard*

The most important component of OpenSAFELY's success, though, was its approach to the records themselves. It did not try to copy them, or move them out of TPP's data centre for processing. Instead, its coders wrote software which let them perform their analysis within that data centre. Even then, Dr Goldacre's crew were not given free rein to poke around inside TPP's systems. Instead they wrote a series of programs which let them interrogate the patient records through a secure connection. A log was also kept of all queries that the group ran on the records—thus the watchers were themselves watched.

This combination, not requiring their own copies of a patient's data and leaving a log of every action they took, made it easier to trust OpenSAFELY. Dr Goldacre's system has even brought Britain's fiercest privacy advocates on board. MedConfidential, a group that focuses on the confidentiality of medical records, has stated its support for this approach. "It was designed and built to promote both research and patient confidentiality at the same time, rather than suggesting they're opposites," says Sam Smith, one of the group's co-founders. John Chisholm, who chairs the ethics committee of the British Medical Association, a doctors' trade union, said that the study contained "hugely valuable information about risk factors" for death from covid-19.

This kind of research, mining medical records for patterns which might help serve the provision of health care, is still in its infancy. But it is most

advanced in Britain, for two reasons. The first is that the single medical market of the NHS has created huge patient-record companies like TPP. The second is that the NHS's norm of GPs being the first point of call for health care means that they have become a catch-all for medical data, and hold the richest, most unified data sets. In China, for instance, people tend to go directly to hospital when they are ill, rather than to visit a GP. Scandinavian countries do have joined-up records, and are often the subjects of medical-research projects for that very reason. But their small, homogenous populations make them less than ideal from a research perspective. The American system, meanwhile, is fragmented across a zillion private providers, though the health care system of the Veterans Affairs department does have a large number of people in a unified arrangement.

For now, therefore, Britain remains ahead. Dr Goldacre says it is “the only country on the planet with the scale of data needed to deliver these analyses”. And new challenges are coming. The team will look at the impacts of covid-19 on children, and the potential protective effect of inhaled steroids. OpenSAFELY is also beginning to work with other health-record firms besides TPP, to extend the range of data available for analysis.

If OpenSAFELY's approach continues to work as it is extended in this way, others will surely follow suit. Dr Goldacre and his collaborators have made this easy by leaving a trail of tools, in the form of open-source software that can be downloaded free, by anyone, from GitHub, a popular code repository. That code may be tweaked to run any query on any kind of database.

The broad adoption of this methodology would have big implications. Electronic-health-records systems would cease to be mere stores of data, and would start to become active pieces of the infrastructure underpinning medical research, shifting with the needs of science. This would be particularly important for the development of medical artificial-

intelligence, which requires large quantities of well curated data in order to learn about ailments with sufficient accuracy.

Covid-19 will not last for ever. The cover of national emergency will eventually pass. Those who wish to study health records in future will need more specific justifications than the sweeping permissions offered by COPI notices. But the OpenSAFELY team has shown that it is possible to get interesting results without copying data and without asking anyone to trust them with a large, sensitive data set. In doing so, they may have made those justifications a little easier to find. ■



医疗数据与隐私

不视而见

新冠疫情催生出一种研究敏感病历的新方法

一篇论文于5月7日在医学研究在线数据库medRxiv上发布，指出导致新冠肺炎的病毒SARS-CoV-2在不同人群中的致死率不同，至少在英国是如此。男性患者的病死率高于女性。老年人和脱离社会的人群高于年轻人、富裕人群和有强大社会关系的人群。糖尿病控制不佳者或严重哮喘患者高于没有这些基础疾病的人。少数族裔高于白人。

这些发现都不算惊人，即便是第一点。毕竟有相当多种类的传染病的感染率都是男性高于女性。甚至吸烟者的病死率低于非吸烟者这一点虽然乍看起来抓人眼球，其实也和其他不同方法得出的研究结果一致；不过哮喘患者吸入类固醇可能起到防护作用这一点似乎值得继续研究。但这项研究的非凡之处并非其实际结论。该论文的第一作者、牛津大学的临床医生、数据学家本·高达克（Ben Goldacre）表示，它的亮点在于它用以得出结论的分析方法。论文团队并没有从替全科医生（英国的家庭医生网络）管理病患资料的公司的数据库中提取敏感的病历资料，而是开发出了一套软件，在数据储存地就地开展大规模分析。

论文研究了在英国全科医生诊所注册的约1700万人的病历及其中5683例可归因于新冠肺炎的死亡病例。全科医生是英国国家医疗服务体系（以下简称NHS）中所有非急诊就医的第一接诊点，因此拥有最完整的患者健康记录。以如此规模和详细程度研究这些记录并将个人病历与死亡原因关联起来是前所未有的。过去，单单是计划使用这类基础医疗数据都会在英国国内引起轩然大波。高达克的研究之所以能够推进，完全要归功于新冠疫情的刺激，以及他组建的这支流行病学家和数据学家团队的聪明才智。这支团队自称“安全开放合作社”（OpenSAFELY Collective）。

| 上锁的文件柜底部

正常情况下，仅仅是申请权限查看如此庞大的敏感医疗数据就要用掉几个

月甚至几年的时间，需要通过伦理委员会、计算机网络安全检查等重重难关。开展分析和发表论文可能又需要好几个月。但眼下的情况非同寻常，实际上，OpenSAFELY团队从提出构思到发表论文只用了42天。

三方面因素促成了这样的高速。首先是英国卫生大臣马特·汉考克（Matt Hancock）签署发布通知，广泛允许NHS系统内的各类人员访问及处理与抗击新冠肺炎相关的医疗数据。这一系列“患者信息管控”（以下简称COPI）通知大大减少了数据再加工过程中的阻碍。众多了解英国政府数字化抗疫的人士大谈人们如何在调取数据遇阻时就亮出COPI通知的见闻。OpenSAFELY团队代表NHS开展研究，所以有COPI通知撑腰，得以加速推进。

不过，更重要的是在OpenSAFELY这面旗帜下积聚的政治影响力。关于电子病历的学术知识由这方面的权威——伦敦卫生与热带医学院（London School of Hygiene and Tropical Medicine）下属的一个研究团队提供。实际操作由菲尼克斯合伙公司（Phoenix Partnership，以下简称TPP）完成，这家英国公司为全科医生网络存储了约5000万人的电子病历。而高达克本人是英国医学界的名流之一。他曾经是一家全国性报纸的专栏作家，在推特上有近50万粉丝。他的个人品牌，加上他率领的牛津大学循证医学数据实验室（Evidence-Based Medicine DataLab）的数据学家及程序员，让一切臻于圆满。

| 当心豹子

但OpenSAFELY取得成功最重要的因素是对病历本身的处理手法。团队没有尝试复制病历，也没有从TPP的数据中心输出这些资料再做处理。相反，团队程序员编写的软件让研究人员可以直接在TPP的数据中心内开展分析。即便在那里，高达克的团队成员也不能在TPP系统中随意窥探。他们编写了一系列程序，让他们可以通过安全连接来查询患者的病历信息。团队对病历的一切查询都会生成日志，这样监视者自身也受到了监视。

由于无需复制患者病历，而且每项操作都有日志记录，OpenSAFELY团队更容易获得人们的信任。高达克的系统甚至得到了英国最激进的隐私倡导

组织的支持。关注病历隐私保障的组织MedConfidential已经表达了对这种方法的支持。该组织的联合创始人之一山姆·史密斯（Sam Smith）说：“它的设计既推进研究也保护患者信息，没把两者对立起来。”医生工会英国医学协会（British Medical Association）的伦理委员会主席约翰·奇索姆（John Chisholm）表示，这项研究包含有关新冠肺炎致死“风险因素的极有价值的信息”。

这类从病历中探寻模式以提升医疗服务的研究仍处于起步阶段。但英国在这方面走在最前，有两个原因。首先，NHS的单一医疗市场造就了像TPP这样的庞大的病历管理公司。其次，NHS规定全科医生为第一级诊点，这让他们能将医疗数据一网打尽，并拥有最丰富、最规整的数据集。相比之下，在中国，人们生病后往往直接去医院，而不是找全科医生。北欧国家倒是有协调整齐的医疗记录，因此往往会成为医学研究项目的对象。但北欧国家人口不多且同质化，从研究的角度来看并不是理想的对象。美国的医疗系统由无数分散的私人医疗机构组成，尽管退伍军人事务部的医疗系统内确实有大量规整的病患数据。

所以目前而言，英国仍保持领先。高达克称，英国是“地球上唯一一个拥有完成这样的分析所需的大规模数据的国家”。新的挑战不断出现。

OpenSAFELY团队将研究新冠肺炎对儿童的影响，以及吸入类固醇可能具有的保护作用。除了TPP之外，它还开始与其他病历管理公司合作，以扩大可用于分析的数据范围。

假如OpenSAFELY团队的研究方法以上述方式不断拓展而能继续奏效，其他人肯定会效仿。而高达克与其合作方为此提供了便利：他们以开源软件的形式留下了一系列工具，任何人都能从著名的代码存储库GitHub上免费下载。对这些代码稍作修改，就可以在各类数据库上开展各种查询。

广泛采用这种研究方法将产生重大的影响。电子病历系统将不只用来存储数据，还将成为医学研究基础设施中的活跃组成部分，随科研的需求而调整变化。这对于医疗人工智能的发展尤为重要，因为它需要大量精心管理的数据来足够准确地了解疾病。

新冠疫情不会永远持续。以“国家紧急状态”为名的阶段总会过去。未来想要研究病历将需要提供更具体的正当理由，而不能再依靠COPI通知这样笼统的许可。但OpenSAFELY团队表明，无需复制数据，也无需请求任何人放心交出庞大而敏感的数据集，也可能得出有趣的研究结果。通过这样的尝试，他们可能让寻找正当理由的负担变轻了一点。 ■



Business resilience

Hanging together

Businesses can cope with awful surprises—up to a point

IF A VENGEFUL deity were to design a weapon to wield against the global supply chains that characterise modern business, it might well hit on a virus which hit production facilities all around the world. In the face of covid-19, though, the sinews of business have, for the most part, held up remarkably well.

Air freight has suffered, but shipping has steamed on—and its comparatively long transit times have provided a buffer to the supply shocks which followed China's shutdown. Prologis, an American company which operates one-and-a-half Manhattans-worth of warehouse space around the world, says that 95% of its customers have remained at least partially operational. Systemic risks such as those which brought the banking industry crashing down during the financial crisis have, as yet, failed to materialise.

This is not to say that business is booming. But it is demand, not supply, that is lacking. To the extent that the sinew is not working it is for want of a task, not for want of strength.

That companies have been flurried over their supply chains is not in doubt. From January to May supply-chain disruption was mentioned nearly 30,000 times in the earnings calls of the world's 2,000 biggest listed firms, up from 23,000 in the same period last year. Mentions of "efficiency" declined from 8,100 to 6,700. Managers know that supply chains are good conduits of economic pain. Looking at the aftermath of the tsunami and earthquake which hit northern Japan in 2011 Vinod Singhal, Brian Jacobs and Kevin Hendricks, three management scholars, found that the share

prices of suppliers to companies directly affected dropped by 4%, and those of their customers by 3%.

The sources of disruption, and thus pain, can be impressively obscure. In 2012, a month after a fire at a factory in Germany, carmakers from Düsseldorf to Detroit found themselves facing production cuts. It turned out that Evonik, the factory's owner, was responsible for between a quarter to a half of the world's supply of cyclododecatriene, a precursor chemical to a resin widely used in the business. Otto Kocsis, who works for Zurich, an insurance firm, has found that while the proportion of disruptions that can be attributed to "tier one" suppliers—those with which manufacturers deal directly—fell during the first half of the 2010s, the proportion which could be attributed to companies that manufacturers hardly knew they were dealing with, like Evonik, shot up.

One way to avoid such pain is to keep as diverse a supplier base as feasible—something which also helps you deal with customers quick to change their fancies. Zara, a Spanish fashion retailer, exemplifies the approach, with its different frock lines reaching the shops entirely independently. Another is to maintain spare manufacturing capacity. Though companies may pride themselves on their lean manufacturing, the world's factories do not typically run at full tilt: across the world the proportion of their potential capacity which industrial firms actually use has been flat or falling over the past two decades.

Then there is inventory. It is widely assumed that modern supply chains relentlessly eat away at this source of resilience, but that is not entirely true. Investors can punish firms if they start piling up stock, especially if there are other signs of trouble. But they also look askance at firms that cut too close to the bone.

Hong Chen, Murray Frank and Owen Wu, another trio of business-school

professors, have looked at the period between 1981 and 2000 when average inventories in America Inc declined from 96 days to 81 days. The share prices of the companies which slashed inventories by the most and of those which did not cut at all both suffered compared with those which made moderate cuts. Work by Ananth Raman and a colleague at the Harvard Business School shows that when a sharp increase in operational performance is followed by some sort of downturn, investors pay heed to the nature of the setback. If it is down to some exogenous factor, such as a flood, the firm goes unrebuked. If it is down to an internal issue, and so suggestive of excessive cost-cutting, returns on investment decline by 3.8 percentage points.

Since the financial crisis of 2007-09 companies have actually been increasing the amount of stock they have on hand. In America the ratio of inventories to sales just before the pandemic had risen to levels last seen in the early 2000s (see chart). The expansion of warehouse space that has recently been seen around the world is not just down to the rise of e-commerce—which typically requires three times as much as retailers who sell in physical locations. Some is down to firms concentrating on being near to the consumer, which increases the amount of storage a company needs. Prologis says that there has been an uptick in pricier short-term leases in warehouse space over the past few years, suggesting that companies are happy to pay a premium for flexibility.

Further evidence for buffering in the system can be seen in figures on working capital, which is calculated by subtracting what companies owe suppliers from the value of their inventories plus what they are owed by customers. Reducing working capital is the cheapest way for firms to get cash, since they need pay no interest to do so. Yet many companies are not making the most of it.

A recent survey of 15,000 large firms undertaken by PwC, a consultancy,

divided them into quartiles based on their working-capital performance. If each firm in the three lower quartiles matched the performance of companies in the quartile above which were in the same line of business they would liberate \$1.4trn in cash, equivalent to 55% of their cumulative capital spending. But despite this theoretically copious incentive, working-capital efficiency has not changed since 2016. Part of this is down to the increase in inventories seen in recent years, but another factor is reduced payables. Companies appear willing to spend money on their relationships with suppliers, which speaks to a sensitivity to supply-chain management.

It may also speak to the fact that many companies are already sitting on stacks of cash. Few boast sofas as plumply padded as Apple, Microsoft, Amazon, Alphabet and Facebook, which have \$270bn in net cash between them, enough to finance many countries' covid-related fiscal stimulus. But the total cash holdings of the world's 2,000 biggest listed non-financial corporations increased from \$6.6trn in 2010 to \$14.2trn today.

Diversified suppliers, spare capacity, inventory and cash provide companies, especially big ones, with a certain degree of security. But whether their current "portfolios of resilience", as Panos Kouvelis of the Boeing Centre for Supply Chain Innovation at Washington University puts it, can withstand the pandemic is another matter altogether. With respect to supply chains, the answer has so far been yes. But appetite for most non-essential goods and services among social-distancing consumers has evaporated. For some things, like air travel, ocean cruises or cinema, it may never fully recover.

How, though, could business have been better prepared? It might be possible, in principle, to self-insure against a disastrous drop in overall demand by sacrificing margins in order to build up buffers and to keep open strategic options the company will probably never willingly choose to use. But good luck convincing investors of that approach. Strategies which

pay off handsomely in the event of even the worst worst case are terribly expensive.

Consider the Eureka Hedge Tail Risk Hedge Fund Index, which tracks vehicles that try to make money out of “black swans”, highly improbable events that have a very large impact. If you had bet on the index on January 1st this year you would have seen a rise of 52%. But if you had bet on January 1st 2008 you would now be 25% below where you started. Insuring against lots of rare risks can never be cheap. Mr Kocsis says that insurance policies against disruptions caused by problems throughout the supply chain, including insolvencies of business partners, tend to cost 1% or more of the turnover insured annually. That is ten times what it would cost to protect the same amount of stock sitting in a warehouse from property damage.

| *Straighten out*

Another worry is that a company which spends on resilience may end up at a disadvantage if others survive without making such provisions, for example by extracting concessions from suppliers or bail-outs from governments, says Debra Dandeneau of Baker McKenzie, a law firm. Such firms would get the benefits of insurance without having paid the premiums.

Today, having built up buffers that keep things going looks smart. But in time the attractions of cutting back will begin to assert themselves again. Yes, long supply chains bring some added risk. But as ManMohan Sodhi of the Cass Business School in London puts it, “Nothing in the operational world is risk-free.” An American company that offloads capital-intensive operations to suppliers in China is weighing the boost in value that provides against the risks—though if the Chinese supplier does a deal with one in Vietnam which then does a deal in Bangladesh, the level of risk may be hard to assess. Low inventories may expose you to disruptions in supply,

but they save you from losses due to excessively rosy forecasts of demand, notes Sunil Chopra of the Kellogg School of Management in Chicago. The boss of a big European retailer doubts that his industry will return to heavy stockholding. “We value that efficiency because it keeps prices low,” he explains.

In the age of covid-19 producing closer to home is both an understandable urge and smiled on by many national governments, especially for necessities like medicines or face-masks. But a company’s home country is not necessarily the least disruptive place for operations. Many factories in America are closed or running at low capacity: on May 11th Elon Musk reopened the Tesla factory in Fremont, California, in defiance of a public-health order from Alameda county. Meanwhile, Tim Cook of Apple, which continues to make most of its iPhones in China—and sell millions to Chinese consumers—recently told investors that “we have been gratified by the resilience and adaptability of our global supply chain.”

Mr Kouvelis expects companies mostly to go back to their old ways of thinking about the efficiency-resilience trade-off. Firms “manage one shock at a time”, he says. Having so far emerged from this one relatively unscathed, Mr Cook and others may well stick to Andrew Carnegie’s advice to “put all your good eggs in one basket and then watch that basket.” Until the next black swan waddles along. ■



商业韧性

链条不断

企业能够应对可怕的意外——在一定程度上【深度报道】

如果复仇之神要设计一种武器来打击现代商业的标志——全球供应链，很可能会想到用病毒来袭击世界各地的生产设施。然而面对新冠疫情，商业的筋腱却在很大程度上扛住了压力，维系得非常不错。

航空货运受到了冲击，但海运照常运行——它相对较长的运输时间为中国封城后的供应中断提供了缓冲。美国公司安博（Prologis）在全球运营的仓库面积相当于1.5个曼哈顿，它表示自己95%的客户至少仍保持了部分运作。金融危机时期令银行业崩溃的那种系统性风险目前尚未变成现实。

倒不是说现在生意兴隆。但不足的是需求，而非供给。如果说筋腱有些问题，那不是因为它软弱无力，而是因为有力无处使。

企业为自己的供应链慌乱不安，这一点毋庸置疑。1月至5月，世界最大的2000家上市公司的财报电话会议中，供应链中断被提及近3万次，高于去年同期的2.3万次。提及“效率”的次数从8100次减少至6700次。企业主管们知道，经济阵痛很容易通过供应链上下传导。三位管理学者维诺德·辛格（Vinod Singhal）、布赖恩·雅各布斯（Brian Jacobs）和凯文·亨德里克斯（Kevin Hendricks）研究了2011年日本北部遭受海啸和地震袭击后的情况，发现直接受灾企业的供应商的股价下跌了4%，其客户的股价下跌了3%。

供应中断及由此而来的阵痛的源头有时异常隐秘。2012年，德国一家工厂发生火灾的一个月后，从杜塞尔多夫到底特律的汽车制造商纷纷被迫减产。原来这家工厂属于赢创（Evonik），而赢创供应了全球四分之一到一半的环十二碳三烯，这是一种汽车业常用树脂的前体化学品。供职于苏黎世保险的奥托·科奇士（Otto Kocsis）发现，2010至2015年间，那些与制造商直接交易的“一级”供应商所造成的供应中断比例有所下降，而由制造

商自己都不知道和自己有供应关系的公司（正如赢创）造成的供应中断的比例却大幅上升。

要避免这种阵痛，一个方法是尽可能保持供应商分散——这也有助于应对易变的顾客喜好。西班牙时装零售商Zara就是采取这种策略的典型，其不同的女装系列完全各自独立供货，分别运抵店面。另一个方法是保持富余的制造产能。尽管企业可能以精益生产为傲，但世界各地的工厂一般并不会全速运转：过去20年里，全球工业企业的潜在产能利用率实际上一直持平或者有所下降。

还有库存，这也是韧性的来源之一。人们普遍认为现代供应链会毫不留情地压缩库存，但这并不完全属实。投资者可能会惩罚那些开始积压库存的公司，特别是有迹象显示其他方面也存在问题的话。但过分削减库存的公司同样会遭受投资者的冷眼。

另外三位商学院教授陈宏、默里·弗兰克（Murray Frank）和欧文·吴（Owen Wu，音译）研究了1981年至2000年美国公司的情况，在这一期间平均库存水平从96天减少至81天。与适度削减库存的公司相比，那些削减力度最大和完全不减库存的公司股价均受到不利影响。哈佛商学院的安南思·拉曼（Ananth Raman）和一位同事的研究表明，当公司经营业绩大幅增长然后陷入低迷时，投资者会关注业绩倒退的性质。如果是源于洪灾等外生因素，公司就不会遭到非议。但如果是由于内部因素，且显示是公司过度削减成本所致，那么投资回报率就会下降3.8个百分点。

自2007至2009年金融危机以来，企业实际上一直在提高库存水平。疫情发生前，美国公司的库存销售比已经回升至本世纪初的水平（见图表）。近年世界各地都出现仓储空间扩容的现象，并不完全是由于电商的兴起——电子商务需要的仓储空间往往是实体零售店的三倍。有一部分原因是企业更加重视贴近消费者，因而增加了仓储需求。安博表示，最近几年价格较贵的仓库短租出现上升，表明企业愿意为灵活性支付溢价。

营运资金方面的数据也进一步证明系统中存在缓冲。营运资金的计算方式

是公司库存价值减去应付供应商的款项，再加上应收客户的款项。减少营运资金是公司获取现金最便宜的方法，因为无需为此支付利息。然而许多公司并没有充分利用这一方法。

咨询公司普华永道最近对15,000家大型企业展开调查，根据营运资金的表现将它们划分为四等份。如果三个较低四分位当中的每家公司都将自身表现提升至上一个四分位中同业公司的水平，那么将可释放出1.4万亿美元的现金，相当于它们累计资本支出的55%。尽管理论上的好处如此诱人，但自2016年以来营运资金效率却并无变化。一个原因是近年来库存增加，但另一个因素是应付账款减少。公司似乎愿意花钱维护与供应商的关系，说明它们对供应链管理相当敏感。

这可能也表明许多公司已经坐拥大量闲置现金。没有多少公司敢夸口自己像苹果、微软、亚马逊、Alphabet和Facebook那般富足，这几家公司合计持有2700亿美元的净现金，足以支撑许多国家的抗疫财政刺激计划。但世界最大的2000家非金融上市公司合计持有的现金已从2010年的6.6万亿美元增加至今天的14.2万亿美元。

分散的供应商、备用产能、库存和现金为企业（特别是大企业）提供了一定程度的安全保障。对此，华盛顿大学波音供应链创新中心（Boeing Centre for Supply Chain Innovation）的帕诺斯·库韦利斯（Panos Kouvelis）称之为“韧性组合”。但企业当前的韧性组合是否足以抵御这次疫情就完全是另一回事了。就供应链而言，迄今为止的答案是肯定的。但践行社交隔离的消费者的大部分非必需商品和服务的需求已经消失。其中一些需求可能永远无法完全恢复，例如航空出行、远洋邮轮或者看电影。

那么，企业怎样才能更好地准备呢？原则上，也许可以为总体需求暴跌的风险采取自我保险措施，牺牲利润率来建立缓冲，并保留公司可能永远不愿选择使用的一些策略选项。但是要说说服投资者接受这种做法可不容易。即使是在最糟糕的情况下也能带来丰厚回报的策略异常昂贵。

以EurekaHedge尾部风险对冲基金指数为例，该指数跟踪那些试图从“黑天

鹅”事件（概率极低但影响极大的事件）中赚钱的投资工具的表现。如果在今年1月1日押注这个指数，你将获得52%的回报。但如果是在2008年1月1日下注，到现在还亏25%。要为众多的低概率风险投保，保费绝不可能便宜。科奇士表示，如果为整个供应链中各种问题（包括商业伙伴破产）所造成的供应中断购买保险，往往需要花费每年被保营业额的1%或更多。这一成本相当于为仓库里等量的存货购买财产保险的十倍。

| 理清思路

公司不愿花钱提升韧性的另一个顾虑是，如果别的公司没有做类似的准备，却生存了下来，例如通过从供应商那里索取让步或者得到政府救助，那么花了钱的公司反而可能陷入不利地位，贝克麦坚时律师事务所（Baker McKenzie）的黛布拉·丹德诺（Debra Dandeneau）指出。那些没有做准备的公司相当于没支付保费就享受了保险的好处。

当下，那些已经提前建立了缓冲来保证业务延续的做法看起来很明智。但随着时间的推移，削减开支的吸引力将再度显现。确实，较长的供应链会带来一定的附加风险。但正如伦敦卡斯商学院（Cass Business School）的曼莫汉·索迪（ManMohan Sodhi）所言，“在经营的世界里一切皆有风险。”当一家美国公司将资本密集型业务交给中国的供应商，就在价值增长与风险之间做出了权衡——不过，如果中国供应商又找了一家越南供应商，后者又在孟加拉做了笔交易，这其中的风险可能就难以衡量了。芝加哥凯洛格商学院的苏尼尔·乔普拉（Sunil Chopra）指出，低库存可能会让你承受供应中断的风险，但也会让你避免因为对需求预测过分乐观而蒙受损失。一家欧洲大型零售商的老板不相信零售行业会回到持有大量库存的做法。“我们重视效率，因为有效率才能保持低价。”他解释说。

在新冠疫情时代，让生产回归本土市场的冲动可以理解，而且也会受到许多国家政府的嘉许，尤其是像药品、口罩这样的必需品。但企业的母国未必是运营最不易受冲击的地方。美国许多工厂已经关闭或者低产能运转：5月11日，伊隆·马斯克不顾阿拉米达县（Alameda）的公共卫生令，重启了位于加州弗里蒙特的特斯拉工厂。与此同时，苹果公司也继续在中国生产大部分iPhone，并继续向中国消费者销售数百万台。蒂姆·库克最近对

投资者表示：“对我们的全球供应链的韧性和适应力，我们感到十分满意。”

库韦利斯预计，企业基本上还会采用以往的思维方式，在效率与韧性之间做取舍。他说，企业“一次只能顾一头”。苹果等公司相对平安地度过了这一次危机而未伤筋动骨，库克和其他老板很可能还是会坚守安德鲁·卡内基（Andrew Carnegie）的建议：“把所有好鸡蛋都放在一个篮子里，然后好好盯着那个篮子。”直到下一只黑天鹅蹒跚而至。■



Globalisation

Torn apart

Pre-existing conditions have exacerbated covid-19's blow to world trade

THE 2010S WERE not a happy decade for proponents of global trade. Though fears of an increase in protectionism following the financial crisis of 2007-09 did not materialise, nor did the growth of the 1990s and 2000s re-establish itself. Finance was tamer; China was richer and developing its internal market; transport was no longer getting cheaper. As a share of global GDP, neither global trade, foreign direct investment, nor stocks of cross-border bank lending returned to their 2000s peak.

And then, belatedly, fears about protectionism came good with the election of President Donald Trump. In 2018 he launched a trade war against China; he applied tariffs in the name of national security; his administration hog-tied the World Trade Organisation's appellate court.

Optimists might have seen the 2020s getting off to a slightly better start. The "Phase One" deal between America and China, signed on January 15th, left tariffs six times higher than they had been before Mr Trump launched his trade war. But at least it seemed a step in the right direction.

The covid-19 pandemic has since, by curtailing trade across the Pacific, made it very hard to see how China can increase its imports from America in line with the Phase One deal's requirements. But that is the least of the trading world's worries. The United Nations Conference on Trade and Development is predicting that covid-19 will reduce flows of foreign direct investment by 30-40%; the World Bank expects remittances to fall by 20%; the WTO reckons trade could fall by as much as a third. Much of this carnage is because of crashing demand, not new barriers to trade. But the crisis has not made international commerce any easier.

Travel bans, quarantines and a widespread desire to stay at home even among those not ordered to do so means that the movement of individuals from place to place, the one aspect of globalisation that had continued from strength to strength, came to a juddering halt.

Fewer passengers means fewer planes means less room for air freight. In a forecast of covid-related costs made this April, the WTO took into account higher air-cargo prices, extra time spent in transit for goods having to go through more stringent border checks, and travel restrictions making trade in services and the delivery of equipment that needs bespoke installation more difficult. Overall, the WTO thinks the rise in costs could be equivalent to a 3.4% global tariff. For comparison, in 2018 the global average tariff was around 8%.

As firms have foundered, fears have mounted that foreign state-supported companies will swoop in and snap them up. The European Commission has urged member states to be “particularly vigilant” in making sure businesses are not sold off. The German, Italian and Spanish governments have all tightened their processes for screening foreign investment. The Australian government is requiring that all foreign investments be approved by the Foreign Investment Review Board. India has enacted new restrictions, too; China calls them “discriminatory”.

Around the world, governments responsive to their people are concerned with little more than keeping them something close to safe and solvent. Meeting the needs of the public is taken to mean being able to provide for them independently. Kevin O'Rourke of NYU Abu Dhabi sees a parallel with the period which came immediately after the second world war. Policy was neither being driven by corporate interests seeking protection from foreign competitors, nor by a calamitous attempt to impose capital controls, but rather voters' desire for safety. It is a powerful justification for protective measures.

| *Let me down easy*

Take medical supplies. In 2018 China alone supplied about 42% of the world's exports of personal protective equipment. Almost three-quarters of Italy's imported blood thinners come from China; so do 60% of the ingredients for antibiotics imported by Japan. Such dependence on any country seems unwise. Such dependence on China, which has been known to abuse its market dominance, seems idiotic. Smaller, poorer countries have little choice but to build stockpiles. But the bigger, richer countries and blocs are thinking of ways to shake up the status quo.

On April 27th Bernd Lange, head of the European Parliament's Committee on International Trade, suggested that requirements could be imposed on companies to source certain intermediate products from several countries, or to develop strategic agreements with companies for their assembly lines to change quickly in a crisis. Alternatively, the EU could create a list of strategic goods for which European production would be required.

Mr Trump's trade adviser, Peter Navarro, is clearly itching to set procurement rules which would force health-care providers to buy American-made products. Mr Trump's administration is reportedly also trying to remedy what it sees as a strategic vulnerability by convincing Intel and Taiwan Semiconductor Manufacturing Company, two companies on the frontiers of chipmaking, to build new factories in America. A survey of members of the Global Business Alliance, a group of companies with investments in America, published on May 11th, revealed that 77% expected the country to become more protectionist in terms of cross-border mergers and acquisitions, government procurement and trade because of the pandemic.

Those businesses, and their peers, are currently in crisis-management mode. When the dust gets to settling, they have some reconfiguring to do. Adjusting their supply chains will probably accelerate the trend towards

regionalisation, particularly in complex cases where assemblies cross borders repeatedly. This will have the knock-on effect, desired by some, of reducing the centrality of China.

Take regionalisation first. In the automotive supply chain, which stretches from the leather for seats to the chips for dashboard displays, 59% of trade is already intraregional. Such integration is self-reinforcing; it becomes increasingly easy, and enticing, to replace suppliers farther afield with ones nearer to hand. Comparing the second half of 2019 with the second half of 2017, China's share of car parts imported by the United States fell by 2.2 percentage points. The share coming from elsewhere in North America increased by 2.8 percentage points (see chart).

What works for cars, though, does not work for everything. Near-shoring imports of furniture, toys and clothes may not be worth the fuss. As China's (sizeable) share in America's imports of clothing, toys and furniture fell between 2017 and 2019, North America's barely budged. Drops in electronics imports from China were offset not by suppliers closer to home, but mostly by other Asian countries.

That demonstrates the other strategy companies are developing: globalisation with fewer Chinese characteristics. Last October a survey of American multinationals found that around 40% were either considering or in the process of relocating manufacturing or sourcing outside of China. A more recent survey suggested that 24% were planning to adjust their sourcing outside of China as a result of covid-19.

For some companies, this is not a straightforward retrenchment, but an embrace of what is known as "China+1". The strategy is still to use Chinese suppliers, not least so as to go on serving the very attractive Chinese market, but also to encourage suppliers elsewhere in case something goes wrong. Witness Google's reported investment in Vietnam to produce its

Pixel smartphone or Microsoft's to produce its Surface tablet. The strategy's purported benefits, though, are not bought cheaply, argues Jake Parker of the US-China Business Council, a lobby group. It will take five years for any such reconfigured supply chain to achieve costs as low as what they would have been if based in China. In the meantime prices will have to rise.

In the longer run, and once companies have more cash to spare, it is possible that they will attempt to set up new clusters of production. Mike Jette of GEP, a supply chain consultancy, reports hearing from some electronics manufacturers that they want to get 30-40% of their supply chain within the same region as the customer, leaving around half in China.

If the customer is in Asia, that will be fairly easy. If the customer is elsewhere, it will be harder. Their historical and geographic ties give the nexus of Asian electronics suppliers a huge advantage over comparatively isolated firms elsewhere, even if customers are actively trying to encourage the challengers. The Asian advantage will be hard to dislodge.

To the extent that companies do go looking for new secure sources of supply, they will keep in mind how countries have responded to covid-19. Kristin Dziczek of the Centre for Automotive Research says that the Mexican government's haphazard approach to the pandemic generated huge uncertainty for car companies, and raised questions about their reliance on the country as a supplier.

| *Rise of the robots*

Such concerns will be weighed against countries' other advantages, such as trade deals, existing sophisticated manufacturing capacity, and competitive labour costs. In Mexico's case, an incoming trade deal with America and Canada will increase the incentives to source car parts from within the region. Pierre Sauvé of the World Bank reckons that deals with America

and/or the European Union mean that the likes of Colombia, Costa Rica, Morocco and Tunisia could also gain from shifting supply chains, as could Malaysia and Vietnam, which enjoy broad, well-established trade ties with Japan and Korea.

Such countries need not limit themselves to whittling away at China's manufacturing role. Trying to supply digital services could be a better long-run strategy—one that the pandemic may be making easier. White-collar workers have just been jolted into a mostly digital existence. If managers get used to supervising staff remotely, why should they not get used to managing more overseas? Employers will be keen on cost savings after the shutdown, notes Richard Baldwin, who works at the Graduate Institute in Geneva.

That said, trade is not the only way to realise savings. Bernard Hoekman of the European University Institute warns that companies may choose to automate services rather than to offshore them. The same warning applies, in reverse, to people hoping that reshoring production brings back jobs. It may do if you are an engineer. It will not if you wait tables.

As defenders of the status quo try to explain that strength lies in openness, and critics crow about globalisation going too far, the reality is that both will probably get their way. The medical and pharmaceutical sectors should expect pressure to localise more of their production in those countries that have enough clout to apply it. Those Chinese companies hoping to take advantage of the global market in ideas will find it harder to access. Foreign acquisitions will be treated with suspicion. American scrutiny of their suppliers will make international commerce harder.

But once companies can start investing again many will continue to set up their supply chains in such a way as to chase the next source of growth—mindful, of course, of governments prone to placing obstacles

between them and their favoured suppliers. It is something global business knows how to do pretty well. “If I were advising Davos man, I would advise him to keep quiet and take it on the chin,” says Mr O’Rourke, adding that his study of history has taught him the benefits of moderation in all things.

That return to the norm could be impeded if political leaders see the public desire for security as requiring an all-out assault on what went before. “It was clear that this kind of globalisation was ending its cycle,” Emmanuel Macron, the president of France, recently told the *Financial Times* in a disquisition on the lessons of the covid-19 pandemic and the retrenchment it might bring. If so, better for the world to start a new, rebalanced cycle, less centred on a single dominant exporter, than to give up on the process altogether. ■



全球化

四分五裂

本已存在的问题加剧了新冠肺炎对世界贸易的打击【深度报道】

对于全球贸易的支持者来说，过去这十年不怎么让人高兴。尽管对2007至2009年金融危机后贸易保护主义加剧的担忧并没有成为现实，但1990年代和2000年代的那种增长也没能再现。金融部门变得更保守；中国变得更富裕并发展国内市场；运输成本不再继续下降。全球贸易、外国直接投资和跨境银行贷款存量占GDP的比例均未回升到2000年代的峰值。

然后，特朗普当选总统，对贸易保护主义的担忧终于开花结果。2018年，特朗普对中国发动贸易战；他以国家安全为名加征关税；他的政府让WTO的上诉机构陷入瘫痪。

乐观主义者可能以为进入2020年代情况会略有好转。中美在今年1月15日签署“第一阶段”经贸协议后，关税比特朗普发动贸易战之前高出六倍。但至少这看起来是朝着正确的方向迈出了一步。

之后，新冠肺炎限制了跨太平洋贸易，很难想象中国还如何能够按照第一阶段协议的要求增加从美国的进口。但这还只是贸易领域最小的问题。联合国贸发会议预测，新冠肺炎将导致外国直接投资下降30%至40%；世界银行预计汇款规模将缩减20%；世贸组织估计全球贸易降幅可能高达三分之一。导致这些惨状的主要原因是需求暴跌，而不是新的贸易障碍。但是，疫情确实令国际贸易雪上加霜。

旅行禁令、隔离措施，以及人们普遍想要待在家里（即使在没有人要求他们这么做时）导致人员流动戛然而止，而人员流动原本是全球化持续加强的一个方面。

乘客减少导致航班减少，进而又导致航空货运空间减少。4月，WTO在预测新冠肺炎导致的成本时考虑了种种因素，包括航空货运价格上升、更严

格的边境检查导致货物运输时间更长，以及旅行限制让服务业贸易和需要定制安装的设备交付都更困难。总体而言，WTO认为上涨的成本可能相当于全球关税增加3.4%。而2018年全球的平均关税在8%左右。

由于企业运转困难，人们越来越担心受外国政府支持的公司会趁虚而入，大举收购。欧盟委员会已敦促成员国要“特别警惕”，确保企业不被抛售。德国、意大利和西班牙政府都收紧了审查外国投资的程序。澳大利亚政府要求所有外国投资均需经外国投资审查委员会（Foreign Investment Review Board）批准。印度也出台了新的限制政策，中国称这些政策具有“歧视性”。

在全球各地，政府对民众的响应不过是保证他们的基本安全和不破产。满足公众的需求被等同于国家能自力更生地保证他们的生活。纽约大学阿布扎比分校的凯文·奥罗克（Kevin O'Rourke）认为，现在的情况与二战刚结束后的那个阶段相似。政策背后的驱动力不是寻求免于外国竞争的企业利益，也不是要实施资本管制的灾难性企图，而是选民对安全的渴望。这是采取保护性措施的有力依据。

| 慢慢调整

以医疗用品为例。2018年，仅中国一国就占了全球个人防护用品出口的约42%。意大利进口的血液稀释剂近四分之三产自中国。日本进口的抗生素原料药有60%来自中国。对任何国家达到这种程度的依赖似乎都是不明智的，而如此依赖众所周知滥用市场支配地位的中国就显得愚蠢了。贫穷小国别无选择，只能建立储备体系。但富裕大国和国家联盟正在想办法改变现状。

欧洲议会国际贸易委员会主席博纳德·兰格（Bernd Lange）4月27日建议，可以强制要求企业从几个国家采购某些中间产品，或者与企业制定战略协议，让它们在发生危机时迅速调整装配线。或者，欧盟可以创建一个战略产品清单，欧洲必须生产这些产品。

特朗普的贸易顾问彼得·纳瓦罗（Peter Navarro）显然摩拳擦掌地想要制

定采购规则，迫使医疗机构购买美国产品。据报道，特朗普政府还在说服芯片制造领域的两家龙头公司英特尔和台积电在美国建设新工厂，以弥补它认为美国存在的一个战略漏洞。5月11日，针对在美国投资的企业组成的全球商业联盟（Global Business Alliance）成员的调查显示，77%的成员企业预计，因疫情影响，美国在跨境并购、政府采购和贸易方面的保护主义倾向将加强。

这些成员企业及其同行目前正处于危机管理模式中。尘埃落定后，它们需要实施一些结构性改革。调整供应链可能会加速区域化的趋势，特别是在产品组装需要多次跨境的复杂情形中。这将产生某些国家希望看到的中国中心地位被削弱的连锁反应。

先看区域化。在从座椅皮革到仪表盘显示芯片的汽车供应链中，已经有59%的贸易在区域内进行。这种整合会自我强化：用更邻近的供应商取代更遥远的供应商变得越来越容易，也越发有吸引力。与2017年下半年相比，2019年下半年美国进口的汽车零部件中，中国所占份额下降了2.2个百分点。来自北美其他地区的零部件增加了2.8个百分点（见图表）。

但是，在汽车供应链中行得通的做法并不适用于其他所有行业。把家具、玩具和服装改为近岸进口可能并不值得费事。2017年至2019年间，中国在美国的服装、玩具和家具进口中所占的（可观）份额有所下降，但北美所占份额并没有什么变化。美国从中国进口的电子产品数量下降，其中大部分被其他亚洲国家的供应商填补，而不是较近的供应商。

这表明了企业正在发展的另一个战略：较少中国特色的全球化。去年10月对美国跨国公司的一项调查发现，大约40%的公司正在考虑或正在将制造或采购转移到中国境外。更近期的一项调查表明，由于新冠疫情的影响，有24%的公司计划把采购调整到中国境外。

对于某些公司而言，这并不是简单的紧缩开支，而是要拥抱所谓的“中国+1”战略。也就是说，它们仍将保留中国供应商，这样不仅能继续为非常有吸引力的中国市场服务，还能在出现问题时鼓励其他地方的供应商填补

空白。比如据悉谷歌将在越南投资生产Pixel智能手机，微软也将在越南投资生产Surface平板电脑。游说团体美中全国贸易委员会（US-China Business Council）的杰克·帕克（Jake Parker）认为，要获得这种战略声称会带来的好处得付出不小的代价。任何重新配置的供应链都需要五年时间才能让成本降到以中国为基地时的水平。在此期间价格将不得不上涨。

长远来看，一旦公司有了更多的可支配现金，它们可能就会尝试建立新的生产集群。供应链咨询公司GEP的迈克·耶特（Mike Jette）称，他听说一些电子制造商希望把供应链的30%至40%转移到客户所在的地区，留一半在中国。

如果它们的客户在亚洲，那就相当容易。但如果客户在其他地区，就比较难了。即便这些客户正在积极尝试鼓励来自其他地区的挑战者，但亚洲的电子产品供应商之间拥有历史和地理上的连结，这使得它们结成的网络与其他地方相对孤立的企业相比具有巨大的优势。亚洲的优势将难以撼动。

如果企业真要寻找新的安全供应来源，它们会牢记各国应对新冠肺炎时的表现。汽车研究中心（Centre for Automotive Research）的克里斯汀·齐泽克（Kristin Dziczek）说，墨西哥政府应对疫情毫无章法，给汽车企业带来了巨大的不确定性，让人们质疑依靠墨西哥供应是否可靠。

| 机器人的崛起

这类担忧会被拿来和各国的其他优势做权衡，比如贸易协议、现有的先进制造能力和具有竞争力的劳动力成本。以墨西哥为例，它与美国和加拿大即将生效的贸易协定将推动企业从该地区内部采购汽车零件。世界银行的皮埃尔·索维（Pierre Sauvé）认为，与美国和/或欧盟达成的协定意味着哥伦比亚、哥斯达黎加、摩洛哥和突尼斯等国也可以从供应链转移中受益，与日本和韩国有着广泛而稳定的贸易关系的马来西亚和越南也一样。

这些国家不必将自己的目标局限于削弱中国在制造业中的地位。尝试提供数字化服务可能是一种更好的长期战略，而新冠疫情可能让这一战略更易实现。白领工作突然间基本上实现了数字化。如果管理者慢慢习惯于远程

监督员工，还有什么理由会不习惯于管理更多的海外员工呢？在日内瓦国际研究所（Graduate Institute in Geneva）任职的理查德·鲍德温（Richard Baldwin）指出，因疫情停工过后，企业将会积极节省成本。

即便如此，贸易也不是节流的唯一途径。欧洲大学学院（European University Institute）的伯纳德·霍克曼（Bernard Hoekman）警告说，企业可能选择将服务自动化，而不是转往海外。反过来，同样的警告也适用于希望工厂回迁国内能带来更多就业机会的人。对工程师来说机会可能是多了，但对餐厅服务员没有影响。

捍卫现状的人试图解释开放的优势，而批评者则抱怨全球化已经走得太远，现实是两者都可能会如愿以偿。在有足够的影响力来布署调整的国家，医疗和制药行业预计会面临把更多的生产本地化的压力。那些希望利用全球创意市场的中国企业会发现要进入这样的市场更难了。外资收购将受到猜疑。美国对其供应商的审查将让国际贸易更加困难。

但是，一旦企业可以重新开始投资，许多都会继续以追寻下一个增长点的方式打造自己的供应链。当然，需要留意那些倾向于在企业和它们偏爱的供应商之间设置障碍的政府。在这方面全球性企业都颇为擅长。奥罗克说：“如果要我给‘达沃斯人’提建议，我会建议他们少发表意见，忍气吞声。”他补充说，他对历史的研究教会了他万事保持温和中庸的好处。

如果政治领导人认为满足公众对安全的渴望就要对过去的做法全盘否定，那么回归常态就可能受阻。法国总统马克龙近期接受了《金融时报》专访，谈论新冠肺炎的教训及其可能带来的紧缩，他说：“很明显，这种全球化已经走到了它周期的尽头。”果真如此，更好的办法就是全球开始建立一个不再以单一主要出口国为中心、重新平衡的新周期，而不是完全放弃全球化。■



Payment systems

Piping up

Away from America, the financial world's nervous system is being rewired

TWO WEEKS before Christmas, executives from OneConnect, a Chinese technology firm, boarded a plane to New York. They landed in a chilly atmosphere: American legislators were about to bar Huawei, a telecoms giant suspected of spying for Beijing, from supplying American agencies. But OneConnect did the job. On December 13th it listed on the New York Stock Exchange, raising \$312m, which valued it at \$3.7bn. Analysts expect the loss-making firm's share price to climb by more than 70% in the next 12 months.

OneConnect supplies the artificial brain and nervous system of financial firms that go digital, says Dai Ke, its strategy chief. It serves all China's top lenders and 99% of the next tier down. It is expanding in Asia and recruits in America, where it runs a research lab, yet few people have ever heard of it. It belongs to a new breed of Chinese firms that are rewelding the pipes channelling money in the developing world. They are waging a "proxy battle" against American giants, says Huw van Steenis of UBS, a bank.

With America readier than ever to close the liquidity taps on rivals, China is investing time and money in building a private track. It has rolled out its own messaging system to complement SWIFT, which may one day supersede it. Meanwhile Alibaba and Tencent, two giant tech firms, have already built what Paco Ybarra of Citigroup, an American bank, calls "parallel banking systems". Their digital wallets have over 1bn users each and account for half of in-store payments and nearly three-quarters of web sales in China.

| *Plumbing new depths*

Payment systems are more about moving information than money. The process usually involves banks at both ends, which exchange messages about such things as the sender's identity or funds available. Within a single country banks talk the same language, and transfers can be settled by updating the central bank's ledger. But cross-border payments cause headaches. Rules and standards differ. And the world lacks a common central bank, so there is no global ledger on which to record the transfer.

For large-value payments, finance's usual fix is the "correspondent" banking system. Under often reciprocal arrangements, one bank in one country holds deposits owned by another bank in another. When a customer of the second wants to pay someone at the first, that bank instructs its correspondent to use the deposits. Many banks, however, do not have a direct link. To get to its final destination, the money must make stopovers. That requires an ID for each bank, a messaging system and a common language.

SWIFT provides all of these. Built over decades, its network is hard to replicate. But most of the world has two incentives to give it a go. The first is political. Although the organisation is not American, Uncle Sam leans on it to pressure friends and isolate foes. In 2018, when America threatened action if it did not exclude Iranian banks, SWIFT quickly complied.

The network's complexity also makes cross-border transfers slow and costly. Many tasks, like checking customers are not known criminals, are duplicated. Banks must keep idle funds in foreign currency (some \$10trn globally) to meet forecasted demand. And the system is not fully hack-proof. In 2016, North Korean hackers used stolen SWIFT identifiers to siphon off \$81m from an account Bangladesh's central bank held in New York.

Startups try to alleviate the pain by reducing the number of interactions banks and companies have with SWIFT. Some work with “hub” firms in recipient countries that break up big sums, like payroll, into tiny payments. Others aggregate transfers to absorb fixed costs. Lucy Liu of Airwallex, a fintech company, says it relocated from Australia to Hong Kong to serve rising demand from Chinese exporters. Some fintechs fully bypass SWIFT. Ripple, an American firm, has created a cryptocurrency it uses as an intermediary for payments between countries with different currencies.

Governments are also exploring crypto-money. China is leading a solo effort. It has already filed more than 120 patent applications for a sovereign digital currency, more than any other country. Hawks fear it may impose its use on BRI countries. “Our values are at stake,” says Tim Morrison, a former adviser to President Trump. But China seems to favour goals closer to home. With much of its economy now cashless, it sees a digital coin it controls as a crucial fail-safe for its domestic payment systems. It also wants to pre-empt Libra, a cryptocurrency Facebook intends to launch, from infiltrating people’s pockets.

Others have looked at international applications. Singapore and Canada, as well as Hong Kong and Thailand, have led joint experiments to test if digital coins minted by central banks could be used by commercial banks to transact across borders. Those proved successful, but engineers who took part doubt the system could ever deal with a large volume of transfers.

| *Crypto and petro*

Pariah states already use digital monies to trade unnoticed. North Korea has hacked crypto-exchanges to fund weapons imports. Russia used bitcoins to pay for the infrastructure that hacked into the servers of America’s Democratic Party in 2016. But that underground economy is tiny. Jonathan Levin of Chainalysis, a data outfit, says transactions involving the petro, a currency Venezuela created, hit its peak in the last quarter of 2019—at just

\$8m.

Europe has instead tried to barter. Last year Britain, Germany and France launched Instex, a system meant to match the payments of firms buying oil or foodstuffs from Iran with the receipts of companies selling to the country. In principle, goods could flow with no need of moving money. Yet it took 14 months for Instex to do its first deal. European firms, many of whom do more business with America than Iran, fear being blacklisted.

China has gone furthest. In 2015 it launched CIPS, an interbank messaging system to ease international payments in yuan. It uses the same language as SWIFT, allowing it to talk to other countries' payment systems. For now just 950 institutions use it—less than 10% of SWIFT's membership. But "what matters is it's there," says Eswar Prasad of Cornell University.

The real revolution is happening in low-value transfers. Like SWIFT, the network of American card schemes is tricky to displace. Member banks and merchants trust each other because they adhere to tested rules. They also like the convenience of the schemes' settlement platforms, which compute "net" positions between all banks that they square up at the end of the day. So rival schemes struggle to make a dent. In 2014, fearing sanctions could block it from using American schemes, Russia created its own, which now accounts for 17% of domestic cards. But its 70m tally is dwarfed by Visa and Mastercard's 5bn. Size is not a problem for UnionPay, China's own club. Just 130m of its 7.6bn cards were issued outside the mainland, however, where it is mostly used by Chinese tourists.

A mightier threat comes from a state-led revamp of domestic payment systems. Eager to reassert control over key infrastructure, some 70 countries have rebuilt their local plumbing to enable near-instant bank transfers at the tap of a screen. Europe is the most advanced, having fused local networks into a bloc of 35 countries and more than 500m people.

South-East Asia is also trying to stitch its systems together. On March 5th India and Singapore connected theirs for the first time.

China lags behind its neighbours in beefing up its kit. But that need not matter. As the region's trade hegemon, it can free ride on others. "Once Malaysia gets its system going, it will figure out a way to work with China," says Phil Heasley, a former chairman of Visa USA. China is also hedging its bets by building a private track.

Just five years ago, shopping in second-tier cities was tedious. Few shops accepted cards. They did not like the fees and lacked a connection to plug in terminals. Settling anything other than daily supplies in cash required wads of it. The mass adoption of smartphones, however, meant most customers were starting to carry mini-terminals around. And the invention of QR codes suddenly allowed customers to pay even when the merchant was offline.

The combination of both has swept all before it. Last year Chinese customers paid 347trn yuan (\$49trn) in purchases via mobile, 35 times the total in 2013. Two giants eat up 92% of the market. WeChat Pay, owned by Tencent, a tech group, dominates peer-to-peer transfers. Alipay, which belongs to Ant Financial, the finance arm of Alibaba, an e-commerce group, rules payments to firms. After loading digital "wallets" from their bank account, users can pay for almost anything, from cabs and bills to doctor appointments. Wallets charge no fee to users but tax them when they move money out, so everybody is incentivised to stay in their universe.

Their market now cornered, the "super-apps" are going global. Alipay is accepted by shops in 56 countries and regions, where it targets Chinese travellers. It has also bought minority stakes in wallets in nine Asian jurisdictions, allowing it to influence the industry without applying for local licences.

Douglas Feagin, Ant Financial's internationalisation chief, says connecting the wallets in which it has invested is not a priority. But others suspect the firm is waiting for local wallets to reach critical mass. "It may not be branded Ant Financial," says Zennon Kapron of Kapronasia, a consultancy, "but one of their goals is to eventually build an international cross-border wallet platform." Its expertise is also luring firms from farther away. Six European mobile wallets have adopted Alipay's QR format.

China's fintechs will not always succeed. In some markets credit cards, or interbank systems, are too popular. But the battle over payment methods masks a bigger war over the hardware and software that power them all. It is one that China is winning.

Squeezed by low interest rates and the high fixed costs of going digital, banks across Asia are seeking to borrow scale by "moving to the cloud". They store their data on large servers owned by specialist providers. Dave Bartoletti of Forrester, a research firm, sees the region as the "most important battleground" for cloud in finance (along with Europe). On hardware Alibaba is top dog. The firm provides a fifth of cloud infrastructure in Asia Pacific, more than its next two rivals (Amazon and Microsoft) combined.

China's tech firms also rule the software bit. The need to execute huge amounts of transactions fast—last year Alibaba netted its first billion dollars in sales for Singles' Day, China's annual shopping festival, in 68 seconds—has endowed Ant Financial and Tencent with a knack at automation, machine-learning genius and troves of data. Both have used them to build nimble digital banks. These lead the race to define identification and security standards, crucial as banks and payments move online. Henry Ma of WeBank, Tencent's offspring, says its facial-recognition tool has an error rate of less than one in a million (the human eye averages 1%).

Both banks are growing fast. MYbank (Ant Financial's offering) already serves 20m of the country's 100m SMEs. It also rents its kit to 200 other banks, and hopes to use Hong Kong and Singapore as a testing ground for those skills abroad. Investors think internationalisation has promise: Ant Financial, which is private, was valued at \$150bn in its latest funding round. WeBank is taking a different tack. It is making the infrastructure it created available on an open-source basis, so foreign banks can build upon it.

Tencent and Alibaba's greatest impact, however, may have been to awaken another giant. Ping An, a Chinese insurer with \$1trn in assets, decided to become a cloud company after seeing their meteoric rise in finance, says Jonathan Larsen, its innovation chief. The company, which invests 1% of its revenue—worth \$164bn last year—in research and development, has spawned 32 stand-alone businesses to help export the tech it hones at home.

The most strategic of its offspring is probably OneConnect, the startup that listed in New York in December. The firm offers cloud-based services that cover everything, from back-office to client-facing tasks. Its first foreign outpost, opened in 2018 in Singapore, has grown to 200 staff. It now serves 47 clients in 16 overseas markets. Those include Thailand, where it is poised to power the credit-card processing of a top-three bank, and Europe.

Covid-19 could help. With staff stuck at home, banks across the world are looking to move data-hungry processes like risk management online. OneConnect has launched a charm offensive to capture the business—this time without boarding a plane. ■



支付系统

双管齐下

在远离美国的地方，金融世界的神经系统正在重新连接【专题报道《国际银行业》系列之四】

去年距圣诞节还有两周时，中国科技公司金融壹账通的高管登上了飞往纽约的航班。他们降落在寒冷肃杀的氛围中：因为怀疑电信巨头华为为北京从事间谍活动，美国立法者即将禁止这家公司向美国政府供货。但金融壹账通完成了自己的任务：12月13日它在纽约证交所上市，筹集到3.12亿美元，这让它的估值达到37亿美元。分析师目前预计，这家尚在亏损的公司在未来12个月内股价将上涨超过70%。

金融壹账通的首席战略官戴可说，公司为向数字化转型的金融公司提供人工大脑和神经系统。它服务所有中国顶级银行和下一级银行中的99%。它正在亚洲扩张，在美国设有一个研究实验室并招募人员，不过很少有人听说过这家公司。和它类似的一批中国新生代企业正在重新焊接发展中国家传输资金的管道。瑞银（UBS）的休·范斯坦尼斯（Huw van Steenis）表示，它们正在掀起一场与美国巨头的“代理人战争”。

鉴于美国比以往任何时候都更可能关停对手的流动性闸门，中国正投入时间和资金打造一个私人通道。它已经推出了自己的消息传递系统来作为SWIFT（环球同业银行金融电讯协会）的补充，某天可能会完全取代它。与此同时，两大科技巨头阿里巴巴和腾讯已经建立了美国花旗集团的帕科·伊巴拉（Paco Ybarra）所说的“平行银行系统”。它们各自的数字钱包都拥有超过10亿用户，承担了中国一半的实体店内支付和近四分之三的销售支付。

| 下挖新深度

支付系统更多的是在传递信息而不是钱。这个过程的两端通常是银行，它们交换有关付款方的身份或可用资金等信息。在单个国家内部，银行使用相同的语言，可以通过更新中央银行的分类帐来结算转帐。跨境支付就比

较麻烦。各地的规则 and 标准各异。而世界又没有一个通用的中央银行，因此也没有一本记录跨境转账的全球分类帐。

对于大额付款，金融系统通常的解决方法是“代理”银行系统。在通常都是对等的安排下，一个国家的一家银行持有属于另一国的另一家银行的存款。当第二家银行的客户想要给第一家银行的某个客户付款时，第一家银行就会指示其代理行动用这笔存款。但是，许多银行之间并没有直接的联系。为到达最终目的地，这笔钱必须经过中间行。这就要求每家银行都有一个自己的身份号，还要有一个消息传递系统和一种通用语言。

SWIFT提供了所有这一切。其网络已经建立了几十年，很难复制。但是，世界上大多数地区都有两种动力来试一把。首先是政治。尽管该组织并不是属于美国的，但山姆大叔依靠它来向盟友施压并隔离敌人。2018年，当美国威胁称如果不排除伊朗的银行就要采取行动时，SWIFT很快服从了。

这个网络的复杂性也使得跨境转账速度慢、价格高。许多任务都是重复的，例如核查非已知罪犯的客户身份。银行必须用外币保留一些闲置资金（全球总计约10万亿美元）以满足预期需求。而且这个系统不完全防黑客。2016年，朝鲜黑客使用盗窃来的SWIFT标识符，从孟加拉国央行在纽约开设的账户中窃取了8100万美元。

创业公司试图减少银行和企业与SWIFT的互动次数以减轻麻烦。它们中有些和收款国的“枢纽”公司合作，把大笔款项（如工资）分拆成小额支付。还有些把转账汇总以节省在固定费用上的开支。金融科技公司空中云汇的刘月婷表示，公司从澳大利亚迁到了香港以满足中国出口商日益增长的需求。一些金融科技公司完全绕过了SWIFT。美国公司瑞波（Ripple）创建了一种加密货币，充当在使用不同货币的国家之间支付的中介。

各地政府也正在探索加密货币。中国在那些单打独斗的行动中走在最前面。它已经为一种主权数字货币申请了120多项专利，比任何其他国家都多。鹰派担心中国可能会把这种货币强加给“一带一路”沿线国家使用。“我们的价值观受到了威胁。”特朗普总统的前顾问蒂姆·莫里森（Tim

Morrison) 说。但中国似乎更喜欢离它较近的目标。由于中国经济中有一大块都已不再使用现金，中国政府把一种受它控制的数字货币视为对国内支付系统至关重要的后备保障。它也想抢在Facebook计划推出的加密货币Libra之前渗透人们的钱包。

另外一些国家和地区探索了国际化应用。新加坡和加拿大，还有香港和泰国，都已联手开展实验，测试由央行铸造的数字货币是否可被商业银行用于跨境交易。这些实验已经成功，但参与其中的工程师怀疑数字货币系统无法应付海量转账。

| 加密货币和石油币

流氓国家已经在悄无声息地使用数字货币开展交易。朝鲜入侵了加密货币交易所来获得进口武器的资金。俄罗斯用比特币支付于2016年入侵了美国民主党服务器的硬件设施。但这一地下经济规模很小。数据公司Chainalysis的乔纳森·莱文(Jonathan Levin)表示，用到委内瑞拉创造的“石油币”(Petro)的交易在2019年最后一个季度达到峰值——仅800万美元。

欧洲则尝试了以物易物。去年，英国、德国和法国推出了Instex系统，试图把从伊朗购买石油或食品的公司付款与向伊朗出口商品的公司收款匹配起来。原则上，无需转移资金就可以让货物流动。然而，Instex花了14个月才完成了第一笔交易。许多欧洲公司和美国做生意比和伊朗多，它们担心被美国列入黑名单。

中国走得最远。2015年它推出了银行间消息系统“人民币跨境支付系统”(CIPS)以简化人民币国际支付。它使用和SWIFT相同的语言，所以可以和其他国家的支付系统对接。目前只有950家机构使用它——不到SWIFT成员总数的10%。但是，“重要的是它已经存在。”康奈尔大学的埃斯瓦·普拉萨德(Eswar Prasad)说。

真正的革命正在小额转账领域中发生。和SWIFT一样，美国的银行卡网络很难被取代。其成员银行和商家彼此信任，因为大家都遵守经市场验证的

规则。大家也都喜欢其结算平台的便利性，它会在一天结束时结清所有银行的“净”余额。因此竞争对手很难抢它的生意。2014年，由于担心美国的制裁可能会禁止它使用美国银行卡网络，俄罗斯创建了自己的银行卡网络，目前占国内发卡总数的17%。但是，它7000万张的总数只是维萨卡及万事达卡的50亿张的一个零头。对中国自己的银行卡俱乐部“银联”来说，规模不是问题。但是，在它发行的76亿张卡中，只有1.3亿张是在中国大陆以外发行，主要是中国游客在使用。

一个更大的威胁来自自由国家主导的对本国支付系统的改造。因急于重新确立对关键基础设施的控制权，约70个国家已经重建了本地管道，以求在屏幕上一划就能完成近乎即时的银行转账。欧洲走在最前面，已将地方网络融合成一个35国集团，覆盖超过五亿人。东南亚也在尝试将它的系统粘合在一起。3月5日，印度和新加坡首次连接了双方的系统。

中国在加强自己的设施方面落后于邻国。但这可能也无关紧要。身为区域贸易霸主，它可以搭其他国家的便车。维萨美国（Visa USA）的前董事长（Phil Heasley）说：“一旦马来西亚启用自己的系统，它将找到与中国合作的方式。”中国还在建造一条私人赛道来对冲自己的押注。

仅仅五年前，在中国的二线城市购物还很繁琐。商店里大多不能刷卡，因为商家不喜欢为此支付手续费，也没有接入终端的连接。购买日常用品以外的东西往往需要一大摞现金。然而，智能手机普及后，大多数顾客开始随身携带迷你终端。而二维码的发明一下子使得顾客在即便商家离线时也能付款了。

两者的结合所向无敌。去年，中国消费者通过移动设备为购物支付了347万亿元人民币，是2013年时总额的35倍。两家巨头瓜分了92%的市场。科技集团腾讯的微信支付主宰了点对点转账。电商集团阿里巴巴的金融部门蚂蚁金服的支付宝则统领了商业支付。用户用银行帐户给数字“钱包”充值后，就可以为从打出租、付账单到看病的几乎任何事项付费。这些钱包不向用户收取任何费用，但如果用户要把钱转出则要扣除一笔服务费，这就促使每个人都继续留在它们的世界里。

在垄断了国内市场后，这些“超级应用”正在走向全球。56个国家和地区的商店已经接受支付宝付款，以吸引中国游客。支付宝还在亚洲九个司法辖区收购了数字钱包的少数股权，这样它无需申请当地牌照就可以影响这个行业。

蚂蚁金服的国际化业务负责人道格拉斯·费根（Douglas Feagin）表示，把公司已经投资的钱包连接起来并非优先事项。但其他人怀疑这家公司只是在等待这些本地钱包的规模达到临界点。咨询公司Kapronasia的泽农·考普龙（Zennon Kapron）表示：“他们的目标之一是最终建立起一个国际跨境钱包平台，虽然这个平台可能不会挂蚂蚁金服的牌子。”这家公司的专业知识也吸引了更遥远的同业。六个欧洲移动钱包已经采用了支付宝的二维码格式。

中国的金融科技不会永远成功。在某些市场，信用卡或银行间系统太受欢迎了。但是，关于支付方式的战役掩盖了一场围绕支撑所有这些支付方式的软硬件的更大的战争。而中国正在赢得这场战争的胜利。

受到低利率和数字化转型的高固定成本的压力，亚洲各地的银行都在寻求通过“移到云端”来借得规模。它们把数据存储专门在供应商拥有的大型服务器上。研究公司Forrester的戴夫·巴尔托莱蒂（Dave Bartoletti）将该地区和欧洲一道视为金融云的“最重要战场”。在硬件方面，阿里巴巴目前排在第一。该公司供应了亚太地区五分之一的云基础设施，超过紧随其后的两个竞争对手亚马逊和微软的总和。

中国的科技公司也统治了软件领域。因为需要快速执行大量交易（去年双十一阿里巴巴在68秒内完成十亿美元销售额），蚂蚁金服和腾讯都掌握了自动化和机器学习方面的本领以及大量数据。两者都用它们来构建灵活的数字银行。这也引发了身份识别和制定安全标准的竞赛——这在银行和支付向线上转移时至关重要。腾讯的微众银行（WeBank）的马智涛说，公司的面部识别工具的错误率不到百万分之一（人眼平均为1%）。

两家银行都迅猛扩张。蚂蚁金服的网商银行（MYbank）已经为中国一亿

家中小企业中的2000万家提供服务。它还将自己的工具包出租给其他200家银行，并希望利用香港和新加坡作为这些技术在中国大陆以外的试验场。投资者看好它的国际化前景：非上市公司蚂蚁金服在最近一轮融资中的估值达1500亿美元。微众银行的策略与之不同。它正在开源提供自己创建的基础设施，让外国银行可以在此基础上构建自己的系统。

但是，腾讯和阿里巴巴的最大影响可能是唤醒了另一家巨头。拥有一万亿美元资产的中国保险公司平安在看到这两家的金融业务急速崛起后，决定成为一家云公司，该公司创新总监乔纳森·拉森（Jonathan Larsen）说。中国平安将它营收（去年达1640亿美元）的1%投入研发，已经催生了32家独立企业帮助出口它在国内打磨的技术。

它最具战略意义的子公司可能就是金融壹账通了，这家创业公司于去年12月在纽约上市。该公司提供云基服务，涵盖从后台办公到面向客户的任务等方方面面。它的第一个海外中心于2018年在新加坡开业，现已发展到200名员工。它目前为16个海外市场的47个客户提供服务，包括泰国和欧洲。在泰国，它将支持一家排名前三的银行处理信用卡交易。

新冠肺炎可能会再助推一把。由于员工们被困在家中，世界各地的银行都在寻求将风险管理这类需要海量数据的流程转移到线上。金融壹账通已经展开魅力攻势来抢占商机——这次不需要搭乘飞机了。■



Global banks

Credit clout

The global advance of China's companies is bringing its giant banks out into the world, too

AMERICAN BANKERS make for bold bosses. From his roomy office in Manhattan, in early February, the boss of one of the country's biggest suggested he has few serious rivals—and all are just a few blocks away. “US banks continue to gain share from European banks.” Asia barely gets a mention. “Chinese institutions have generally proven incapable of expanding globally. When they buy sports cars and flashy hotels, it just doesn't feel solid.” Days later Morgan Stanley, America's sixth-largest bank, announced its \$13bn acquisition of E-Trade, a broker—the biggest by a Wall Street bank since 2008.

Within weeks China had exported a different threat. As coronavirus-induced investor fever took hold, the Dow Jones index of top American lenders, which had soared by a third over 2019, crashed by 50%. The market rout did not wipe them out. But it is the sort of event that could lead incumbents to self-isolate—accelerating the discreet spread of Chinese banks in emerging markets. And the country is opening up its own market, hoping to learn tips from new entrants along the way.

Chinese banks are already huge. Their total assets now surpass those of American and European banks. They are also providing more cross-border credit, the bread and butter of international banks. The sum they lend overseas has grown by 11% a year since 2016. More surprising to outsiders, they are gaining clout in the sophisticated universe of capital markets, too. Last year Chinese banks earned three times more investment-banking fees than all Asian rivals combined (excluding Japan). Their share of the total has jumped from 1% in 2000 to 14%.

| *Balance-sheet of power*

On the eve of the collapse of Lehman Brothers in 2008, European banks were the kings of cross-border lending. They accounted for 71% of total flows, which had grown from \$10trn in 2000 to \$35trn in 2008. But the subprime meltdown, followed by the eurozone crisis, forced them to retreat. As regulators required global banks to hold more rainy-day equity, other lenders chose to issue capital or to retain earnings. But conditions in Europe meant its banks had little choice but to trim their balance-sheets. Banks shed assets overseas. Far-flung subsidiaries were sold or shut. Today Europe (including Britain and Switzerland) provides 47% of the world's \$31trn in cross-border flows.

Cyclical events are likely to stymie them further. It is hard for banks to grow faster than their home economy. Europe has had anaemic growth throughout the 2010s. The virus crisis is turning 2020 into an even sicker year. Interest rates, negative across the region for many quarters, are plumbing new depths. European banks' return on tangible equity (ROTE) sank to 6.6% last year (investors reckon 10% is par). America's top banks, buoyed by positive rates and a sprightly economy, posted double-digit ROTEs in 2019.

Europe will be hindered by structural factors, too. American lenders draw strength from their vast and unified home market. They can also reduce risk by repackaging loans and flogging them onto the country's deep capital markets. The EU lacks both those things. Squabbles among members are hampering plans to complete a banking union. Cross-border mergers would give its top banks more scale, but are politically tricky, says Irene Finel-Honigman of Columbia University. And efforts to fuse capital markets remain unfinished (and diminished by Brexit, which separates the EU from its main financial centre).

The biggest issue lies with where European banks sit within the financial

system. For all their cross-border heft, they are mostly middlemen, ferrying greenbacks from New York to other corners of the planet. Outside Europe much of their lending is done in dollars. Some is locked in long-term loans that cannot be called back. Yet they have no natural source of dollars, so many fund themselves by borrowing from short-term money-market funds. That makes them hostage to unsympathetic parties. Many reeled in 2012 when American funds, spooked that some European countries might default on their debt, struck European clients off their registers, says a top executive at a Swiss lender.

Asian rivals are filling part of the gap. With Japan stagnant, the country's "megabanks" have been hunting for yield. They now extend 16% of global cross-border lending, twice their pre-2008 share. But their onslaught looks brash: they have piled into risky American securities. The rise of South-East Asia's "super-regionals" seems more robust. They avoided follies during the 2000s, so suffered no hangover, says Edmund Lin of Bain, a consultancy. They have upgraded their tech. Perky economies give them oomph. Their total assets in the region have grown fivefold since 2002, when those of international banks doubled.

Many think China is missing out. A distant third in 2008, its banking system, at \$40trn in assets, now surpasses both the euro area's and America's. A list of 30 "global systemically important banks" by the Financial Stability Board, a grouping of watchdogs, now includes all China's "Big Four"—Bank of China, Industrial and Commercial Bank of China (ICBC), China Construction Bank and Agricultural Bank of China. Only one featured in 2012. But sceptics say they sit on dud loans at home and are being reined in by the state, which owns them. Their management is deemed "paternalistic"; their systems "unsophisticated".

Chinese banks have indeed long been absorbed by their home market, where they have a 98% share. And their first attempts at internationalising

did fail. Many hoped to garner tips on how to climb global leagues in the 2000s after luring American stars, like Goldman Sachs and Bank of America, as “strategic shareholders” through IPOs in Hong Kong. But those stakes were quickly liquidated after the subprime crisis. Chinese banks also realised they could earn higher profits at home. So plans were scaled back.

In recent years, however, they have been on a stealthy prowl. Banks have followed their corporate clients, themselves inclined to grow beyond their saturated home market. They finance trade, take local deposits from local subsidiaries and serve their mundane needs, like cash management or foreign exchange. They also fund Chinese-built infrastructure in emerging markets. Thanks to huge balance-sheets and inside knowledge of contractors’ history, they often outcompete foreign peers, says John Ott of Bain.

| *The Chinese octopus*

Their tentacles are spreading. The Big Four now have a total of 618 branches outside the mainland—a conservative proxy, since commercial banks need few shops. Since 2015 their share of global cross-border lending has risen from 5% to 7%. Foreign assets account for 9% of their book. Their footprint differs from that of Western peers: Chinese banks supply two-thirds of all cross-border lending within emerging markets. Hasnen Varawalla of Absa, a South African bank, says their presence in Africa keeps growing.

President Xi Jinping’s Belt and Road Initiative (BRI) is a big catalyst. Chinese banks have lent nearly \$600bn to 820 official BRI projects since 2013, reckons RWR, a consultancy. Unofficial sums are probably bigger. Bank of China alone says it lent more than \$140bn to 600 projects between 2013 and mid-2019 (others do not disclose figures). Chinese lenders are expanding along the trail: they now have 76 branches in BRI countries, many created since 2018. Commercial banks share the labour with “policy” banks, like China Development Bank or the Export-Import Bank. Those tend to fund

low-yielding projects like ports and railways, while the Big Four often back the “bankable” amenities around them, such as shopping centres or property development. Significant lending also appears to be done by non-bank subsidiaries of Chinese banks (no one knows how much). Many state agencies also disburse “hidden” credit. A paper in 2019 by German economists argues international bodies miss as much as 50% of China’s “public” lending.

The medium-term fallout from covid-19 may draw China’s Big Four further out. China’s global firms—which make up 24% of the Fortune 500 ranking, second only to America’s—may focus on Asia, where they have a natural edge. The banks will also want to diversify away from their domestic market, where non-performing loans are increasing. And unlike Japanese banks in the 1980s, which bought expensive property, they “have a strategic reason to win,” says Jamie Dimon of JPMorgan Chase.

They may be fighting the wrong fight. Since the financial crisis a growing share of people and firms are financing themselves by issuing securities on capital markets, shunning traditional lenders for “shadow” banks like pension funds and insurance firms. These have been amassing assets twice as fast as banks since 2008. They now account for nearly half the world’s financial system—about \$184trn. Issuers of securities still rely on banks, but the shift favours those earning a living through fees (advising on issuances or underwriting them) rather than interest on loans from their balance-sheets.

American banks have a huge advantage, says James Gorman, Morgan Stanley’s boss. They make 60% of their revenue at home, which hosts the world’s biggest and most profitable capital market (it now represents 45% of global investment-banking revenue, up from 36% in 2009). The world’s top-five earning banks are all American. Some European banks, notably BNP Paribas, have snapped up clients and businesses from ailing peers,

says Jean Lemierre, its chairman. Yet even in their backyard the top slots belong to transatlantic rivals.

Gaining an edge in investment banking requires a global network of investors and companies Chinese banks do not yet have. Many also lack independence. In 2015 the state leaned on securities firms to rescue the stockmarket. Last year it told them to lend to struggling small firms. Attempts at tie-ups with foreigners have foundered, too. The rigid hierarchy of China's state-owned firms does not mix well with Wall Street's freewheeling ethos, bankers say. Many staff have left CLSA, a respected Hong Kong outfit, since CITIC, a Chinese broker, bought it in 2013.

But Chinese banks are making unnoticed leaps. Eager to diversify funding and amass firepower for acquisitions overseas, home-grown companies have been rapidly raising dollar debt. Issuance reached \$310bn last year, from \$71bn in 2016. Chinese banks are underwriting these as lead or even sole arrangers, allowing tighter links with domestic titans while building contacts with foreign investors. Some also outsource services they do not yet master, like sales or electronic trading, to Western banks, which they then resell under their own brand. That enables them to grab a growing slice of clients' "banking wallet".

They are also progressing in the prestigious equity business. In 2019 CITIC beat Goldman Sachs to become the first local bank to top league tables in Asia. Chinese firms are propelled by their home market: local companies raised half a trillion dollars through IPOs in the past decade, says Refinitiv, a data firm. They are climbing the ranks in Hong Kong, which became the world's largest listing hub in 2019. Chinese venues may not replace New York peers soon, says Ivy Wong of Baker McKenzie, a law firm. But they do provide leverage. Chinese issuers facing resistance in America can court global investors from Hong Kong, with no political fracas. Stock Connect, a scheme launched in June 2019 allowing Shanghai-listed firms to raise

equity in London, may help.

Elsewhere in Asia China's progress has been muted. But that need not matter much. Last year protests in Hong Kong prompted talk of a drain to Singapore, the rival regional centre. Yet, loth to anger Chinese officials, few firms dared move staff, says an executive at an American bank in Hong Kong. The Middle Kingdom is cementing its status as the centre of gravity for the region: investment-banking revenue in China has grown to \$12bn, up from \$550m in 2000.

Those juicy prospects are attracting outsiders—and Beijing is opening the door. Last year regulators cleared the way for full foreign takeovers of local banks. They then allowed outsiders to control wealth-management firms, pension-fund managers and brokers. In April foreign-ownership caps were also removed on securities firms. The world's A-team of money managers is teaming up with locals or seeding subsidiaries in the hope of grabbing a slice of China's \$45trn financial-services market. "Every week we get a knock on the door by one of these top 15 players," says Greg Gibb of Lufax, a Chinese wealth manager.

Breaking ground will be hard. Incumbents have a 25-year head start at building networks of branches and contacts throughout China's huge landmass. Often they use investment banking to cross-sell other services to local companies, so can undercut outsiders on fees. Past episodes of liberalisation are not encouraging: in 2007, when Beijing first allowed foreign banks in, it hindered competition by forcing them to operate in bizarre locations. Today they have a 1.5% market share.

New entrants say it would be mad not to try. But many fear they will be crushed before they get big enough to make money. "We do not have expectations of short-term commercial success," says the man in charge at an American firm. Another money manager in a tie-up with a local

company says the flow of information seems to be going only in one direction.

Incumbents can hope for more efficient markets and some knowledge transfers. Many have started joint ventures with several foreign firms to cover all bases. “China is opening up because it is confident,” says a former Bank of China executive. He compares the country’s financial industry to its automotive sector, on which China also lifted ownership caps last year. One such tie-up suggests possible dangers ahead for foreign companies. In 2007 Geely, an obscure Chinese firm, partnered with LTI, the maker of London’s black cabs. By 2013 it had bought the business. It is now filling Britain with e-taxis that can out-green Uber. ■



全球银行

信贷势力

中国企业的全球行军也把它的银行巨头带向了世界【专题报道《国际银行业》系列之二】

美国的银行家圈子出大胆老板。2月初，在曼哈顿一间宽敞的办公室里，一家顶级银行的老板表示自己没有几个真正对手——而且他们都只隔了几个街区。“美国的银行继续从欧洲银行那里抢夺市场份额。”亚洲几乎不值一提。“中国的银行已经基本上证明了自己没有能力向全球扩张。当它们买跑车和那些豪华招眼的酒店时，给人感觉就是不靠谱。”十几天后，美国第六大银行摩根士丹利宣布以130亿美元收购券商E-Trade，这是自2008年以来华尔街的银行最大的一笔交易。

几周后，中国出口了另一种威胁。随着新冠病毒引发的投资者恐慌一发不可收拾，在2019年飙升了三分之一的道琼斯美国顶级银行指数暴跌了50%。市场崩盘并没有把它们摧毁。但这类事件可能会导致传统银行自我隔离，从而加速中资银行在新兴市场中的谨慎扩张。而且中国正在开放自己的市场，希望在此过程中向新进入者学习技巧。

中国的银行已经十分庞大。它们的总资产现在超过了美国和欧洲的银行。它们也在提供更多的跨境信贷——这是跨国银行的主要收入来源。自2016年以来，它们向海外发放的贷款总额每年增长11%。更令外界惊讶的是，它们也在资本市场的复杂世界中获得影响力。去年，中资银行赚得的投行业务费用比除日本以外的所有亚洲竞争对手的总和还要多三倍。它们在这个市场中的份额已从2000年的1%扩大到14%。

| 势力决算表

在2008年雷曼兄弟倒闭前夕，欧洲的银行是跨境贷款领域的王者。跨境贷款总额从2000年的10万亿美元增加到了2008年的35万亿美元，欧洲银行占到了其中的71%。但是，次贷危机以及随后的欧元区危机迫使它们回撤。由于监管机构要求全球性银行持有更多净资产以备不时之需，其他地方的

银行选择发行资本或保留收益。但欧洲的状况意味着其银行别无选择，只能削减资产负债表。它们砍掉了海外资产，出售或关闭了遥远的分支机构。如今，欧洲（包括英国和瑞士）提供了全球31万亿美元跨境贷款总额的47%。

周期性事件很可能会进一步阻碍它们。银行的发展很难快过本国经济。在整个2010年代，欧洲增长乏力。而病毒危机正将2020年变成更虚弱的一年。在整个欧洲持续了多个季度的负利率正在下探新的深度。去年，欧洲银行的有形资产回报率（ROTE）降至6.6%（投资者认为一般标准是10%），受正利率和活跃的经济提振的美国顶级银行则给出了两位数。

欧洲还将受到结构性因素拖累。美国的银行从其庞大且统一的国内市场中汲取力量。它们还可以重新打包贷款，放到该国深厚的资本市场上出售来降低风险。这两点欧盟都不具备。其成员间的争执不休阻碍了建立银行业联盟的计划。哥伦比亚大学的艾琳·菲内尔-霍尼希曼（Irene Finel-Honigman）说，跨境合并会使欧洲的顶级银行更具规模，但在政治上很棘手。而融合资本市场的努力仍未完成（并且被英国脱欧所削弱，因为它令欧盟和自己的主要金融中心分离）。

最大的问题在于欧洲银行在金融体系中的角色。尽管有较大的跨境影响力，它们大多只是中间商，把美元从纽约运送到地球上其他角落。它们在欧洲以外的地区发放的贷款多以美元完成。有些银行被无法提前收回的长期贷款锁定。然而它们并没有自然的美元来源，因此许多都是从短期货币市场基金借钱来筹措资金。这使它们受制于无情的合作方。瑞士一家银行的高管表示，许多欧洲银行在2012年受到打击，因为当时美国的基金害怕一些欧洲国家可能发生债务违约，直接把欧洲客户剔除了。

亚洲竞争对手正在填补部分缺口。日本的“超大银行”因为本国经济停滞而一直四处寻求收益。目前它们提供了全球跨境贷款的16%，是2008年前占比的两倍。但它们的猛烈出击看起来很草率——蜂拥购入高风险的美国证券。东南亚的“超级区域联队”的崛起似乎更为稳健。咨询公司贝恩

（Bain）的埃德蒙·林（Edmund Lin）说，它们避过了2000年代的危险

操作，因此也没有后遗症。它们已经升级了自己的技术。充满活力的经济给它们注入了能量。自2002年以来，它们在亚洲地区的总资产增长了四倍，而同期那些国际银行的资产增长了一倍。

许多人认为中国正在错过机遇。2008年中国银行系统的规模在全球排第三，但远远落后于前两名。现在，其资产总额达40万亿美元，超过了欧元区和美国。由一批监管机构组成的金融稳定委员会评选的30家“全球系统重要性银行”如今包括中国全部“四大行”：中国银行、中国工商银行、中国建设银行和中国农业银行。2012年时还只有一家入选。但持怀疑态度的人说，它们在国内坏账累累，并被拥有它们的政府严格控制。它们的管理被认为是“家长式的”；它们的系统“还不成熟”。

中资银行长久以来无疑都沉浸于本国市场，在其中占有98%的份额。而它们最初的国际化尝试的确也都失败了。2000年代，它们中有许多通过在香港上市，吸引到高盛和美国银行等美国明星成为“战略股东”，希望以此获取攀登全球梯队的技巧。但次贷危机爆发后，这些股份很快被抛掉了。中资银行也意识到它们可以在国内赚到更高的利润。因此向外扩张的计划收缩了。

但近些年来，它们一直在悄悄布局。银行追随自己企业客户的脚步，而这些客户本身想要到已经饱和的国内市场之外发展。它们为贸易融资，吸收当地存款并服务日常需求，比如现金管理或换汇。它们也为中国在新兴市场建造的基础设施融资。贝恩的约翰·奥特（John Ott）说，它们拥有庞大的资产负债表和对承包商背景的内幕知识，所以通常都比外国同行更有竞争力。

| 中国八爪鱼

它们的触角在延伸。目前，四大行在中国大陆以外共有618个分支机构——这是一种保守的衡量影响力的方式，因为商业银行并不需要多少营业网点。自2015年以来，它们在全球跨境贷款中的份额从5%上升至7%。外国资产占其资产负债表的9%。它们的足迹不同于西方同行：中资银行提供了新兴市场所有跨境贷款的三分之二。南非联合银行（Absa）的哈斯南·

法拉瓦拉（Hasnen Varawalla）表示，它们在非洲的业务不断扩张。

习近平主席的“一带一路”倡议是一大催化剂。咨询公司RWR估计，自2013年以来中资银行已向820个“一带一路”官方项目提供了近6000亿美元贷款。非官方的数额可能更大。仅中国银行一家就说它在2013年至2019年年中向600个项目提供了逾1400亿美元的贷款（其他银行没有透露具体数字）。中国的贷款机构正沿着“一带一路”出征：它们目前在沿线国家拥有76个分支机构，许多都是在2018年后成立的。商业银行会和国家开发银行或进出口银行等“政策性”银行分担任务。政策性银行往往为港口和铁路等低收益项目融资，而四大行则经常性地支持这些项目周边的“可盈利”便利设施，如购物中心或房地产开发。中资银行的非银行子公司似乎也提供了大量贷款（没人知道具体数额）。许多政府机构也发放“隐形”信贷。德国经济学家2019年发表的一篇论文认为，国际机构的统计漏掉了多达50%的中国“公共”贷款。

新冠肺炎的中期影响可能会把中国四大行进一步拉出国门。中国的全球性企业（在《财富》世界500强中占24%，仅次于美国）可能会把重点放在它们拥有天然优势的亚洲地区。四大行也会希望从不良贷款不断增加的国内市场转向多元化。而与1980年代日本银行购买昂贵的房地产不同，它们“有战略上的获胜机会”，摩根大通的杰米·戴蒙（Jamie Dimon）说。

它们有可能打错了仗。自金融危机以来，越来越多的人和公司通过在资本市场上发行证券来为自己融资，避开传统银行，而转向养老基金和保险公司等“影子”银行。自2008年以来，这类机构积累资产的速度是银行的两倍。它们现在占到全球金融体系的近一半，约184万亿美元。证券发行者仍然依赖银行，但这种转变有利于那些靠收费（为发行证券提供咨询或承销）谋生的部门，而不是靠资产负债表上的贷款赚利息的机构。

摩根士丹利的老板詹姆斯·高曼（James Gorman）说，美国的银行拥有巨大的优势。它们60%的收入来自国内，那里有全球最大、最赚钱的资本市场（目前占全球投行收入的45%，2009年时为36%）。全球收入最高的前五家银行都是美国银行。法国巴黎银行（BNP Paribas）的董事长让·勒

米埃尔（Jean Lemierre）表示，一些欧洲银行，尤其是法国巴黎银行，已经从陷入困境的同行手中抢夺了客户和业务。然而，即使在它们自家后院，最靠前的位置也属于大西洋彼岸的对手。

要在投行业务领域获得优势需要一个全球性的投资者和企业网络，而中资银行尚不具备这些。此外许多银行也缺乏独立性。2015年，中国政府依赖券商救市。去年，政府让它们给陷入困境的小企业放贷。与外国人结盟的尝试也失败了。银行业人士说，中国国有企业僵化的等级制度和华尔街随心所欲的精神合不来。中国大陆的证券公司中信（CITIC）在2013年并购了声誉极高的香港公司里昂证券（CLSA），自那以后里昂证券的许多员工都已离职。

但中资银行正在不动声色地实现飞跃。国内的本土企业急于转向多元化融资并为海外收购积蓄弹药，它们的美元债务迅速增加。发行额从2016年的710亿美元增至去年的3100亿美元。中资银行正在充当主承销商甚至唯一的承销商，这让它们与国内巨头的关系更加紧密，同时与外国投资者建立起联系。有些还把自己目前尚未熟练掌握的服务（如销售或电子交易）外包给西方银行，再以自己的品牌转售。这让它们得以从客户的“银行钱包”中分得越来越大的一块。

在享有声望的股权业务上，它们也在取得进展。2019年，中信击败高盛，成为第一家登上亚洲股票资本市场榜首的中资银行。中国企业受到本土市场的推动：据数据公司Refinitiv统计，中国企业在过去十年中通过IPO筹集到了五千亿美元。它们在香港提升自身地位，那里在2019年成为全球最大的上市中心。律师事务所贝克·麦坚时（Baker McKenzie）的王端淇说，中国的证交所可能不会很快取代纽约同行的地位。但它们确实带来了影响力。在美国面临阻力的中国发行方可以在香港吸引全球投资者而避免政治上的麻烦。2019年6月推出的“沪伦通”计划让在上海上市的公司可以到伦敦发行股票，可能也有助益。

中国在亚洲其他地区的进展不大。但这可能也没什么大不了。去年香港发生抗议活动后，人们谈论迁往新加坡这个竞争性的区域中心。不过，香港

一家美国银行的高管表示，企业都不想激怒中国官员，因而没有几家敢调离员工。中国正在巩固它作为亚洲重心的地位：中国的投行业务收入已从2000年的5.5亿美元增至120亿美元。

这些油水丰厚的前景吸引着外界，而北京正在打开大门。去年，监管机构为外资全面收购本地银行清除了路障。而后它们又允许外国公司控制财富管理公司、养老基金管理机构和券商。4月，证券公司的外资持股上限也被取消。全球最顶尖的一批理财公司正与本地人合作，或者酝酿设立子公司，以期在中国45万亿美元金融服务市场中分得一杯羹。“每周都会有一家‘15大’来敲我们的门。”中国的投资理财平台陆金所（Lufax）的计葵生（Greg Gibb）说。

要打开局面很难。本地传统银行已经早于外资银行25年在中国辽阔的土地上建立起分支和人脉的网络。它们常常利用投行业务向本地企业交叉销售其他服务，因此可以压价与外来者竞争。过去的几段自由化进程并不怎么鼓舞人心：2007年北京首次允许外资银行进入时，迫使它们在一些偏僻的地点运营，限制了竞争。目前它们拥有1.5%的市场份额。

新进入者说，不试一把那真是疯了。但也有许多人担心业务还没做大到能赚上钱就已经被碾毙了。一家美国公司的负责人说：“我们不期望在短期内获得商业成功。”与一家本地公司合作的另一位理财经理说，信息似乎只是单向流动。

本土的“在位者”可以期待市场变得更高效率，并获得一些知识传授。它们中许多已经开始和多家外国公司成立合资企业以求万无一失。一位中国银行前高管表示：“中国在放开，因为它有自信。”他把中国的金融产业和汽车产业相提并论，中国在去年也取消了汽车业的外资所有权上限。其中一个合作的例子显示了外国公司可能面临的危险。2007年，一家不起眼的中国公司吉利与伦敦黑色出租车的生产商LTI成为合作伙伴。到2013年，它已经把LTI收入囊中。现在，吉利正在把比优步更“绿色”的电动出租车送上伦敦的大街小巷。■



International banking

Parallel universe

Geopolitics and technology are pulling half the world away from America's financial orbit, says Matthieu Favas. The covid-19 pandemic is precipitating a split

IN JANUARY AN American former general spoke at a gathering of senior global financiers. Used to thinking about strategy and hard power, he warned that America is dealing poorly with its most complex array of threats since the cold war—from Iran and Russia to the novel coronavirus. But he also spoke of a much less visible threat: how, through its aggressive use of economic sanctions, America is misusing its clout as the predominant financial power, thereby pushing allies and foes alike towards building a separate financial architecture. “I’m not sure of the decider-in-chief’s appreciation for how the financial system works,” he said. That a former general would be thinking about the global financial system says much about how significant that danger has become.

The system is made up of the institutions, currencies and payment tools that dictate how the invisible liquidity feeding the real economy flows around the world. America has been its pulsating centre since the second world war. Now, though, repeated missteps, and China’s growing pull, have begun to tear at the seams. Many assume the status quo is too entrenched to be challenged, but that is no longer the case. A separate financial realm is forming in the emerging world, with different pillars and a new master.

The hegemon-in-waiting financially, as geopolitically, is China, whose rapid rise is tugging away at the system. The country today accounts for 15.5% of global GDP, up from 3.6% in 2000. Its economy, the world’s second-largest, is deeply woven within the fabric of global trade. Yet it weighs little in the financial system. China sees correcting this asymmetry as crucial to gaining great-power status. “The dollar dominance is being

hollowed out from underneath,” says Tom Keatinge of RUSI, a think-tank. The covid-19 crisis threatens to give centrifugal forces a decisive boost.

The system’s first pillar was laid in 1944 with the founding of the World Bank, the IMF and the global monetary order at Bretton Woods, New Hampshire. Having supplied weapons to allies throughout the war, America owned most of the planet’s gold, in which it priced its wares. Much of Europe and Asia lay in ruins. The interwar system of floating exchange rates had proved dysfunctional. It was thus decided that all currencies would be linked to the dollar, and the dollar tied to gold. That made the greenback the world’s new reserve currency. Two decades later the rising economic heft of Japan and Germany, coupled with vast money-printing by America during the Vietnam war, made the pegs untenable. The system disintegrated, but the “dollar standard” survived.

In the 1970s America also gained sway over the plumbing system that underpins global payments. American banks, then barred from operating outside state borders, teamed up to develop interbank messaging systems and nationwide ATM networks. Lenders also clubbed together to form credit-card “schemes”—associations setting the rules and systems through which members settle payments in plastic. Those worlds merged when two major card networks (soon rechristened Visa and MasterCard) bought the two largest ATM firms to expand overseas. By allowing individuals to shop anywhere, cards and cash machines became the dominant infrastructure for moving small sums of money across the world.

A revolution soon ensued in large-value transfers. In the old “telex” system, a cross-border payment between banks required the exchange of a dozen messages in free text, a process prone to human error. In 1973 a group of banks joined to create SWIFT, an automated messaging service assigning a unique code to every bank branch. It became the lingua franca for wholesale payments.

New technology boosted America's banks, which became better equipped to follow clients overseas, and its capital markets, helped by the digitalisation of paper assets. Having rebuilt, savings-rich Japan and Germany parked their dollars in treasury bonds. A housing boom spawned asset-backed securities. Between 1980 and 2003, America's stock of securities grew from 105% to three times GDP, forming the international springboard for its investment banks. After a regulatory big bang in the 1990s, they merged with commercial banks. By 2008, 35 firms had become the big four—Citigroup, Wells Fargo, JPMorgan Chase and Bank of America—the last prong of America's financial dominance.

America's pull within the system remains huge. When disasters strike, the dollar surges. It is still the world's safest store of value and its chief means of exchange. That makes the institution that mints it the metronome of global markets. In 2008 America's Federal Reserve avoided a general cash crunch worldwide by offering "swap lines" to rich-world central banks, allowing them to borrow dollars against their own currencies. When panic gripped markets again this March, the Fed expanded the offer to some emerging countries. In April it widened it further, allowing most central banks and international institutions to exchange their American debt securities against greenbacks, thus stalling the stampede.

The world's financial plumbing remains under America's thumb, too. SWIFT's 11,000 members across the world ping each other 30m times daily. Most international transactions they make are ultimately routed through New York by American "correspondent" banks to CHIPS, a clearing house that settles \$1.5trn of payments a day. Visa and Mastercard process two-thirds of card payments globally, according to Nilson Report, a data firm. American banks capture 52% of the world's investment-banking fees.

| *All change*

Three things are driving change. First, the "push" factor of geopolitics.

America's centrality allows it to cripple rivals by denying them access to the world's liquidity supply. Yet until recently it refrained from doing so. The financial system was seen as neutral infrastructure for promoting trade and prosperity. The first cracks appeared after 2001, when America started using it to choke funding for terrorism. Organised crime and nuclear proliferators soon joined the list. It persuaded allies by presenting such groups as threats to international security and the integrity of the financial system, says Juan Zarate, a former adviser to George W. Bush who designed the original programme.

The arsenal gained potency under Barack Obama. After Russia's invasion of Crimea in 2014, America punished oligarchs, companies and entire sectors of an economy twice the size of previous targets. "Secondary" sanctions were imposed on other countries' companies that traded with blacklisted entities. President Donald Trump has since elevated the system for use as a weapon and used it against allies. In December it targeted firms building a pipeline bringing Russian gas into Europe. In March it toughened sanctions against Iran even as others channelled aid to the country. The arsenal hardly feels impartial: since 2008 America has fined European banks \$22bn, out of \$29bn in total. In 2019 it designated new sanction targets 82 times, says Adam Smith of Gibson Dunn, a law firm.

Sanctions are now increasingly used in conjunction with other restrictions to throttle China. The Department of Commerce maintains a jumble of lists of entities with which other firms cannot deal. One of them, the "unverified" list, bans exports to companies about which the ministry has questions. It has grown from 51 names in 2016 to 159 in March. Chinese entities make up two-thirds of additions. Other departments are also racing to be seen as the toughest on China.

In the short run the opaque nature of the whole system maximises the impact of sanctions. But it also creates a strong incentive for others to seek

workarounds, and technology is increasingly providing the tools needed to build them.

Such advances result from the second driver of the new trends: the “pull” factor of attempts to meet the needs in emerging economies. Tech firms have sights on the world’s 2.3bn people with little access to financial services. Helped by plentiful capital and permissive rules, they have created cheap-to-run systems they are starting to export. Some also aim to enable commerce in regions where credit cards are rare but mobile phones common. Propped up by their huge home market, China’s “superapps” run ecosystems in which users spend their way without using actual money.

It helps that many emerging markets, not just China, are keen on a rebalancing. Most borrow abroad, and price their exports, in dollars. America was once the biggest buyer. Whenever the dollar rose, demand would follow, making up for costlier debt. But a stronger dollar now means China, their chief trading partner, can afford less stuff. So demand falls just when repaying loans gets dearer. And the stakes have risen: emerging markets’ stock of dollar debt has doubled since 2010, to \$3.8trn.

The third factor helping insurgents is covid-19, which could lead to a tipping-point. Already hobbled by rising tariffs, global trade is likely to fragment further. As disruption far away causes local shortages, governments want to shorten supply chains. That will give regional powers like China more room to write their own rules. The economic fallout in America—not least the fiscal impact of its \$2.7trn stimulus measures—could dent confidence in its ability to repay debt, which underpins its bonds and currency.

Most important, the crisis harms other countries’ trust in America’s fitness to lead. It ignored early warnings and botched its initial response. China is guilty of worse—its own missteps helped export covid-19 in the first place.

Yet it managed to curb cases fast and is now broadcasting a narrative of domestic competence. America's ability to guarantee global prosperity is the glue that holds the financial order together. With its legitimacy badly hit, renewed assaults on the system seem inevitable. On the front line are the dollar-system's foot soldiers, the banks. ■



国际银行业

平行宇宙

专题作者马修·法瓦斯认为，地缘政治和技术正在将世界的一半拖离美国的金融轨道。新冠肺炎大流行正在加剧分裂【专题报道《国际银行业》系列之一】

今年1月份，一位美国前上将在一个全球资深金融家聚会上发表了讲话。惯于思考战略和硬实力的他警告说，从伊朗和俄罗斯到新型冠状病毒，美国在应对它自冷战以来最复杂的一系列威胁时处理得很糟糕。但他还谈到了一个鲜为人知的威胁：通过积极使用经济制裁，美国如何滥用其作为金融强国的影响力，由此迫使盟友和敌人建立另外的金融体系。他说：“我不确定首席决策者是不是了解金融体系如何运作。”一名前上将会思考全球金融体系的问题，本身就充分说明了这种危险已变得多么重大。

这一体系由机构、货币和支付工具组成，这些工具决定了支撑实体经济的无形流动性如何在世界范围内流转。自第二次世界大战以来，美国一直是它跳动的核心。但如今，一再的失误以及中国日益增长的吸引力已开始让这一体系撕裂。许多人认为现状太根深蒂固而无法受到挑战，但情况已不再如此。在新兴世界中正在形成一个独立的金融世界，具有不同的支柱和新的主人。

和地缘政治版图一样，金融版图上即将出现的霸主是中国，它的迅速崛起正在削弱该体系。如今，中国占到全球GDP的15.5%，而2000年时仅为3.6%。它已成为世界第二大经济体，深深植根于全球贸易的网络中。但它在金融体系中的影响力却很小。智库RUSI的汤姆·基廷格（Tom Keatinge）说：“美元的主导地位正从下面被掏空。”新冠危机有可能给这种离心力推上决定性的一把。

该体系的第一根支柱在1944年铺设：在于新罕布什尔州的布雷顿森林举行的会议上，成立了世界银行、国际货币基金组织，确立了全球货币秩序。美国在整个战争期间向盟友提供军火，拥有了地球上大部分的黄金，并以

此为军火定价。欧洲和亚洲很多地方都是一片废墟。事实证明，两次大战之间的浮动汇率制度功能失调。因此，人们决定将所有货币与美元挂钩，美元又与黄金挂钩。这使美元成为全世界的新储备货币。20年后，日本和德国日益增长的经济实力，加上美国在越战期间大量印钞，使这种固定汇率难以为继。该体系解体了，但“美元标准”留存了下来。

在1970年代，美国还掌控了支撑全球支付的底层系统。当时美国的银行被禁止在州境之外运营，于是联合起来开发了银行间消息系统和全国性的ATM网络。贷款机构也聚集在一起成立信用卡系统，即负责制定规则和体系的协会，让会员用塑料卡片付款。当两个主要的信用卡网络（很快改名为“维萨”和“万事达”）收购了两家最大的ATM公司以向海外扩张时，所有这些系统合并在了一起。银行卡和自动取款机让个人得以在任何地方购物，成为在全球各地转移小额款项的主要基础设施。

大额转账很快也发生了一场革命。在旧有的电汇系统中，银行之间的跨境付款需要以自由文本交换十几条消息，而这一过程容易发生人为错误。1973年，一批银行联合创立了SWIFT，这是一种自动消息服务，为每个银行分支机构分配唯一的代码。它成了批发支付的通用语言。

新技术推动了美国银行业的发展，在纸面资产数字化的帮助下，这些银行变得更有能力适应海外客户及其资本市场。重建后，拥有丰富储蓄的日本和德国将手中的美元存放在美国国债中。房地产热潮催生了资产支持证券。从1980年到2003年，美国的证券存量从GDP的105%增长到GDP的三倍，成为美国投资银行的国际跳板。在1990年代的监管大爆发之后，这些投资银行与商业银行合并。到2008年，35家公司变成了四大——花旗集团、富国银行、摩根大通和美国银行，它们是美国金融主导权仅存的硕果。

美国在这个体系内的吸引力仍然很大。当灾难来袭时，美元飙升。它仍然是世界上最安全的价值存储方式及主要交换手段。这让铸造美元的机构成了全球市场的节拍器。2008年，美联储通过向富裕国家的中央银行提供“掉期额度”，使它们能够以自己的货币借入美元，从而避免了全球范围内

的现金紧缩。当今年3月市场再次陷入恐慌时，美联储将这一操作扩大到了一些新兴国家。4月，它进一步扩大范围，允许大多数央行和国际机构将美国债务证券兑换成美元，从而防止了挤兑。

全世界的底层金融系统也仍然在美国的掌控之下。SWIFT的11,000名全球成员每天互相发送三千万次消息。它们进行的大多数国际交易最终都由美国“代理”银行通过纽约转发给CHIPS这个每天结算1.5万亿美元支付的清算所。数据公司“尼尔森报告”（Nilson Report）称，维萨和万事达处理了全球三分之二的银行卡付款。美国的银行收取了全球投资银行业务费用的52%。

| 一切都改变

三件事正在推动变革。首先，地缘政治的“推动”因素。美国的中心地位让它可以阻止竞争者获得全球的流动性供应来让它们寸步难行。不过它一直克制住没有这样做，直到近些年。过去金融体系被视为促进贸易和繁荣的中立性基础设施。第一批裂痕出现在2001年之后，当时美国开始用该体系掐断恐怖主义的资金。有组织犯罪和核扩散者不久就被加入了黑名单。相关计划把这些群体描绘成对国际安全和金融体系完整性的威胁，以此说服了盟友，小布什的前顾问、该计划最初的设计者胡安·扎拉特（Juan Zarate）说。

这套工具在奥巴马的领导下获得了强大的影响力。俄罗斯在2014年入侵克里米亚之后，美国处罚了一个体量是先前目标两倍的经济体的寡头、公司和整个行业。美国还对与黑名单上的实体做交易的其他国家的公司实施了“次级”制裁。此后，特朗普总统将该系统用作武器，并用于对抗盟国。去年12月，它瞄准了铺设管道将俄罗斯天然气引入欧洲的公司。今年3月，它加强了对伊朗的制裁，即使其他国家向伊朗提供了援助。这个武器库看起来并不是一视同仁的：自2008年以来，美国的罚款总额为290亿美元，其中对欧洲银行的罚款达220亿美元。吉布森律师事务所（Gibson Dunn）的亚当·史密斯（Adam Smith）说，在2019年它指定新制裁目标共计82次。

现在，制裁被越来越多地与其他限制措施联合使用以压制中国。美国商务部列有一大堆其他公司不能与之交易的实体清单。其中之一是“未经核实”清单，禁止向商务部视为有疑问的公司出口产品。列表中的名字从2016年的51个增加到今年3月的159个。中国实体占到了新增实体的三分之二。其他部门也竞相做出对中国强硬的姿态。

在短期内，整个系统不透明的性质放大了制裁的影响。但是，这也极大地刺激了其他人寻求变通和规避的办法，而技术越来越多地提供了构建它们所需的工具。

这些进步来自于新趋势的第二个驱动力：试图满足新兴经济体需求的“拉动”因素。科技公司将目光投向了全球几乎无法获得金融服务的23亿人口。在充足资金和宽松规定的帮助下，它们创建了运营成本低廉的系统并开始输出。有些还希望在信用卡罕见但手机普及的地区支持贸易。在庞大国内市场的支撑下，中国的“超级应用程序”上运行的生态系统让用户无需使用现金就可进行消费。

许多新兴市场（不仅仅是中国）都渴望实现经济再平衡，这一点也有助于变化。这些市场大多在国外借款，并以美元为其出口定价。美国曾经是它们最大的买家。每当美元上涨，需求就会随之增加，弥补了更为昂贵的债务。但现在，强势美元升值意味着它们的主要贸易伙伴中国能买得起的东西更少了。因此在还贷变得更昂贵的同时，需求也下降了。而且风险也增加了：新兴市场美元债务存量自2010年以来翻了一番，达到3.8万亿美元。

助力“叛变者”的第三个因素是新冠肺炎，它可能会将事情引至临界点。已经因关税上涨而步履蹒跚的全球贸易很可能会变得愈发支离破碎。由于远方的生产中断会导致本地短缺，各地政府现在希望缩短供应链。这将为中国这样的地区大国提供更多空间来制订自己的规则。对美国的经济影响——尤其是其2.7万亿美元刺激计划的财政影响——可能削弱人们对其偿债能力的信心，而这是其债券和货币的根基。

最重要的是，这场危机损害了其他国家对美国领导能力的信任。它无视预警，最初的应对一团糟。中国犯下了更严重的错误——其自身的失误首先帮助把新冠肺炎传到了国外。但它设法迅速遏制住了病毒传播，现在正四处宣扬其国内治理能力。美国保证全球繁荣的能力是维持金融秩序的粘合剂。随着这一角色的正当性受到严重打击，针对该体系的新一轮攻击似乎不可避免。首当其冲的是美元体系的步兵——银行。■



International currencies

Redback on track

China has a cunning plan to make the yuan a central-bank favourite

BETWEEN 2004 AND 2012 BNP Paribas helped funnel \$30bn into Sudan, Cuba and Iran, all then under American sanctions. It hid its tracks using a network of “satellite” banks and by stripping payment messages of incriminating references. Whistleblowers tipped off American prosecutors. The bank pleaded guilty, expecting to pay €1.1bn (\$1.2bn). It was fined \$8.9bn by American authorities in 2014, and the case escalated to a diplomatic row.

BNP immediately fell into line. It moved the division overseeing the security of its dollar transactions from Europe to America, the first foreign bank to do so. A dozen staff lost their jobs and its compliance team was revamped. There was relief at the bank. It had avoided being permanently banned from clearing dollars, the closest thing to commercial death for international lenders. “Banks create money, and money is a sovereign good,” says Jean Lemierre, BNP’s chairman. “States decide what we can do with it.”

America wields more clout than other states because its money is so central to the system. On international currencies’ three roles—unit of account, medium of exchange and store of value—the greenback ranks high. Most commodity contracts are denominated in it. The dollar represents half of cross-border interbank claims, a proxy for international payments, and 62% of central-bank reserves. No amount of American goofing seems able to blunt its appeal. Everyone rushed to buy dollars during the subprime crash, even though Wall Street caused it. They did it again in March despite America’s bungled response to covid-19.

| *Minting it*

Yet the flattering snapshot masks an ominous process. Aware of the power that issuing an international currency confers, China is on a charm offensive. Cautious to avoid past mistakes, it is advancing methodically. And it is playing a big trump card: opening up its \$13trn bond market, which accounts for 51% of all bonds issued by emerging economies. So far, all is going according to plan.

There are three types of benefits to the issuers of a reserve currency. One is reduced transaction costs. Banks can access central-bank liquidity at will. Firms can borrow cheaply overseas and suffer less foreign-exchange risk.

A second, bigger prize is macroeconomic flexibility. To outsiders, dollars are an attractive asset they use for cross-border purposes. Yet, for America, foreign ownership of its notes is like a loan from abroad. Hunger for dollars allows it to finance deficits with its own money instead of forcing its residents to spend less. That reduces the elemental need to balance the money that comes in with what goes out, freeing America to pursue the monetary and fiscal policy it wants. When the country suffered its first-ever credit-rating downgrade in 2011, investors rushed to buy dollar assets, making it even cheaper for it to borrow.

That autonomy, as well as the world's dependence on greenbacks, gives it leverage—its third big advantage. America can extract concessions by rewarding allies with vital liquidity while denying it to foes. Last year three Chinese banks pledged swift compliance when suspected of flouting sanctions against North Korea. Monetary clout grants influence on international regulation: European bankers complain that global capital-adequacy ratios are harsher on them than on Americans.

Being the world's money master incurs costs, too. Robust demand for the dollar boosts its value relative to others, hurting exporters. The Fed must

contend with a growing overhang of liquid debt overseas, which leaves the domestic economy hostage to sudden movements of capital, says Benjamin Cohen of the University of California, Santa Barbara. And there is the duty to bail out the system when necessary.

Such trade-offs explain why rising economies, like Japan and Germany in the 1980s, shied away from turning their fiat into global favourites. Until recently Europe was in that camp. It saw the euro as a tool to build the union but did not care if others adopted it. Yet that calculus has changed. With America more isolationist, the EU attaches fresh value to monetary autonomy. In 2018 the European Commission started pushing for a stronger international role for the euro.

In that world minting a reserve currency is the ultimate aim. This is because the currency mix of central-bank holdings tends to be highly concentrated—more so than private investors' portfolios. Becoming an investor darling, however, is a necessary first step. That requires having large, liquid capital markets and government bonds that are deemed safe assets (these make up the bulk of foreign-exchange reserves). Another requisite is to be widely used in trade, as central banks like to stock up on the cash their country needs to buy imports. There it helps to have a big economy that is integrated into global markets.

With four oil majors, a convertible currency and a vast cross-border banking system, the EU would seem to be “ready for prime time”, says Karthik Sankaran, a fund manager and currency strategist. Without fiscal union, however, it lacks a supranational, liquid eurobond. And bonds issued by single members display uneven safeness, because Europe's weak banks and sovereigns are tightly connected (banks typically hold 15-30% of their home country's debt). A banking union would help break that “doom loop”, but Brusselites admit the project is “a bit stuck”. The euro's share of global reserves fell to 20% last year, from 28% in 2009.

So Europe tinkers around the edges. It sends questionnaires to G20 countries to understand why they do not use euros more often. In March it held a workshop with its eastern neighbours on how to issue euro bonds. The EU scolds its policy banks for not issuing more debt in euros. But top-down efforts are gaining little traction. “I look around me and everyone uses the dollar. It’s not me, it’s my clients,” says a European bank boss.

Russia has been brasher. Since 2013 its central bank has cut the dollar share of its reserves from 40% to 24%. Today Moscow mostly issues debt in roubles and euros. ING, a bank, reckons 62% of its exports were settled in dollars last year, down from 80% in 2013. But the push aims to insulate it from American wrath, not make it a currency power. Rosneft, a blacklisted firm that extracts 40% of Russia’s oil, now denominates its contracts in euros.

| *Going global*

China makes no secret of its yearning for a global yuan. Eager to control how much money comes in and out of the country, however, it has long had capital controls in place, which limit how much of the currency outsiders can access. So its progress has been gradual. In the 2000s it started allowing Hong Kong residents to open deposit accounts in redbacks, creating pools of liquidity outside the Great Wall. It used the former British colony to test other policies, such as persuading foreign states and firms to issue “dim sum” bonds. Its efforts stalled in 2015, when a loosening of controls, and worries about China’s economy, forced the central bank to dump \$1trn in reserves to combat outflows. Controls were tightened. Foreign trade settled in yuan collapsed. Offshore deposits cratered.

Sceptics say China is dreaming when it talks about internationalisation. But they have not woken up to fresh facts on the ground. Deposits did take a hit in 2015, but they are rising fast again and are now back to over 1trn yuan

(\$144bn), 20 times their total in 2009. Liquidity has spread: Taiwan has nearly half as much in deposits as Hong Kong. Singapore and London have grown.

A boom in foreign-exchange transactions also suggests growing usage. The daily turnover of FX instruments traded in Hong Kong has more than doubled since 2013, to \$107bn. Other hubs have risen: Britain accounts for 37% of all trades; France and America are nearing double-digit shares. A growing list of offshore investment products are denominated in yuan, which helps raise its profile among investors. Hong Kong now lists exchange-traded funds, equities, gold futures and property investment trusts, says Craig Chan of Nomura, a bank.

But China's mightiest advances are in the real world, where it uses its vast trade and investment network to fan out its fiat. The Belt and Road helps. Direct investment by Chinese firms into related projects was worth \$15bn last year, a quarter of which was in yuan. China now settles 15% of its foreign trade in the currency, up from 11% in 2015. It has made it easier for its national champions to use the yuan in their transfers to foreign outposts, such as financing flows, capital injections or day-to-day cash management.

China wields particular clout in emerging markets. The number of banks processing yuan payments globally has grown by half since 2017, to 2,214. Most additions have come from Asia, the Middle East and Africa. Some European countries are also keen, notably France, the region's dollar-basher in chief. A fifth of its trade with China is settled in yuan, as is 55% of payments between both countries. Paris actively encourages its banks and businesses to use the redback. A former IMF official says several multinationals have begun pricing deals in yuan to bypass American sanctions.

Beijing is mulling a wider offensive. It has appointed yuan-clearing banks in 25 countries to accompany exporters. It also wants to procure more of its vital imports in redbacks. In 2018 it launched yuan-denominated oil futures in Shanghai. This helps importers hedge risk while paying in domestic currency, says Stephen Innes of Axicorp, a foreign-exchange provider. They became the third-most widely traded such futures globally in just six months. Last year HSBC became the first foreign bank to hold margin deposits for foreign traders of iron-ore futures in Dalian, China's commodities exchange. Vina Cheung, its yuan expert, says the country is "preparing the infrastructure to include overseas investors and traders". Multinationals are starting to respond: Rio Tinto sold its first yuan iron-ore contract in October.

Crucially for China's end goal, central banks are also warming up to the yuan. Since its inclusion in the IMF's special drawing rights, a basket of elite currencies, in 2016, its share of global reserves has risen every quarter, to 2.1% in September. Natalie Dempster of the World Gold Council, an industry body, reckons some central banks are using gold as a halfway house to buy yuan once capital controls are lifted (they bought a record amount of gold in 2018). China has signed currency swap agreements with over 60 countries, amounting to half a trillion dollars. Some have pledged to allocate 10% of their stash to the yuan, which would bring its share of reserves to \$800bn (from \$220bn today).

Two factors could tip them into action. First, the yuan appears to be influencing exchange-rate fluctuations around the world. Recent research by IMF scholars finds the "yuan bloc" to account for 30% of global GDP—second only to the dollar, at 40%. Central banks pick reserve currencies closely tied with their own.

Second, China has opened a fresh breach in its capital controls, and money is streaming in (see chart). In 2017 the country launched Bond Connect,

which allows foreigners to invest in onshore bonds through Hong Kong, and scrapped investment quotas. Last year it also authorised international credit-rating agencies. That, plus rising domestic demand for listed securities, has convinced the world's most popular index providers to phase Chinese bonds into their benchmarks. This helped draw \$60bn of foreign money into government bonds in 2019, a flow that covid-19 has not stopped. Some 1,900 overseas investors are registered to Bond Connect, up from 700 a year ago.

Foreigners now own 3% of China's bond market, the world's second-largest, and 8.8% of its government bonds (up from 2.8% in 2015). Their appetite will only rise. Chinese bonds offer good yields and diversification benefits. Yet they remain on the "very periphery of institutional investors' portfolios", says Mark Wiedman of BlackRock, the world's largest money manager. It is creating a programme to guide clients on how to invest in China. ■



国际货币

红票子上轨道

中国有一个精妙的计划来使人民币成为央行的宠儿【专题报道《国际银行业》系列之三】

在2004年至2012年间，法国巴黎银行协助向当时受到美国制裁的苏丹、古巴和伊朗输送了300亿美元。它使用一个“卫星”银行网络，把能够定罪的信息从付款消息中去除，以此隐藏自己的行踪。举报人向美国检察官告发。该银行认罪，预期自己要支付11亿欧元（12亿美元）。结果它在2014年被美国当局处以89亿美元的罚款，案件升级为外交争端。

法国巴黎银行很快就服了输。它将负责监督美元交易安全性的部门从欧洲转移到了美国，是第一家这样做的外国银行。十几名员工丢了工作，负责合规事宜的团队也被改组。这家银行松了口气。它避免了被永久禁止结算美元——这对国际银行来说是最接近“商业死亡”的事情。“银行创造货币，而货币是主权财富，”银行董事长让·勒米埃尔说，“国家决定我们可以拿它做什么。”

美国拥有比其他国家更大的影响力，因为它的货币对于这个系统是如此的重要。从国际货币的三个角色即会计单位、交易媒介和价值存储来看，绿票子排名很高。大多数商品合同都用它计价。美元占跨境银行间债权（可看作国际支付的代表）的一半，占央行储备的62%。不管美国犯下多少愚蠢的错误，似乎都不能削弱它的吸引力。在次贷危机中人人争抢美元，哪怕危机是华尔街引发的。尽管美国应对新冠肺炎的措施不力，但人们在3月份再次疯抢美元。

| 铸造它

然而，漂亮的瞬间掩盖了一个不祥的进程。在意识到发行国际货币带来的权力后，中国开展了魅力攻势。它谨慎地避免过去的错误，正在有条不紊地推进。而且它还打出了一张大王牌：开放其价值13万亿美元的债券市场，占新兴经济体发行的所有债券的51%。到目前为止，一切都按计划进

行。

储备货币的发行国可享受三种好处。一是降低交易成本。银行还可以随时获得中央银行的流动性。企业可以廉价地向海外借钱，而承受较少的汇率风险。

第二个更大的好处是宏观经济的灵活性。对于外国人来说，美元是一种有吸引力的资产，可用于跨国交易。但是对美国而言，外国人拥有美钞，就好比从国外借钱。对美元的渴求让美国可以用自己的货币来弥补赤字，而不是强迫居民减少支出。这就减少了平衡资金进出的基本需求，使美国可以自由地追求自己想要的货币和财政政策。当美国在2011年首次遭受信用评级下调时，投资者蜂拥购买美元资产，使其借贷成本变得更低。

这种自主权加上世界对美元的依赖给了美国影响力——这是第三大好处。美国可以把至关重要的流动性奖赏给盟友而拒绝让敌人获得，从而迫使其做出让步。去年，三家中资银行在涉嫌无视对朝鲜的制裁后承诺迅速合规。货币影响力会影响国际监管：欧洲银行家抱怨说，全球资本充足率的标准对他们而言比对美国人更苛刻。

做世界货币之王也有其代价。对美元的强劲需求提升了这种货币相对于其他货币的价值，伤害了本国出口商。加州大学圣塔芭芭拉分校的本杰明·科恩（Benjamin Cohen）说，美联储必须应对海外流动性债务积压的持续增长，因为资本的突然流动会劫持国内经济。此外美国还有责任在必要时为该系统纾困。

这些利弊可以解释为什么新兴经济体——比如1980年代的日本和德国——不愿将自己的法定货币变成全球最爱。直到最近，欧洲一直属于这个阵营。它把欧元视为建立联盟的工具，但并不关心其他人是否接纳它。但这种计算已经改变。随着美国变得更倾向孤立主义，欧盟为货币自主附加了新的价值。欧盟委员会于2018年开始推动加强欧元在国际上的作用。

在那个世界里，铸造储备货币是终极目标。这是因为中央银行所持的货币组合往往高度集中——比私人投资者的组合更集中。但是，成为投资者的

宠儿是必不可少的第一步。这就需要拥有庞大而流动性良好的资本市场，以及被视为安全资产的政府债券（这些债券构成了大部分的外汇储备）。另一个要求是被广泛用于贸易，因为央行喜欢囤积本国的进口采购所需的现金。就此而言，有一个融入全球市场的庞大经济体会有帮助。

基金经理和货币策略师卡尔西克·桑卡兰（Karthik Sankaran）表示，欧盟拥有四大石油巨头、一种可兑换的货币和庞大的跨境银行体系，似乎已经“准备好登上巅峰”。但是，没有一个财政联盟，欧盟缺乏超越国家且有流动性的欧洲债券。而单个成员发行的债券的安全性并不均衡，因为欧洲疲软的银行与主权国家紧密相连（银行通常持有其本国债务的15%至30%）。一个银行联盟将有助于打破这种“厄运闭环”，但布鲁塞尔的精英们承认该项目“有点卡住了”。欧元在全球储备中所占的份额从2009年的28%降至去年的20%。

所以，欧洲在边缘小修小补。它向20国集团（G20）国家发送了调查表，以了解为什么它们不更多使用欧元。3月，它与东部邻国举行了关于如何发行欧元债券的研讨会。欧盟责骂其政策银行未能发行更多的欧元债务，但自上而下的努力几乎没有什么拉动力。“我环顾四周，每个人都在用美元。不是我，是我的客户。”一位欧洲银行老板说。

俄罗斯一直更为大胆。自2013年以来，其中央银行已将其外汇储备中的美元份额从40%降至24%。今天，莫斯科主要发行卢布和欧元的债务。ING银行估计去年以美元结算的出口额占总出口额的62%，而2013年时是80%。但这些变化旨在使它免受美国怒火的影响，而不是使其成为货币大国。俄罗斯石油公司（Rosneft）被美国列入了黑名单，该公司开采了俄罗斯40%的石油，现在它的合同均以欧元计价。

| 走向全球

中国毫不掩饰对打造“全球人民币”的向往。然而它急于控制有多少钱进出该国，长期以来一直实行资本管制，这就限制了境外人士有多少人民币可用。所以它的进步一直是渐进的。在2000年代，它开始允许香港居民以人民币开设存款账户，从而在长城外创造了流动资金池。它使用这个前英

国殖民地来检验其他政策，例如说服外国政府和公司发行“点心”债券。它的努力在2015年陷于停滞，当时放松管制以及对中国经济的担忧迫使中央银行倾销了1万亿美元的储备以应对资金外流。管制被加强了。以人民币结算的外贸骤降。离岸存款缩水。

怀疑论者说中国谈论国际化是痴人说梦，但他们还没有意识到地面上的新鲜事实。存款确实在2015年受到了打击，但它再次迅速增长，现在回到了1万亿人民币以上（1440亿美元），是2009年总额的20倍。流动性也在扩散：台湾拥有的人民币存款已接近香港的一半。新加坡和伦敦的存款都在增长。

外汇交易量的激增也表明了使用量的增加。自2013年以来，在香港交易的外汇工具的每日交易额增长了一倍以上，达到1070亿美元。其他枢纽也在崛起：英国占了所有交易的37%；法国和美国的份额已接近两位数。越来越多的离岸投资产品以人民币计价，这有助于提高它在投资者中的形象。银行野村证券的陈立伟说，如今在香港上市的有交易所交易基金、股票、黄金期货和房地产投资信托。

但中国最大的进展发生在实体世界中，它利用其庞大的贸易和投资网络来散布人民币。“一带一路”起了作用。去年，中国企业对相关项目的直接投资价值150亿美元，其中四分之一以人民币结算。目前，中国以人民币结算的对外贸易额为15%，高于2015年的11%。中国让其领军企业更容易地将人民币用于向国外分支的转账，例如资金流、注资或日常现金管理。

中国在新兴市场具有特别的影响力。自2017年以来，全球处理人民币付款的银行数量增长了一半，达到2214家。大多数增长来自亚洲、中东和非洲。一些欧洲国家也很热衷，特别是法国。法国是欧洲的反美元先锋：法中贸易的五分之一、两国之间支付的55%都以人民币结算。巴黎积极鼓励其银行和企业使用红票子。国际货币基金组织（IMF）的一位前官员说，一些跨国公司已经开始以人民币定价交易，以绕过美国的制裁。

北京正在考虑更广泛地出击。它已经在25个国家指定了人民币清算银行来

配合出口商。它还希望用人民币采购更多的重要进口品。2018年，它在上海推出了人民币计价的石油期货。外汇交易供应商Axicorp的斯蒂芬·因内斯（Stephen Innes）说，这有助于进口商用本币付款并对冲风险。在短短六个月内，它们成为全球交易量排名第三的此类期货。去年，汇丰银行成为第一家在中国大连的商品交易所为铁矿石期货的外国交易者提供保证金存款的外资银行。汇丰的人民币汇率专家张捷（Vina Cheung）表示，中国“正在准备基础设施，以接纳海外投资者和贸易商”。跨国公司开始做出回应：力拓于10月出售了第一份人民币铁矿石合同。

各国央行对人民币的态度也在升温，这对于中国的最终目标而言至关重要。自2016年被纳入IMF的特别提款权（一篮子精英货币）以来，人民币在全球储备中的份额每季度都在上升，去年9月达到了2.1%。行业组织世界黄金理事会（World Gold Council）的娜塔莉·登普斯特（Natalie Dempster）认为，一旦取消资本管制，一些央行就把黄金用作购买人民币的中间货币（它们在2018年购买的黄金数量创下了纪录）。中国已与60多个国家签署了货币互换协议，总额达5000亿美元。一些国家已承诺将其全部储备的10%分配给人民币，这将使人民币的外汇储备份额从今天的2200亿美元增至8000亿美元。

有两个因素会促使它们采取行动。首先，人民币似乎正在影响全球的汇率波动。IMF学者最近的研究发现，“人民币集团”占全球GDP的30%，仅次于占40%的美元。中央银行会选择与其自身货币息息相关的储备货币。

其次，中国在资本管制方面新开了口子，资金已在流入（见图）。中国于2017年推出了债券通，允许外国人通过香港投资在岸债券，并取消了投资配额。去年它还向国际信用评级机构颁发了进入国内市场的牌照。这一进展，加上国内对上市证券的需求不断增长，已经说服了全球最受欢迎的指数提供商将中国债券逐步纳入基准。受此推动，2019年有600亿美元的外国资金被吸引到政府债券中，而新冠肺炎并未阻止这一流动。目前大约有1900名海外投资者注册了债券通，而一年前为700名。

外国人现在拥有中国债券市场（全球第二大）的3%和政府债券的

8.8%（高于2015年的2.8%）。他们的胃口只会增加。中国债券提供了良好的收益率和多元化的好处。不过，世界银行最大的资金管理公司贝莱德（BlackRock）的马克·维德曼（Mark Wiedman）说，它们仍然处于“机构投资者的投资组合中非常边缘的地带”。它正在创建一套方案，指导客户如何在中国投资。 ■



All work and no play

Economic recovery

Though some lockdowns are being lifted, economies are not roaring back

LAST MONTH *The Economist* coined the term "90% economy" to describe what will happen as lockdowns are eased across the world. It depicts a more solitary and less fun sort of society—the sort of place where the office is open but the pub isn't. Analysis by Tang Jie of Peking University finds that weekday subway trips in China have recovered to a greater extent than weekend ones, suggesting that people are more prepared to travel for work than for pleasure. Sales of instant noodles, savoured by homebodies, have rocketed. Meanwhile, some American states have started to lift lockdowns, but there is little sign of economies roaring back. ■



光干活，不玩耍

经济复苏

尽管封城措施已部分解除，经济并没有强劲复苏

上个月本刊创造了“九成经济”一词，用以形容世界各地放松封城措施后会发生什么。它描画了一个更孤独、更无趣的社会——那种办公室开着而酒吧不开的地方。北京大学的汤杰分析发现，在中国，工作日地铁客流量的恢复程度超过周末客流量，表明人们更情愿去工作而不是娱乐。宅家的人爱吃的方便面销量直线上升。与此同时，美国一些州已开始解封，但看不到什么经济显著回升的迹象。■



Coffee and capitalism

The big grind

The story of coffee is a parable of global capitalism

WHAT BEGAN as an obscure berry from the highlands of Ethiopia is now, five centuries later, a ubiquitous global necessity. Coffee has changed the world along the way. A “wakefull and civill drink”, its pep as a stimulant awoke Europe from an alcoholic stupor and “improved useful knowledge very much”, as a 17th-century observer put it, helping fuel the ensuing scientific and financial revolutions. Coffeehouses, an idea that travelled with the refreshment from the Arab world, became information exchanges and centres of collaboration; coffee remains the default drink of personal networking to this day.

The focus of Augustine Sedgewick’s book is not coffee’s effect on drinkers but its role in the story of global capitalism, as a commodity that links producers in poor countries with consumers in rich ones. Coffee does more than merely reflect this divide, he argues—it has played a central role in shaping it. It is, he notes, “the commodity we use more than any other to think about how the world economy works and what to do about it”.

To illuminate this history, and the web of connections between workers on plantations and coffee-sipping consumers, Mr Sedgewick focuses on a single planter in one country: James Hill, a British emigrant who by the 1920s had established himself as “the coffee king of El Salvador”. By telling the story of El Salvador’s emergence as the world’s most intensive coffee economy, and following coffee beans from Hill’s plantation to American consumers’ cups, Mr Sedgewick painstakingly shows how shifts in the global coffee market have affected conditions for workers on the ground. The result is a portrait of the political and economic consequences of the world’s addiction to coffee.

He tucks many fascinating details into his narrative. Contrary to popular belief, for example, it was not the Boston Tea Party that led to tea's dethronement as America's favourite hot drink: it was the abolition of tariffs on coffee imports in the early 19th century, as the United States sought to build trade ties and buy influence across Latin America. Imports doubled every decade between 1800 and 1850; during the civil war the average Union soldier consumed five cups of coffee a day. By the turn of the 20th century consumption per person in America was roughly double the level in France and ten times that in Italy. Most of this coffee came from Latin America.

A secondary theme is the relationship between food and labour, and the effort to measure human food consumption and energy output. Hill applied ideas from industrial Manchester, the city of his birth, to wring as much work as possible from his team. By paying mostly in food, and removing all other sources of it (such as wild fruit trees), he could manipulate the degree of hunger among local workers, and thus the availability of labour. The resulting coffee was then used to optimise the efficiency of workers in America, as bosses realised that formal coffee breaks improved productivity. Both coffee producers and consumers, Mr Sedgewick scathingly implies, are mere cogs in the remorseless machinery of global capitalism.

After all this readers might expect his conclusion to be a ringing endorsement of the "fair trade" model (coffee is by far the leading fair-trade product), which adds a small premium to the price of certified coffees to fund projects to improve workers' welfare. In fact, Mr Sedgewick thinks the arguments over fair trade obscure a more fundamental issue, which is the lack of other opportunities in places where the local economy is dominated by coffee. In El Salvador's "dictatorship of coffee", where coffee planters enjoyed a virtual monopoly on politics, the only alternatives were migration or revolution, leading to decades of strife during the 20th

century that pitted coffee growers against their overlords.

Artfully blending together all these strands, and juggling a wide cast of characters, Mr Sedgewick's book is a parable of how a commodity can link producers, consumers, markets and politics in unexpected ways. Like the drink it describes, it is an eye-opening, stimulating brew. ■



咖啡与资本主义

大力研磨

咖啡的故事是全球资本主义的一则寓言【《咖啡国度》书评】

一种源自埃塞俄比亚高原的不起眼的浆果在五个世纪后的今天成了风靡全球的必需品。咖啡一路以来改变了世界。正如一位十七世纪的观察家所言，这是一种“让人清醒而文明的饮料”，它那提神醒脑的功效将当时沉迷于酒精的欧洲从麻木中唤醒，并“极大地增进了有用的知识”，助推了随后的科学和金融革命。随着这种提神饮料从阿拉伯世界流行开来，与之相伴的咖啡馆也发展成了信息交流的场所和协作的中心。时至今日，咖啡仍然是人际交往的首选饮品。

奥古斯丁·塞奇威克（Augustine Sedgewick）这本书的重点并非咖啡对其饮用者的影响，而是它在全球资本主义运作中扮演的角色：这是一种将穷国生产者与富国消费者联系在一起的商品。他提出，咖啡不仅反映了这道鸿沟，也在它的形成中发挥了核心作用。他指出，咖啡“这种日常用品比任何其他商品都更多地让我们思考世界经济如何运行，以及该对此做些什么”。

为阐述这段历史，以及种植园工人和咖啡消费者之间的关系网络，塞奇威克把目光聚焦于一个国家的一位种植园主：詹姆斯·希尔（James Hill）。这位英国移民在上世纪20年代已经成了“萨尔瓦多的咖啡之王”。塞奇威克讲述了萨尔瓦多如何成为世界上咖啡种植密度最高的经济体，而希尔种植园的咖啡豆又如何成为美国消费者的杯中之物，由此非常详尽细致地展示了全球咖啡市场的变迁如何影响了种植园工人的生活状况。他最终描绘出一幅全景图，让读者一览全世界对咖啡上瘾有着怎样的政治和经济后果。

他在叙述中穿插了大量引人入胜的细节。例如，茶原本是美国最受欢迎的热饮，后来被咖啡取代，但与普遍观点相反的是，这并非拜波士顿倾茶事件所赐，而是由于美国在19世纪初期取消了咖啡的进口关税，为的是与拉

美各国建立贸易关系并“购买”影响力。从1800年到1850年，咖啡进口量每十年就翻一番；美国内战期间，联邦士兵平均每天要喝五杯咖啡。到20世纪之交，美国的人均咖啡消费量大约是法国的两倍，是意大利的十倍。这些咖啡大部分产自拉丁美洲。

一个次要主题是食物和劳动力的关系，以及资本家对人的食物摄入与能量输出的衡量。出生于工业城市曼彻斯特的希尔运用了他家乡的理念，想方设法地从工人身上压榨劳动。他用食物来支付大部分工资，并铲除了其他一切食物来源（如野果树），从而操纵了本地工人的饥饿程度，继而控制了劳动力供给。生产出来的咖啡继而被用来优化美国工人的生产效率，因为那里的老板们意识到安排正式的咖啡休息时间提高了生产率。塞奇威克尖锐地暗示，无论是咖啡生产者还是消费者，都不过是无情的全球资本主义机器中的齿轮而已。

读到这里，读者可能会以为他的结论将是铿锵有力地支持“公平贸易”模式（咖啡无疑是最主要的公平贸易产品），这种模式让经过认证的咖啡获得小幅溢价，以获得资金来资助改善工人福利的项目。但事实上，塞奇威克认为，有关公平贸易的观点掩盖了一个更根本性的问题，即在本地经济被咖啡主导的地方缺乏其他机会。在萨尔瓦多的“咖啡的独裁”中，咖啡种植园主实际上享有政治上的垄断地位，仅有的替代选择就是移民或者革命，这导致20世纪的几十年里种植园工人与种植园主冲突不断。

塞奇威克这本书将所有这些议题巧妙地融合在一起，同时在各种各样的人物角色之间穿梭来去，讲述了一则关于一种日常商品如何以意想不到的方式将生产者、消费者、市场和政治连接在一起的寓言故事。和它描述的这种饮料一样，这本书读来也让人大开眼界、精神为之一振。■



Bartleby

Teachable moment

The pandemic may result in some business schools closing for good

LOCKDOWN HAS delivered a nasty shock to academia, with universities around the world closing for the summer term, disrupting the plans of millions of students. Business schools are suffering along with the rest, but the shutdown has occurred when the sector is already facing a host of problems. A survey of the deans of American business schools by Eduvantis, a consultancy, found that almost all thought the pandemic would lead to permanent closures.

Bartleby contacted seven leading schools in America, Britain and France to see how they were coping with the crisis. Unsurprisingly, the immediate reaction has been to switch to teaching online. Many are putting a brave face on the issue. Christoph Loch, dean of the Judge school at Cambridge, says: “If we do this right, if we do it strategically, this is going to stay beyond covid.” Meanwhile the INSEAD school in France maintains that it is hard to imagine going back to a world where the successes from online learning will not be combined with person-to-person exchanges.

The pandemic also presents a teaching opportunity. The Wharton School at the University of Pennsylvania has launched a course called “Epidemics, Natural Disasters and Geopolitics: Managing Global Business and Financial Uncertainty”. The London Business School will shortly run a course on “The Economics of a Pandemic”.

Online courses are all very well. But part of the motivation for attending business school is to take advantage of networking opportunities that could last for the rest of students’ careers. Some of this can be done online. At the MIT Sloan School of Management, virtual student networking has

included trivia nights, hackathons and a programming boot camp. In keeping with its location, activities at the Haas School in Berkeley, California, have included remote yoga and mindfulness classes. At INSEAD, students gather in virtual break-out rooms for further discussions, with the groups picked at random to ensure interaction with a broader group of classmates.

Nevertheless, just as a friend you made on Facebook is not the same as someone you grew up with, virtual ties are unlikely to be as strong as normal ones. That has led to some dissatisfaction among students. At Wharton, more than 1,000 MBA students have signed an online petition arguing that the school should reduce fees, which run to \$150,000 for a two-year course. The petition claims that virtual-classroom technology is “unable to fully replicate” the usual teaching environment, and that other elements of the course, such as foreign travel and extra-curricular activities, “have been essentially cancelled”.

The rapid economic downturn caused by the pandemic is a complicating factor. In the past, business schools have benefited from recessions, as young people have chosen to continue their education rather than risk entering a shaky jobs market. But this time could be different.

First, it is not yet clear when business schools can reopen for traditional teaching. None of the schools had a firm timetable for that to happen. And candidates may wait until they do, rather than pay top dollar for an online course. Another survey, by Poets&Quants, a website for news about business schools, found that 43% of prospective MBA students thought that fees should be lowered, and that a third might defer their courses until normal teaching can resume.

Second, the pandemic is likely further to discourage students from applying to business schools abroad. Around half of all American business

schools experienced a decline in overseas applications last year, thanks to anti-immigration political rhetoric and the greater difficulty in getting visas to work once a degree was obtained.

Neither America nor Britain has covered itself in glory in recent weeks. A survey of international students by IDP Connect found that, among Anglophone countries, Britain and America ranked behind New Zealand, Canada and Australia in terms of how they have handled the pandemic. The war of words between America and China over the virus will also have an effect. Students from the People's Republic may be more inclined to study in their own country.

That is bad news for both universities and business schools, as international students are very lucrative. Things may go back to normal in a few years' time; the virus may be conquered and international relations may settle down. But as with many other sectors of the economy, there may be a big shakeout among business schools before that happens. ■



巴托比

受教时刻

疫情可能会导致一些商学院永久关闭

封城给了学术界沉重一击。世界各地的高校在夏季学期关闭，数千万学生的求学计划被打乱。商学院和其他院校一道受到了影响，但在学校关闭前这个行业就已经问题重重。咨询公司Eduvantis面向美国商学院院长的调查发现，几乎所有人都认为这次疫情会导致一些商学院永久关闭。

本专栏作者联系了美国、英国和法国的七所顶尖商学院，看它们是如何应对这场危机的。毫不意外，它们的第一反应是转向线上教学。许多人在这个问题上表现得泰然自若。剑桥嘉治商学院（Judge school at Cambridge）院长克里斯托弗·洛克（Christoph Loch）表示：“如果我们做得得当，做得有策略，那么等新冠过后也会保留线上教学。”与此同时，法国的欧洲工商管理学院（INSEAD）坚持认为，很难想象一切如常后，会有哪家商学院不把成功的在线学习与面对面交流结合起来。

这次疫情也提供了一个教学机会。宾夕法尼亚大学沃顿商学院推出了一门名为“流行病、自然灾害和地缘政治：应对全球商业和金融不确定性”的课程。伦敦商学院不久将开设“大流行病经济学”课程。

在线课程是很好，但读商学院的动机之一就是建立可能会贯穿今后整个职业生涯的人脉。其中一部分工作可以在网上完成。在麻省理工斯隆管理学院，供学生建立关系网的虚拟活动包括趣味问答比赛、黑客马拉松和编程训练营。加州大学伯克利分校哈斯商学院的活动包括远程瑜伽和正念课程，与它所在地的环境相契合。在欧洲工商管理学院，学生们聚集在虚拟分组讨论室做进一步探讨，这些小组都是随机挑选的，以确保学生能与更多同学互动。

然而，你在Facebook上结交的朋友和跟你一起长大的人还是不一样，虚拟的联系同样也不太可能像正常关系那样牢固。学生当中因而出现了一些不

满的声音。在沃顿，1000多名MBA学生在网上签署了一份请愿书，要求学院降低学费。沃顿两年制课程的学费高达15万美元。这份请愿书称，虚拟教室技术“无法完全复制”通常的教学环境，而且课程的其他内容，例如出国旅行和课外活动，“基本上也都被取消了”。

疫情导致的经济快速衰退让情况变得复杂。过去，商学院从衰退中受益，因为年轻人选择继续接受教育而不是冒险进入不稳定的就业市场。但这次可能会不同。

首先，尚不清楚商学院何时能重开，恢复传统教学。对此没有一所商学院有明确的时间表。申请者可能会等到它们给出时间表再行动，而不会花大价钱去上在线课程。另一项由商学院资讯网站Poets&Quants开展的调查发现，有计划修读MBA的学生中，有43%认为学费应该降低，三分之一可能会推迟求学，直到恢复正常教学。

其次，疫情很可能会进一步降低学生申请海外商学院的积极性。由于反移民的政治言论以及拿到学位后获得工作签证的难度加大，去年约有一半的美国商学院海外申请人数下降。

最近几周，美国和英国在这方面的表现都不怎么样。IDP Connect面对国际学生的一项调查发现，在英语国家中，英国和美国在应对疫情上的表现排在新西兰、加拿大和澳大利亚之后。中美之间关于病毒的口水战也将产生影响。中国的学生可能更倾向于在本国求学。

这对大学和商学院来说都是坏消息，因为招收国际学生非常有利可图。几年后情况或许会回归正常：病毒可能被征服，国际关系可能稳定下来。但正如其他许多经济部门一样，在那之前，商学院可能会经历一场大洗牌。





Chip wars

Immaculate misconceptions

The latest American salvo against Huawei is designed to stymie China's ability to make chips. It may push the industry out of America, too

AMERICA HAS it in for Huawei—and not just because some of its politicians fear the Chinese giant's networking gear lets spooks in Beijing eavesdrop on customers' communications. The firm, a world leader in futuristic 5G telecoms, also symbolises China's technological and economic ascent. President Donald Trump does not like it one bit. William Barr, his attorney-general, has warned that America risks "surrendering dominance" to China if it cannot "blunt Huawei's drive" to 5G supremacy.

An earlier attempt at blunting, which made it illegal to sell American-made components to Huawei, including advanced computer chips on which the Chinese firm relies, was not the knock-out blow the White House hoped it to be. Chipmakers were able to keep shipping Huawei semiconductors from factories outside America. So on May 15th the Trump administration extended its restrictions from chips to the tools used to make them—many of which come from America. So long as big microprocessor producers, like Taiwan Semiconductor Manufacturing Company (TSMC), use American-made equipment, they will no longer be able to forge Huawei-designed chips anywhere in the world.

In a press conference on May 18th a reticent Huawei said that the new rule put its survival at risk. Three days later President Xi Jinping vowed to invest \$1.4trn by 2025 to increase China's tech independence. Yet as with America's original restrictions, the latest blast in the Sino-American chip war may not end up having the intended effect.

| *Playing dirty in the clean room*

The new rule may miss its target entirely. Huawei pays contract manufacturers to assemble its phones and base stations. The chips that TSMC makes for Huawei are sent to those companies, not to the Chinese firm, for integration. Finished products are usually sent directly to Huawei's customers. Huawei need not touch the blacklisted chips at any point. This may get Huawei off the hook. Some lawyers note that the new restriction does not seem to apply to items sent to third parties and not destined for Huawei, even where these are being supplied at Huawei's direction.

Even if the legal experts are wrong, the rule will be difficult to enforce: the clean rooms of Asian chip foundries are hard to monitor. More important, the \$412bn semiconductor industry is so globalised that even the long arm of American law will struggle to pin it down. The likelier upshot of the new export controls may be to drive a portion of America's chipmaking industry from its shores.

The industry's geographic scope was already becoming broader—and less American—over time. One crude yardstick for this is to track where its physical assets sit, as recorded in the filings of public tech businesses (see chart). The top dozen global semiconductor firms, for example, now have only 20% of their plant in America. Asian firms, such as TSMC, SMIC and Samsung, mostly locate their factories at home. American chipmakers, meanwhile, and many suppliers, have been diversifying geographically for years, says Dan Hutcheson of VLSI, a consultancy—partly in pursuit of cheap labour, partly to protect against natural disasters.

Consider Intel, which makes chips of its own design for customers (among them Huawei) that assemble electronic devices. In 2019 the American giant had over 35% of its \$55bn in physical assets, a rough proxy for manufacturing capacity, abroad. Some \$8bn-worth sat in Israel and another

\$4bn in Ireland. Industry insiders report that China-bound shipments from both places have increased since America's Huawei-baiting began. Intel also has more than \$5bn in assets in China, its biggest market. All told, \$20bn of its \$72bn in revenues last year came from China.

Another example is Analog Devices, a smaller American firm which makes radio-frequency chips on which Huawei relies heavily for the assembly of telecoms base stations. It, too, is spread around: half of its assets sit in the Philippines, Ireland, Singapore and Malaysia. Perhaps that might make it easier for the firm to explore the option of making its Huawei-bound chips in non-American facilities.

Geographic complexity has made it hard for America's government to stop chipmakers' kit from reaching Huawei. Hence the new focus on chipmaking tools, many of which are still made in America and so easier for Washington to control. Applied Materials, based in California, builds kit used to etch patterns into silicon, has 90% of its assets in the United States. Lam Research, an American maker of equipments used by TSMC and others to process silicon wafers, has 88% of its \$1.1bn plant at home.

One big unknown surrounding the new Huawei rule—which the chip industry's lawyers are busily unpacking—is whether, under it, equipment manufactured at American firms' overseas facilities counts as "American". If so, advanced chipmaking factories that rely on such kit to fabricate cutting-edge chips for Huawei, as TSMC does, will need alternative suppliers. The American toolmakers' Japanese rivals, such as Tokyo Electron and Hitachi High-Technologies, suddenly find themselves with a new geopolitical competitive edge.

Another mystery relates to an announcement made just as the new American measures against Huawei were being unveiled. On May 15th TSMC confirmed it would build a \$12bn chip factory in Arizona, to be up

and running by 2024. Why would the Taiwanese firm, which gets 15% of its revenue from Huawei, agree to pour billions into America just as its new host in effect deprived it of a big customer? It may be currying favour with the administration, hoping to avert sanctions against more Chinese customers. Observers point to another possibility. TSMC could equip the Arizona foundry with American gear from its existing factories, freeing space in its Taiwanese operations for brand new non-American kit that can freely serve Chinese customers. TSMC did not respond to a request for comment.

Even if that is not TSMC's intention, workarounds are bound to proliferate. On May 18th the boss of Samsung Electronics toured his company's new chip factory in Xian, a city in central China. The South Korean firm, which plans to invest \$115bn in its chipmaking business over the next decade, has made it clear that it will not ignore China. America's export controls may prompt it to kit out its foundries with equipment that will not fall foul of Sino-American geopolitics.

Chip-industry insiders report that semiconductor equipment is already being marketed inside China as "EAR free"—meaning Chinese buyers need not worry about the "export administration regulations" that the Trump administration is using to attack Huawei. A person close to American toolmakers says some of them are thinking about moving their patents abroad to rebuild operations from scratch away from America's jurisdiction, in order to circumvent present and future anti-Chinese restrictions. Mr Trump's attempt to de-Sinify the semiconductor industry may do more to de-Americanise it instead. ■



芯片战

完美误算

美国对华为的最新一轮攻击意在阻碍中国发展芯片制造能力，却也可能把芯片产业推离美国

美国盯上了华为。这不仅仅是因为一些美国政客担心这家中国巨头的网络连接设备会帮助北京的间谍窃听客户的通讯。作为未来5G电信的全球领导者，华为也是中国在技术和经济上崛起的象征。特朗普对它绝无好感。他的司法部长威廉·巴尔（William Barr）警告说，如果美国不能“阻碍华为争取”5G霸权的行动，可能就此把“主导权拱手让给”中国。

早前，美国禁止企业向华为出售美国生产的元件，包括华为依赖的先进计算机芯片。但这一措施没有产生白宫期望的摧毁性打击。芯片制造商仍能继续从美国以外的工厂向华为供应半导体器件。于是，5月15日，特朗普政府把管制范围从芯片扩大至制造芯片的设备（许多产自美国）。只要大型微处理器生产商（如台积电）使用的是美国制造的设备，就再也不能在世界任何地方生产华为设计的芯片。

在5月18日举行的一场新闻发布会上，言语谨慎的华为高管表示新规让公司面临生存危险。三天后，国家主席习近平誓言要在2025年之前投资1.4万亿美元以提升中国的技术自主性。然而，与美国最初的禁令一样，中美芯片战的最新一轮冲击波最终可能也无法达到预期效果。

| “弄脏”无尘室

新规定可能完全“脱靶”。华为的手机和基站是由代工厂商组装的，台积电为华为制造的芯片正是发送给这些厂商而不是华为来完成组装。成品通常直接发给华为的客户。华为无需在任何节点触及被列入黑名单的芯片。这也许能让华为摆脱麻烦。有律师指出，新管制措施似乎不适用于发往第三方而非华为的产品，即使这些产品是按华为的指示供应的。

即便这些法律专家的看法有误，新规定也难以实施：亚洲芯片代工厂的无

尘室可不容易监控。更重要的是，价值4120亿美元的半导体产业已高度全球化，即使美国的司法长臂也鞭长莫及。新出口管制也许更有可能导致美国芯片制造业的一部分撤离本土。

芯片制造业分布的地域已日渐广阔，且日益脱离美国。一项粗略的衡量指标是根据上市科技公司的报告资料查看芯片产业实体资产的所在地（见图表）。举例来说，全球前12家半导体公司如今只有20%的工厂设在美国。台积电、中芯国际和三星等亚洲公司大多把工厂设在本土。与此同时，美国芯片制造商和许多供应商多年来一直在扩大地域分布，既为寻求廉价劳动力，也为防御自然灾害，咨询公司VLSI的丹·哈奇森（Dan Hutcheson）表示。

来看英特尔，它为电子设备制造商（包括华为）制造自己设计的芯片。这家美国巨头在2019年拥有550亿美元的实体资产（反映制造能力的粗略指标），其中超过35%在国外。约80亿美元在以色列，40亿美元在爱尔兰。业内人士指出，自美国开始攻击华为以来，以色列和爱尔兰对中国的发货量均已上升。英特尔在其最大的市场中国也拥有超过50亿美元资产。去年它720亿美元的总收入中有200亿美元来自中国。

另一个例子是亚德诺（Analog Devices）。这是一家规模较小的美国半导体公司，生产的射频芯片是华为组装电信基站高度依赖的元件。亚德诺的工厂也遍布世界各地：半数资产在菲律宾、爱尔兰、新加坡和马来西亚。这也许更方便它尝试在美国以外的工厂生产供应给华为的芯片。

复杂的地域分布令美国政府难以阻止芯片制造商给华为供货。所以新的管制措施着眼芯片制造设备，因为这些设备有许多仍在美国本土制造，更易于华盛顿控制。总部位于加州的应用材料公司（Applied Materials）制造硅晶片蚀刻设备，90%的资产在美国。泛林集团（Lam Research）生产台积电等公司使用的硅晶片加工设备，其总值11亿美元的工厂资产有88%在美国本土。

围绕新颁布的华为禁令（芯片行业的律师们正忙于解读）的一大未知数

是，在此规定下，美国公司在海外工厂生产的设备是否该归为“美国制造”。如果是，那么依赖这类设备为华为代工制造尖端芯片的先进芯片制造工厂（如台积电）就需要另觅设备供应商。美国设备制造商的日本竞争对手，如东京电子（Tokyo Electron）和日立高新技术（Hitachi High-Technologies），突然间获得了新的地缘政治竞争优势。

在美国针对华为的新措施公布之际，还出现了另一个谜题。台积电在5月15日当天确认，将在美国亚利桑那州投资120亿美元建立一家芯片工厂，2024年投产。为什么这家有15%的收入来自华为的台湾企业会同意投资上百亿美元到美国设厂，而且还是在新东家实际上让自己丧失了一个大客户之时？它可能是在讨好美国政府，避免针对更多大陆客户的制裁。观察人士还指出另一种可能性。台积电或许会把现有工厂里的美国设备移至亚利桑那州的新工厂，让台湾的工厂腾出空间来购买全新的非美国设备，从而能自由服务大陆客户。台积电对此说法不予置评。

即使这并非台积电的用意，变通的办法势必会越来越多。5月18日，三星电子的老板参观了自家公司位于西安的新芯片工厂。这家韩国公司计划在未来十年投资1150亿美元发展芯片制造业务，而且已经明言不会忽视中国市场。美国的出口管制可能会促使三星在自家芯片厂里使用不会卷入中美地缘政治纷争的设备。

芯片业人士表示，已有半导体设备制造商以“出口管制无忧”（EAR free）为卖点在中国营销产品，意思是中国买家不必担心特朗普政府用来打击华为的出口管制规定。一名知情人士表示，美国一些设备制造商正考虑将专利技术移至国外，在美国管辖范围外从头打造业务，以规避当前和未来的反华限制。特朗普对半导体行业所做的“去中国化”可能反而会换来更多的“去美国化”。■



ASML

Industrial light and magic

A low-key Dutch company has monopolised a critical link in the global technology supply chain

ASK PEOPLE to pinpoint the centre of the digital economy and many will finger Silicon Valley, populated by Apple, Google, Facebook and too many sexy startups to count. Others may nod at the area around Seattle, where Amazon and Microsoft are based. Some could suggest Shenzhen, China's technology hub. Few would point to a nondescript suburb of Eindhoven, the Netherlands' fifth-biggest city. Yet on closer inspection, the case for Veldhoven looks compelling. It is home to ASML, the world's sole manufacturer of the most advanced equipment critical to modern chipmaking. If chips make the world go round, ASML may be the closest the multi-trillion-dollar global tech industry has to a linchpin.

ASML is not the only maker of photolithographic machines, which use light to etch integrated circuits onto silicon wafers. It competes with Canon and Nikon of Japan. But the Dutch firm's market share has nearly doubled, to 62%, since 2005. And it alone has harnessed "extreme ultraviolet" (EUV) light, with wavelengths of just 13.5 nanometres (billionths of a metre). Shorter wavelengths allow the etching of smaller components—vital for chipmakers striving to keep pace with Moore's Law, which posits that the number of components that can be squeezed into a given area of silicon doubles roughly every two years. The world's three leading chipmakers—Intel in America, Samsung in South Korea and the Taiwan Semiconductor Manufacturing Company (TSMC)—have become as reliant on ASML's wares as the rest of the technology industry is on theirs.

The company's performance reflects this increased dependence. Its revenues grew by 8% in 2019, to €11.8bn (\$13.2bn), despite a slump in the

highly cyclical semiconductor business. Although EUV devices accounted for only 26 of the 229 lithography machines the firm sold in 2019, they made up a third of sales by revenue. The firm expects this to rise to three-quarters by 2025, as other chipmakers upgrade from existing “deep ultraviolet” technology.

With neither Canon nor Nikon pursuing EUV technology, investors have concluded that ASML will enjoy its nanoscopic monopoly for a while. Since 2010 its market capitalisation has grown tenfold, to around €114bn (see chart). It has nearly doubled in the past year alone. ASML is worth more than Airbus, Siemens or Volkswagen. Its share price has suffered along with others as covid-19 rattles global markets, but its longer-term outlook appears as bright as the white-walled cleanrooms where its machines take shape. Its shares trade at a mouthwatering 32 times forward earnings, double or more those of its biggest customers.

Times were not always so good. The firm started life in 1984 as a joint venture between Philips, a Dutch electronics giant, and ASM International, which made semiconductor equipment. Early on it occupied a few wooden huts on Philips’s Eindhoven campus. Jos Benschop, ASML’s technology chief, is candid about its early troubles. Its first products were obsolete as soon as they were released, he says, and the firm struggled to find customers. It was kept alive by Philips, itself facing financial difficulties, and by subsidies from the Dutch government and the EU’s predecessor.

In 1995 it listed its shares in New York and Amsterdam. Shortly afterwards the firm bet that EUV lithography would be the future of chipmaking. Big chipmakers planned to be using its machines by around 2007. They were to be disappointed—repeatedly. So were ASML’s shareholders, as the company discovered that EUV light is frustratingly difficult to work with. Working out the kinks took much longer than expected, admits Mr Benschop. The firm’s first prototype machines were sent to IMEC, a research institute in

Belgium, in 2006. Commercial clients did not start using the technology until 2018.

Earlier generations of kit employ lasers to produce light directly. But as wavelengths shrink, things get trickier. Inside a cutting-edge EUV machine 50,000 droplets of molten tin fall through a chamber at its base each second. A pair of lasers zap every drop, creating a plasma that in turn releases light of the desired wavelength. The mirrors guiding this light, made of sandwiched layers of silicon and molybdenum, are ground so precisely that, if scaled to the size of Germany, they would have no bumps bigger than a millimetre. Because EUV light is absorbed by almost anything, including air, the process must take place in a vacuum. To get into the production facilities, your correspondent had to don a special suit and leave his notebook behind, lest it shed unwanted fibres.

The machines, weighing 180 tonnes and the size of a double-decker bus, are themselves a testament to the electronics industry's tangled supply chains. ASML has around 5,000 suppliers. Carl Zeiss, a German optics firm, fashions its lenses. VDL, a Dutch company, makes the robotic arms that feed wafers into the machine. The light source comes from Cymer, an American company bought by ASML in 2013. ASML is, in turn, one of hundreds of firms that supply the chipmakers themselves. But it is so vital that Intel, Samsung and TSMC have all chipped in to finance its research and development in return for stakes in the firm.

Appreciation of ASML's dominant position has not been confined to customers or investors. Politicians share it, too. EUV lithography is on the Wassenaar list of "dual-use" technologies that have military as well as civilian applications. China is keen to foster advanced chipmaking firms of its own, an ambition that America is trying to thwart. In 2018 ASML received an order for an EUV machine from a Chinese customer, widely thought to be the Semiconductor Manufacturing International Corporation,

China's biggest chipmaker, whose factories are currently a couple of generations behind the state of the art. Under American pressure, the Dutch government has yet to grant ASML an export licence.

ASML would hate to surrender access to the Chinese market, which is bigger than most and as captive. Being kept out of China may, in the long run, endanger ASML's dominance—if it leads a Chinese rival unable to secure ASML kit to build its own, and sell it to others. Last April ASML said that six employees, including some Chinese nationals, were involved in pilfering trade secrets from its American office in 2015. The firm disputes the suggestion that the theft was linked to the Chinese government.

Right now, though, China needs ASML more than ASML needs it. Of all the suppliers required for an advanced chip factory of the sort its authorities want built, "ASML's technology is the most difficult to replicate", says Pierre Ferragu, a technology analyst at New Street Research. Malcolm Penn of Future Horizons, another consultancy, thinks that it would take a Chinese rival a decade or more to catch up—and by then the cutting edge would have moved on again. The Dutch are already working on new EUV machines with better optics, which can process more silicon wafers per hour. These are due to ship in 2023—this time, ASML hopes, with no delays.





ASML

工业光魔

一家低调的荷兰公司垄断了全球技术供应链的关键一环

如果问数字经济的中心在哪里，很多人会指向硅谷，那里聚集了苹果、谷歌、Facebook以及数不胜数的炫酷的创业公司。其他人可能会说是亚马逊和微软总部所在的西雅图一带。或许还有人会说是中国的科技中心深圳。不大会有人提到荷兰第五大城市埃因霍温（Eindhoven）一处平淡无奇的郊区。然而，如果细看就会发现，说费尔德霍芬（Veldhoven）是中心很有道理。它是ASML的所在地。这家公司生产对现代芯片制造业至关重要的一种最先进设备，且全球独此一家。如果说是芯片让这个世界运转起来，那么ASML可能最接近于价值数万亿美金的全球科技产业的核心。

ASML并不是唯一的光刻机制造商。这种设备用光把集成电路蚀刻到硅晶片上。它的竞争对手是日本的佳能和尼康。但自2005年以来，这家荷兰公司的市场份额几乎翻了一番，达到62%。它还是全球唯一掌握波长仅为13.5纳米（十亿分之一米）的“极紫外”（EUV）光刻技术的公司。波长越短，蚀刻的元器件尺寸就可以越小——这对于努力跟上摩尔定律的芯片制造商来说非常重要。摩尔定律预计，单位面积的硅晶片上可容纳的元器件数目大约每两年就会翻一番。目前，世界三大芯片制造商——美国的英特尔、韩国的三星和台湾的台积电——对ASML产品的依赖已经不亚于科技产业的其余部分对它们生产的芯片的依赖。

从ASML的业绩能看出这种依赖在加深。2019年，尽管周期性很强的半导体行业遭遇了萧条期，但这家公司的营收仍增长了8%，达到118亿欧元（132亿美元）。2019年ASML总共售出光刻机229台，尽管其中EUV光刻机只有26台，却占到总销售额的三分之一。该公司预计，随着其他芯片制造商从现有的“深紫外”技术升级，到2025年这一比例将升至四分之三。

由于佳能和尼康都无意推进EUV技术，投资者推断ASML将在一段时间内保持它在纳米级光刻上的垄断地位。自2010年以来，ASML的市值增长了

九倍，达到1140亿欧元（见图表），仅去年一年就翻了将近一番。其市值已超过空客、西门子或大众汽车。随着新冠肺炎让全球市场陷入恐慌，ASML的股价也和其他公司一同受挫，但它的远景看起来就和它生产自家机器的墙壁雪白的无尘室一般明亮。它的预期市盈率达到令人垂涎的32倍，是它那些最大客户的两倍或更多。

ASML并不总是这么春风得意。它创办于1984年，是荷兰电子巨头飞利浦和半导体设备制造商ASM国际（ASM International）的合资企业。公司早期蜗居于埃因霍温飞利浦园区的几间木屋内。首席技术官乔斯·本斯霍普（Jos Benschop）坦诚地谈起公司早年间经历的困难。他说，首批产品一上市就过时了，很难找到买家。公司靠着飞利浦（当时自身也面临财务困境）以及从荷兰政府和欧盟前身欧共体那里得到的补贴才得以维持。

ASML于1995年在纽约和阿姆斯特丹上市。之后不久它就押注EUV光刻会成为芯片制造的未来。大型芯片制造商计划在2007年前后用上它的机器，结果却一再失望。同样失望的还有其股东，因为ASML发现EUV光很难对付。本斯霍普承认，解决其中难题所花费的时间远远超过了预期。公司的首批样机于2006年被运往比利时的IMEC研究所。商业客户直到2018年才开始使用这种技术。

前几代光刻机直接使用激光作为光源。但随着波长缩短，事情变得更棘手。在一台尖端EUV光刻机的内部，每秒有五万滴熔化的锡液穿落位于机器底部的一个腔体。一对激光会击中每一滴锡液，产生一个等离子体以发射出具有所需波长的光。导引这些光的反射镜由一层层硅和钼交叠而成，镜面被打磨得极其平整——如果把反射镜的面积放大到整个德国那么大，镜面上的凸起也不会超过1毫米。因为EUV光几乎能被包括空气在内的所有东西吸收，所以这个过程必须在真空中进行。记者必须穿上专用服才能进入车间，也不能带笔记本，以免纤维飘落，惹出麻烦。

这些单个重量达180吨、体积相当于一辆双层巴士的机器本身就显现了电子行业的供应链有多错综复杂。ASML大约有5000家供应商。德国光学公司卡尔蔡司（Carl Zeiss）制造它所用的镜片。荷兰VDL公司生产的机械臂

将硅晶片送入光刻机。光源则来自2013年被ASML收购的美国公司Cymer。反过来，ASML也是为芯片制造商供货的数百家公司之一。但它的地位至关重要，因此英特尔、三星和台积电都为ASML提供研发经费，换取它的股份。

重视ASML主导地位的并不只有客户和投资者，还有政客。EUV光刻技术被列入《瓦森纳协定》的军民“两用物品”技术清单中。中国渴望培育出自己的先进芯片制造公司，而美国正试图阻挠这一雄心。2018年，一家中国客户向ASML订购了一台EUV光刻机，舆论普遍认为该客户是中国最大的芯片制造商中芯国际。中芯国际现有的技术比最先进水平落后了好几代。迫于美国的压力，荷兰政府至今还没给ASML发放相关的出口许可证。

但ASML非常不愿意放弃进入中国市场的机会，因为中国市场比大多数市场都更庞大，且同样受制于它。从长远来看，如果被挡在中国之外，导致某个无法购得ASML设备的中国竞争对手自力更生，再将自主研发的设备卖给他人，就可能危及ASML的霸主地位。去年4月，ASML表示，2015年，包括几个中国公民在内的六名雇员涉嫌从它的美国子公司窃取商业机密。但该公司否认了此次窃密与中国政府有关的说法。

不过目前来说，是中国更需要ASML。New Street Research的科技分析师皮埃尔·法拉古（Pierre Ferragu）表示，在中国政府想要打造的那种先进芯片工厂所需的供应商中，“ASML的技术是最难复制的”。另一家咨询公司Future Horizons的马尔科姆·佩恩（Malcolm Penn）认为，中国的竞争对手需要十年甚至更长时间才能赶得上，而到那时，最先进的技术又已经有了新的发展。荷兰人已经在研发光学性能更好的新型EUV光刻机，每小时能处理更多硅晶片。这些光刻机定于2023年交付——ASML希望这次不会再延误了。■



Supply chains and the pandemic

The food miracle

Markets, ingenuity and open borders have kept the world fed. Don't take that for granted

IF YOU LIVE in the rich world and want an example of trade and global co-operation, look no further than your dinner plate. As the lockdowns began in the West two months ago, many feared that bread, butter and beans would run short, causing a wave of stocking-up. Today, thanks to fleets of delivery lorries filling supermarket shelves, you can binge-eat as you binge-watch.

This capitalist miracle reflects not a monolithic plan, but an \$8trn global supply chain adapting to a new reality, with millions of firms making spontaneous decisions, from switching rice suppliers in Asia to refitting freezers. The system is far from perfect: as incomes collapse, more people are going hungry. There are risks, from labour shortages to bad harvests. And there is an irony in seeing the industry grapple with a crisis that probably began with the sale of pangolin meat in a market in Wuhan. But the food network is so far passing a severe test. It is crucial that, during and after the pandemic, governments do not lurch into a misguided campaign for self-reliance.

The supply chains behind an iPhone, or a car component that criss-crosses the Rio Grande, are wonders of co-ordination. But the unsung star of 21st-century logistics is the global food system. From field to fork, it accounts for 10% of world GDP and employs perhaps 1.5bn people. The global supply of food has nearly tripled since 1970, as the population has doubled to 7.7bn. At the same time, the number of people who have too little to eat has fallen from 36% of the population to 11%, and a bushel of maize or cut of beef costs less today than 50 years ago in real terms. Food exports have

grown sixfold over the past 30 years; four-fifths of people live in part on calories produced in another country.

This happens in spite of governments, not because of them. Although their role has declined, they still sometimes fix prices and control distribution. The European Union's farm tariffs are four times those on its non-farm imports. A dozen or so big exporters, including America, India, Russia and Vietnam, dominate staples such as wheat and rice. Half a dozen trading firms, such as Cargill from Minnesota and COFCO from Beijing, shift food around the world.

Concentration and government intervention, along with the vagaries of the climate and commodity markets, mean that the system is finely tuned and can misfire, with devastating consequences. In 2007-08 bad harvests and higher energy costs pushed up food prices. This led governments to panic about shortages and ban exports, causing more anxiety and even loftier prices. The result was a wave of riots and distress in the emerging world. It was the worst food crisis since the 1970s, when high fertiliser prices and bad weather in America, Canada and Russia caused food production to drop.

Despite the severity of today's shock, each layer of the system has adapted. The supply of cereals has been maintained, helped by recent harvests and very high stocks. Shipping firms and ports continue to move around food in bulk. The shift from eating out has had dramatic consequences for some companies. McDonald's sales have dropped by about 70% in Europe. The big retailers have cut their ranges and rewired their distribution. Amazon's grocery e-commerce capacity has risen by 60%; Walmart has hired 150,000 people. Crucially, most governments have learned the lesson of 2007-08 and avoided protectionism. In terms of calories, only 5% of food exports face restrictions, as against 19% back then. So far this year prices have dropped.

But the test is not over yet. As the industry has globalised, it has grown more concentrated, creating bottlenecks. Covid-19 outbreaks at several American slaughterhouses have cut pork supplies by a quarter—and boosted wild-turkey hunting licences in Indiana by 28%. America and Europe will need over 1m migrant workers from Mexico, north Africa and eastern Europe to bring in the harvest. And as the economy shrinks and incomes collapse, the number of people facing acute food shortages could rise—from 1.7% of the world’s population to 3.4%, the UN reckons, including in some rich countries. This reflects a shortage of money, not food, but if people go hungry governments will, understandably, take extraordinary measures. The ever-present risk is that rising poverty or production glitches will lead panicky politicians to stockpile food and limit exports. As in 2007-08, this could cause a tit-for-tat response that makes things worse.

Governments need to hold their nerve and keep the world’s food system open for business. That means letting produce cross borders, offering visas and health checks to migrant workers, and helping the poor by giving them cash, not stockpiling. It also means guarding against further industry concentration which could grow, if weaker food firms go bust or are bought by bigger ones. And it means making the system more transparent, traceable and accountable—with, for example, certification and quality standards—so that diseases are less likely to jump undetected from animal to human.

To understand food as a national-security issue is wise; to bend that understanding to self-sufficiency drives and blunt intervention is not. Already, before this year, food had become part of a trade war. America has sought to manage its soyabean exports and put tariffs on cheese. President Donald Trump has designated abattoirs part of America’s critical infrastructure. President Emmanuel Macron has called for Europe to build up its “strategic autonomy” in agriculture. Yet food autarky is a delusion.

Interdependence and diversity make you more secure.

| *Cooking up a new recipe*

The work of the food-supply system is not yet done. In the next 30 years supply needs to rise by about 50% to meet the needs of a wealthier, growing population, even as the system's carbon footprint needs at least to halve. A new productivity revolution is required, involving everything from high-tech greenhouses near cities to fruit-picking robots. That is going to require all the agility and ingenuity that markets can muster, and huge sums of private capital. This evening, when you pick up your chopsticks or your knife and fork, remember both those who are hungry and also the system feeding the world. It should be left free to work its magic not just during the pandemic, but after it, too. ■



【首文】供应链与大流行病

粮食奇迹

市场、创造性及开放边境让全世界人口填饱了肚子。这一切并非理所当然

假如你生活在富裕世界，想要找个贸易和全球合作的例证，只消看看自己餐盘里的食物。两个月前西方国家开始封城时，许多人担心面包、黄油和豆子会短缺，于是掀起了一股囤粮潮。现在，幸亏有一队队货车不断给超市补货，你照样可以边刷刷边大吃大喝。

这一资本主义奇迹体现的不是什么庞大的整体规划，而是一条价值八万亿美元、调整适应新现实的全球供应链。其中数以百万计的公司自发地随机应变，有的更换在亚洲的大米供应商，有的改造冷库。这个系统远不算完美：随着收入锐减，越来越多人正忍饥挨饿。还存在从劳动力短缺到歉收的种种风险。而且讽刺的是，眼前粮食产业奋力应对的这场危机可能始于武汉一个市场出售穿山甲肉。但目前为止，粮食体系经受住了这场严峻的考验。眼下至关重要是，在疫情期间及过后，各国政府不要突然转向，乱行“自力更生”之道。

一部iPhone手机或一个跨越格兰德河（Rio Grande）的汽车零部件背后的供应链是协作的奇迹。但21世纪物流中的无名英雄是全球粮食体系。从农田到餐桌，它贡献了全球GDP的10%，雇用了大约15亿人。自1970年以来，全球人口翻倍至77亿，全球食品供应量则增加了近两倍。同时，食物不足人口的占比从36%下降到11%，现在玉米或牛肉的实际价格也低于50年前。过去30年粮食出口量增长了五倍，全球五分之四的人多多少少都会摄入产自他国的卡路里。

在这一成就中，各国政府非但无功，反而制造了阻力。尽管它们的影响力已然减弱，但有时仍会指定价格及操控分销。欧盟的农产品进口关税是非农产品的四倍。包括美国、印度、俄罗斯和越南在内的十多个主要出口国雄霸小麦和大米等主粮的出口市场。六家贸易公司主导全球粮食交易，例如明尼苏达州的嘉吉（Cargill）和北京的中粮集团。

行业高度集中，又有政府干预，再加上气候和大宗商品市场变化莫测，意味着这是一个精准调节的系统，有可能失灵而造成灾难性后果。2007年至2008年，歉收和能源成本上升推高了粮食价格，多国政府担心发生粮荒而禁止粮食出口，加剧了焦虑情绪，进一步推高了粮价。结果新兴世界爆发连串骚乱，陷入困境。那是自上世纪70年代以来最严重的粮食危机。在1970年代，化肥价格高企，加上美国、加拿大和俄罗斯的恶劣天气，导致粮食减产。

尽管当前疫情的冲击很严重，但粮食系统中的各层级已经做出了调整。得益于近期的收成及非常高的库存，谷物供应得以维持。航运公司和港口仍在不断运输大量粮食。人们减少外出就餐对一些公司产生了巨大影响。麦当劳在欧洲的销售额下降了约70%。大型零售商已缩减商品类别，并调整分销渠道。亚马逊的食品杂货电商业务扩容60%，沃尔玛增聘了15万人。关键的一点是，大多数政府都吸取了2007年至2008年危机的教训，避免了贸易保护主义。以卡路里计，只有5%的食品出口受到限制，而当年的数字达19%。今年到目前为止，粮食价格有所下降。

但考验尚未结束。随着粮食产业的全球化，市场集中度随之上升，造成了瓶颈。美国几个屠宰场爆发新冠疫情，导致猪肉供应减少了四分之一，印第安纳州颁发的野生火鸡狩猎许可证随之增加了28%。欧美需要从墨西哥、北非和东欧输入一百多万名劳工来收割农作物。据联合国估计，随着经济萎缩和收入骤减，食物严重不足的人口可能增长，从占全球人口的1.7%上升到3.4%，其中包括一些富裕国家的人群。这反映的是缺钱而非缺粮，但如果民众挨饿，政府自然会采取特别措施。始终存在的风险是，贫困加剧或粮食生产中断会导致政客们恐慌性囤粮并限制出口。就像在2007年至2008年那样，这可能会引发各国之间针锋相对的报复性措施，令局面恶化。

各国政府需要保持冷静，让世界粮食体系继续开放运转。这就要允许农产品跨境贸易，向外国劳工提供入境签证和健康检查，以及通过发放现金帮助穷人，而非囤积粮食。此外也要防范行业集中度进一步上升——假如弱小食品企业破产或被大企业收购，集中度就可能上升。而且还要提升这个

系统的透明度、可追溯性及问责机制（如通过认证和质量标准），从而降低疾病不露形迹地从动物传染给人类的几率。

把粮食视为国家安全问题是对的，但把这曲解为追求“自给自足”并加以粗暴干预则不明智。其实在今年以前粮食就已成为贸易战的一部分。美国设法控制大豆出口，又对奶酪征收关税。特朗普已经把屠宰场定性为美国的一种关键基础设施。法国总统马克龙则呼吁欧洲建立农业“战略自主”。然而，粮食自给自足是一种妄想。互相依存和多样性才能带来更多保障。

| 炮制新食谱

全球粮食供应体系的任务尚未完成。未来30年，供给需要增加约50%以满足不断增长且更富裕的人口需求，同时该系统产生的碳足迹至少需要减半。这需要一场新的生产力革命，包括在城郊建立高科技温室、开发摘果机器人等种种创新。这需要各个市场施展全部的灵活性和创造性，还需要大量私人资本。今晚，当你拿起筷子或刀叉时，想想那些饥肠辘辘的人，也想想帮助人们饱腹的这个全球粮食体系。应该任由它自行发挥魔力，不仅在疫情期间，之后也是。 ■



The world economy

Goodbye globalisation

A more nationalistic and self-sufficient era beckons. It won't be richer—or safer

EVEN BEFORE the pandemic, globalisation was in trouble. The open system of trade that had dominated the world economy for decades had been damaged by the financial crash and the Sino-American trade war. Now it is reeling from its third body-blow in a dozen years as lockdowns have sealed borders and disrupted commerce. The number of passengers at Heathrow has dropped by 97% year-on-year; Mexican car exports fell by 90% in April; 21% of transpacific container-sailings in May have been cancelled. As economies reopen, activity will recover, but don't expect a quick return to a carefree world of unfettered movement and free trade. The pandemic will politicise travel and migration and entrench a bias towards self-reliance. This inward-looking lurch will enfeeble the recovery, leave the economy vulnerable and spread geopolitical instability.

The world has had several epochs of integration, but the trading system that emerged in the 1990s went further than ever before. China became the world's factory and borders opened to people, goods, capital and information. After Lehman Brothers collapsed in 2008 most banks and some multinational firms pulled back. Trade and foreign investment stagnated relative to GDP, a process this newspaper later called slowbalisation. Then came President Donald Trump's trade wars, which mixed worries about blue-collar jobs and China's autocratic capitalism with a broader agenda of chauvinism and contempt for alliances. At the moment when the virus first started to spread in Wuhan last year, America's tariff rate on imports was back to its highest level since 1993 and both America and China had begun to decouple their technology industries.

Since January a new wave of disruption has spread westward from Asia.

Factory, shop and office closures have caused demand to tumble and prevented suppliers from reaching customers. The damage is not universal. Food is still getting through, Apple insists it can still make iPhones and China's exports have held up so far, buoyed by sales of medical gear. But the overall effect is savage. World goods trade may shrink by 10-30% this year. In the first ten days of May exports from South Korea, a trade powerhouse, fell by 46% year-on-year, probably the worst decline since records began in 1967.

The underlying anarchy of global governance is being exposed. France and Britain have squabbled over quarantine rules, China is threatening Australia with punitive tariffs for demanding an investigation into the virus's origins and the White House remains on the warpath about trade. Despite some instances of co-operation during the pandemic, such as the Federal Reserve's loans to other central banks, America has been reluctant to act as the world's leader. Chaos and division at home have damaged its prestige. China's secrecy and bullying have confirmed that it is unwilling—and unfit—to pick up the mantle. Around the world, public opinion is shifting away from globalisation. People have been disturbed to find that their health depends on a brawl to import protective equipment and on the migrant workers who work in care homes and harvest crops.

This is just the start. Although the flow of information is largely free outside China, the movement of people, goods and capital is not. Consider people first. The Trump administration is proposing to curtail immigration further, arguing that jobs should go to Americans instead. Other countries are likely to follow. Travel is restricted, limiting the scope to find work, inspect plants and drum up orders. Some 90% of people live in countries with largely closed borders. Many governments will open up only to countries with similar health protocols: one such "travel bubble" is mooted to include Australia and New Zealand and, perhaps, Taiwan and Singapore. The industry is signalling that the disruption to travel will be lasting.

Airbus has cut production by a third and Emirates, a symbol of globalisation, expects no recovery until 2022.

Trade will suffer as countries abandon the idea that firms and goods are treated equally regardless of where they come from. Governments and central banks are asking taxpayers to underwrite national firms through their stimulus packages, creating a huge and ongoing incentive to favour them. And the push to bring supply chains back home in the name of resilience is accelerating. On May 12th Narendra Modi, India's prime minister, told the nation that a new era of economic self-reliance has begun. Japan's covid-19 stimulus includes subsidies for firms that repatriate factories; European Union officials talk of "strategic autonomy" and are creating a fund to buy stakes in firms. America is urging Intel to build plants at home. Digital trade is thriving but its scale is still modest. The sales abroad of Amazon, Apple, Facebook and Microsoft are equivalent to just 1.3% of world exports.

The flow of capital is also suffering, as long-term investment sinks. Chinese venture-capital investment in America dropped to \$400m in the first quarter of this year, 60% below its level two years ago. Multinational firms may cut their cross-border investment by a third this year. America has just instructed its main federal pension fund to stop buying Chinese shares, and so far this year countries representing 59% of world GDP have tightened their rules on foreign investment. As governments try to pay down their new debts by taxing firms and investors, some countries may be tempted to further restrict the flow of capital across borders.

| *It's lonely out there*

Don't be fooled that a trading system with an unstable web of national controls will be more humane or safer. Poorer countries will find it harder to catch up and, in the rich world, life will be more expensive and less free. The way to make supply chains more resilient is not to domesticate them,

which concentrates risk and forfeits economies of scale, but to diversify them. Moreover, a fractured world will make solving global problems harder, including finding a vaccine and securing an economic recovery.

Tragically, this logic is no longer fashionable. Those three body-blows have so wounded the open system of trade that the powerful arguments in its favour are being neglected. Wave goodbye to the greatest era of globalisation—and worry about what is going to take its place. ■



【首文】世界经济

再见，全球化

一个更盛行民族主义和自给自足的时代在靠近。它不会更富裕，也不会更安全【**新冠报道**】

新冠疫情肆虐前，全球化就已经碰到了麻烦。几十年来主导世界经济的开放贸易体系被金融危机和中美贸易战破坏。现在，为控制疫情实施的封锁措施导致边境关闭、贸易秩序大乱，让全球化遭受了十几年来的第三次重击。伦敦希思罗机场的旅客数量同比下降了97%；墨西哥汽车出口4月减少了90%；5月，21%的跨太平洋集装箱运输被取消。随着各个经济体解封，经济活动将恢复，但别指望一切会迅速复原，重回那个人员来去自如、贸易自由的快意世界。新冠疫情会使出行和移民问题政治化，深化自力更生的趋势。这种向闭关自守的突然转变会拖慢复苏，使经济变得脆弱，加剧地缘政治动荡。

世界经历过几个一体化的时代，但上世纪90年代形成的贸易体系达到的一体化程度前所未有。中国成为世界工厂，人员、货物、资本和信息得以跨境流动。2008年雷曼兄弟破产后，大多数银行和部分跨国公司开始回撤。相对于GDP，贸易和外国投资的增长呈停滞之态，本刊后来把这种现象称为“慢球化”（slowbalisation）。之后，特朗普挑起贸易战，把对美国蓝领工作岗位流失和中国专制资本主义的担忧与在更宽泛层面上奉行沙文主义和蔑视联盟混杂在一起。当新冠病毒去年开始在武汉传播之时，美国对进口商品的关税税率回升至1993年以来的最高水平，而且中美两国的科技产业也开始相互脱钩。

自1月以来，新一轮冲击从亚洲向西扩散。工厂、商店和办公室纷纷关闭，导致需求骤降，供应商接触不到客户。造成的破坏并不均等。食品继续流通；苹果公司坚称可以维持iPhone的生产；受医疗设备销售的提振，中国的出口迄今尚能稳住。但疫情的整体影响很惨烈。今年世界货物贸易可能萎缩10%至30%。5月的头十天，在贸易强国韩国，出口同比下降了46%，很可能是自1967年有记录以来最严重的收缩。

疫情暴露出全球治理的无政府状态。法国和英国在隔离检疫规则上争论不休；面对澳大利亚要求对病毒源头展开调查，中国以实施惩罚性关税相威胁；美国则继续为贸易战磨刀霍霍。尽管在疫情期间有一些合作的例子——比如美联储贷款给他国央行——但美国并不愿意担当领导世界的角色。国内的混乱与割裂已经损害了美国的威望。中国的不透明和强横态度表明它不愿意、也不适合接手这一重任。世界各地的民意正在抛弃全球化。人们发现要保障自身健康需要争抢进口防护装备，还要倚赖外来劳工在养老院工作和收割农作物，这让他们心生不安。

这只是序幕。尽管在中国以外的地方信息流动基本上是自由的，但人员、货物和资本的流动不是。先看人员。特朗普政府正提议进一步限制移民入境，理由是工作机会应留给美国人。其他国家很可能效仿。出行受限，导致找工作、查看工厂和争取订单的范围缩窄。目前全球约90%人口所在国家基本上封闭了边境。许多政府将仅向有类似卫生协议的国家地区开放边境：其中一个正在酝酿中的“出行小圈子”包括澳大利亚和新西兰，也许还会包括台湾和新加坡。行业释出冲击将长久持续的信号。空客公司已减产三分之一，而作为全球化象征的阿联酋航空估计业务要到2022年才会恢复。

随着各国丢弃对国内外企业和商品一视同仁的理念，贸易将遭受冲击。各国政府和央行正通过财政刺激方案让纳税人支持本国企业，不断创造出有利于这些企业的巨大激励。而且，以抗风险为名推动供应链回迁本国的行动正在加速。5月12日，印度总理莫迪向全国宣布，经济自力更生的新时代已经开启。日本的新冠疫情刺激计划包括向那些将工厂迁回国内的公司提供补贴；欧盟官员大谈“战略自主”，正在打造一只基金来收购公司股份。美国正在敦促英特尔在国内建厂。数字贸易蓬勃发展，但规模仍然不大。亚马逊、苹果、Facebook和微软在美国以外的销售额仅为世界出口总额的1.3%。

随着长期投资减少，资本流动也受到影响。今年第一季度，中国在美国的风险投资降至四亿美元，比两年前减少60%。跨国公司今年的跨境投资可能削减三分之一。美国政府刚刚指示其主要联邦养老基金停止购入中国股

票，而且今年迄今，总共占到全球GDP59%的国家已经收紧了对外国投资的规则。随着政府向企业和投资者征税来偿还新债务，一些国家可能会想要进一步限制资本跨境流动。

| 前方一片孤寂

别以为一个由自行其是的各国交织成不稳定网络的贸易体系会更人道或更安全。事实上，穷国将更难赶上富国，而在富裕国家，生活会变得更昂贵，也不如以往那么自由。要让供应链更能抵抗风险，不应该将它迁回国内，因为这只会让风险集中并丧失规模经济；供应链多元化才是出路。此外，要在四分五裂的世界里解决全球性问题会变得更加困难，包括研发疫苗和实现经济复苏。

可悲的是，这一逻辑不再盛行。三轮打击已经重创了开放贸易体系，使得那些支持它的有力理据被无视。挥手告别全球化的最伟大时代吧，还要担心取而代之的将是什么。 ■



Social security

Socialism's precariat

An economic slump exposes holes in China's welfare state

CHINA OR AMERICA: which is the land of rugged self-reliance and which of the government handout? Judging by support for people on low incomes amid the coronavirus crisis, the answer is surprising. America has dramatically scaled up benefits for those out of work. Its federal stimulus has allocated an extra \$600 a week to each jobless person—enough, on average, to replace 100% of lost income. The Chinese government, meanwhile, has given an extra 12 yuan (\$1.70) a week to its poor. That is enough for a daily bowl of noodles.

Those on the margins in China have no choice but to fend for themselves. Lei Yankun was stuck for three months in Hubei province, where the coronavirus outbreak began. Unable to return to his job at an electronics factory, he topped up his savings by harvesting bamboo shoots in the mountains. Li Quanyou, a grey-haired construction worker, went to Shanghai in search of work, but after three fruitless weeks took a 16-hour train ride home, carrying his clothes in a large plastic bucket, to wait out the downturn. Miao Wenjiang, a driver in Anhui province, eliminated his one luxury—weekly meals for his family at KFC—as his earnings dwindled.

The economic pain that China is suffering as a result of covid-19 is common to many countries. What makes it unusual is the contrast between China's world-class physical infrastructure—featuring, among other things, the longest high-speed rail network—and its badly lagging soft infrastructure, with a social safety-net akin to those of much poorer countries.

Analysts often point out that China's official unemployment rate (currently

5.9%, up just slightly from last year) understates the problem, since it only captures full-time urban residents. Economists from UBS and Société Générale think that, by broader measures, as many as 80m might have been out of work in March. That is nearly 20% of the urban workforce. Yet the more salient point is how few of the unemployed receive any help from the government. According to the human-resources ministry, just 2.3m people are on the dole. There are, in other words, upwards of 78m people who are out of a job and are receiving no benefits.

To be eligible for unemployment insurance, applicants must have worked under contract for a company that pays all required fees and taxes. That only describes about a quarter of China's total workforce of 800m, according to government data. The rest typically work for small, private businesses without any formal contract, or on their family farms. For the lucky few who can get unemployment insurance, the payouts are meagre. Benefits are, by law, set at levels below already-paltry minimum wages. Those with nothing can apply for a guaranteed minimum income known as *dibao*. But this offers even less—about 600 yuan a month on average.

That Chinese welfare and unemployment benefits are so threadbare might seem odd for a country that prides itself on how well its poor have fared during the past four decades. The reason is partly historical. Before 1986 unemployment did not officially exist in China. Officials, schooled in Marxism, viewed joblessness as a defect of capitalism and were reluctant to accept that China might have such a problem. In more recent years, the government's main strategy has been to stop unemployment before it occurs, by ensuring that enough jobs are created. Officials have unreservedly primed the pump whenever growth slows. This approach has been helped by the readiness of workers to adapt to changing demands for their labour. Mr Lei, the Hubei resident, has had stints in factories, as a salesman and as a security guard.

But China has refrained from stoking growth in response to the covid slump. It wants people to stay closer to home until the virus is vanquished. So the government is relying on its ultimate safety net, the countryside. Many of China's nearly 300m migrant workers—those most likely to find themselves unemployed without benefits—have some combination of rural land, savings and family to fall back on. "I suppose the government expects migrants to rescue themselves. They can do so in the short term, but if this goes on much longer, many will fall into poverty," says Li Shi, an economist at Zhejiang University. In surveys of villagers in seven provinces, researchers from Stanford University found that most had already started to reduce their spending on basic food items.

Calls are growing for more government action. Gan Li of Southwestern University of Finance and Economics, an expert on income inequality, has proposed, as a start, one-off cash transfers of 2,300 yuan to needy households. Mr Li of Zhejiang University would prefer an outright expansion of the *dibao* income guarantee, to cover more people and provide more cash. Fully replacing wages for the 80m unemployed for three months would amount to less than 1% of GDP—highly affordable. The State Council said last month that it would increase both unemployment and *dibao* benefits, but it has not given details.

The lack of support for the jobless is just one element of a social-security system that is lacking in nearly every dimension. Public spending on health care is, for instance, only about 2% of GDP, roughly half the average of other countries at China's income level, according to the World Bank. Government expenditure on education and social assistance is also lower than the average among China's peers.

One reason to help the needy is moral. But there are also economic arguments for greater social spending. It would deliver an immediate boost to growth. Returns on capital have declined steadily in China over the past

decade. So the government is reluctant to stimulate growth by splurging on yet more railways and airports. The IMF reckons that well-designed investments in social security could have a similar effect.

It would also be consistent with what the government itself wants: growth driven more by consumption and less by pouring concrete. The lowest tenth of income earners in most countries often have no savings. In China they put aside roughly 20% of their earnings, an exceptionally high rate. One reason is that Chinese worry about having to provide for themselves in bad times. A stronger social safety-net would free people to spend more.

If the economic arguments are simple, the politics are more complicated—much as they are in the West’s debates about welfare for immigrants. The only difference is that in China, the migrants are not from abroad. Officials in China’s big cities worry that if they were required to deliver the full gamut of social services to all residents, including migrant workers, the fiscal burden would be crippling. Local authorities also fear that the promise of full benefits would attract more people from elsewhere.

For now they have ways to keep them at bay. On a sunny afternoon in late April, a graphic designer whose firm was in trouble visited a social-security office in Shanghai’s Hongkou district to ask about unemployment insurance. He had worked in the city for several years and his company had paid his payroll tax.

But an official told him that he would have to go to his birth city in Jiangsu province, a couple of hours away by train, to apply and, if successful, collect his benefits. In Jiangsu, however, the payout would be lower than in Shanghai. “I might not bother,” he said. ■



社会保障

社会主义无保者

经济衰退暴露了中国福利国家的漏洞

中国和美国，哪个国家推崇顽强质朴的自力更生精神，哪个是政府救助的楷模？从这次新冠病毒危机中对低收入人群的支持力度来看，答案令人吃惊。美国大幅提高了失业救济。联邦刺激计划为每个失业者额外拨出每周600美元——平均而言，这足以完全弥补失业者的收入损失。与此同时，中国政府给贫困人群每周额外发放12元，只够每天一碗面条。

中国的边缘人群别无选择，只能自寻出路。雷延昆（音译）被困疫情爆发地湖北三个月，无法回到电子器材厂工作，只能靠在山里挖竹笋帮补生计。头发灰白的建筑工人李全有（音译）去上海找工作，三周颗粒无收后，把衣物装在大塑料桶里，坐了16小时的火车返回家乡，等待经济衰退过去。安徽司机苗文江（音译）因收入减少，不得不放弃生活中唯一的奢侈享受——每周与家人去吃一次肯德基。

中国因疫情而遭受的经济痛苦在许多国家都是普遍现象。但中国的不寻常之处是它存在一对反差：一方面拥有世界一流的基础设施硬件，包括世界最长的高速铁路网络；而另一方面，软性基础设施却严重滞后，其社会安全网仅与远比它贫穷的国家相当。

分析师经常指出中国官方公布的失业率（目前为5.9%，较去年仅略微上升）低估了失业问题，因为它只统计全职城镇劳动人口。瑞银和法国兴业银行的经济学家认为，按照更广义的衡量标准，3月份的失业人数可能高达8000万，占城镇劳动人口的近20%。然而更加突出的问题是失业者当中很少有人能从政府获得任何帮助。根据人社部的数据，只有230万人在领取失业救济金。换言之，可能有超过7800万失业人员没有得到任何救济。

要参加失业保险，申请人必须与用人单位签订合同，且公司必须按规定缴纳所有的税费。政府数据显示，中国八亿劳动人口当中只有约四分之一符

合条件。其他劳动者通常在不签订任何正式合同的小型私营企业工作，或者耕种自家的田地。对于能够领取失业保险的少数幸运儿来说，救济也是微不足道。根据法律规定，失业救济金须低于本已微薄的最低工资标准。一贫如洗的居民可以申请最低生活保障也就是“低保”。但这个保障水平更低——平均每个月只有600元左右。

对于一个以40年来的脱贫成就自豪的国家来说，中国的福利和失业救济却如此寒酸，似乎有点奇怪。这其中有一部分是历史原因。1986年以前，中国并不存在官方的失业。受马克思主义教育的官员将失业视为资本主义的缺陷，而不愿接受中国也可能存在这种问题。近些年来，政府的主要策略是在发生失业之前，通过确保创造足够的工作岗位来避免失业。每当经济增长放缓，官员就不遗余力地大举刺激经济。劳动者愿意随时调整和适应变化的劳动需求，也配合了这种做法。湖北居民雷延昆曾在几家工厂打过工，做推销员和保安。

但中国在应对这次疫情导致的衰退时并没有大力刺激经济。政府希望人们深居简出，直至病毒被消灭。因此，政府正在倚赖它的终极安全网——农村。中国近三亿农民工是最可能失业而得不到救济的群体，他们当中有许多人拥有田地、储蓄和家庭这三者不同程度的混合来做退路。浙江大学的经济学家李实说：“我觉得政府希望这些农民工能够自救。短期内他们是能够做到，但如果这种情况长期持续下去，许多人将陷入贫困。”斯坦福大学的研究人员对七个省的农民的调查发现，大多数人已经开始缩减基本食品的开支。

建议政府采取更多行动的呼声越来越高。西南财经大学的甘犁是研究收入不平等问题的专家，他提议首先向贫困家庭一次性发放2300元的现金补贴。浙江大学的李实更倾向于直接扩大低保，纳入更多人并提供更多现金保障。要完全补贴8000万失业人口三个月的工资，所需资金不到GDP的1%——完全可以承受。上个月国务院表示将扩大失业救济和低保保障，但未给出具体细节。

社会保障体系几乎在每个方面都有欠缺，失业救济不足只是其中之一。例

如，世界银行的数据显示，公共医疗支出仅占GDP约2%，仅为同等收入国家平均水平的一半左右。政府在教育和社会援助方面的支出也低于同等国家均值。

道义是济贫的一个原因。但加大社会福利支出还有经济上的理据。它会立竿见影地提振经济。中国的资本回报率在过去十年里稳步降低。因此政府不大愿意再大举砸钱投建更多铁路和机场来刺激增长。国际货币基金组织认为，经过周密设计的社会保障投资能产生类似的效果。

这也符合中国政府自己的目标：更多由消费带动增长，减少对大兴土木的依赖。在大多数国家，收入最低的十分之一人口往往没有储蓄。在中国，他们却存下了收入的约20%，这个比例异常之高。其中一个原因是中国人担心在艰难时期不得不自己养活自己。更强固的社会安全网可以让人们放心地加大消费。

如果说经济上的理据简单明了，政治上的考量则更复杂——正如西方国家关于移民福利的大辩论一样。唯一的区别是中国的外来工并非来自海外。中国大城市的官员担心，如果必须给包括外来工在内的所有居民提供全方位的社会服务，财政上将不堪重负。地方政府也害怕承诺提供全面福利会吸引更多外地人口涌入。

就目前而言，他们还是有办法掌控局面。4月底一个阳光明媚的下午，一位平面设计师因公司陷入困境，来到上海虹口区社保局询问申领失业保险事宜。他已经在上海工作了几年，公司也为他缴纳了个税及社保。

但一位官员说，他必须到江苏省的出生地申请和领取失业金（如果申请成功的话）。那个城市距上海有两小时左右的火车车程。但江苏的失业救济金又比上海少。“我可能就不费这个劲了。”他说。 ■



Lives of the plutocrats

The money tree

William Leith has never managed it—but he has some tips

EVEN MORE than most people, William Leith is fascinated by the super-rich. As a journalist, he devotes a lot of his time to interviewing them; by his own report, he spends much of the rest worrying about his own inability to make money. In his book he sets out to pin down the secrets that lead these modern pharaohs to succeed while he flounders in relative penury.

The title, it is not a surprise to learn, is itself a ruse. There is no simple “trick” to accumulating piles of cash; otherwise Mr Leith would be rich already (and he might be disinclined to share it). More accurately, the object of his inquiry, which he pursues with obsessive zeal, is whether there is a set of identifiable strategies that increase your chances of acquiring extreme wealth. Along the way, the reader learns a great deal about the lifestyles of the plutocrats, and quite a lot about Mr Leith himself.

His research takes him to places most people encounter only through films or prurient television shows. He is admitted to mansions, alights upon private tropical islands and goes to a nightclub in an underwater cavern in the Maldives. One of his subjects is the late Felix Dennis, a maverick British publisher, whose estate in Warwickshire Mr Leith visited. Ruthlessness was essential to amassing a fortune, reckoned Dennis, himself the author of a bestseller titled “How To Get Rich”. Indeed, he believed the first victim of any pursuit of riches must be the pursuer. Dennis’s own life, in which success turned out to be a prelude to drug-addiction, illustrated that bleak view only too well.

Making money, of course, can itself be very addictive. Mr Leith encounters

Jordan Belfort, a former stockbroker and the author of “The Wolf of Wall Street”, a lurid memoir that was turned into a film by Martin Scorsese. Avarice got the better of Mr Belfort, and he was jailed for fraud. Still, for what it is worth, he thinks persuasiveness is one of the key requirements for financial success. He is a better persuader than most: a free man once again, he now delivers lectures on how to strike it rich. Naturally, he demands handsome fees for his insights.

Another route to opulence that Mr Leith analyses in depth is the “black swan” strategy, associated with the writer Nassim Nicholas Taleb. It involves betting heavily on unlikely events—because the odds are rewarding and the world is more chaotic and unpredictable than people expect. Winning business models, the author finds, often arise from a willingness to take hard choices, accept slow progress and, initially, swallow substantial losses. Among his case studies is Patrick Veitch, a talented mathematician whose losing bets on horse races helped him refine a method that subsequently brought in £1m (\$1.25m) a year. He also cites Howard Schultz, who boldly decided to introduce Italian coffee culture to America. The outcome of Mr Schultz’s quixotic scheme was Starbucks.

But this is not a textbook. As well as his observations of the plutocracy and how to penetrate it, Mr Leith offers a tour of his own frantic inner world, reflecting on a dizzying array of subjects that he deems relevant to his mission. These range from cowboys and gangsters to the feeding habits of chimpanzees. His metastasising anecdotes and revelations are deeply personal, often wilfully tangential and always thought-provoking. It may console readers of modest means to learn that the author’s own finances remain disastrous. ■



富豪的生活

摇钱树

威廉·莱斯一直没富起来，但他还是有些致富诀窍要说【《诀窍》书评】

威廉·莱斯（William Leith）为超级富豪着迷，程度较大多数人更甚。作为一名记者，他投入大量时间采访这些富豪。据他说，他其余大部分时间都在担心自己没法赚大钱。他在自己的书中尝试探究这些现代“法老”成功的秘诀，尽管他本人还在比较穷困的日子中挣扎。

书名本身就有取巧的成分，这并不让人意外。要积累万贯家财并没有什么简单的“诀窍”可言，否则莱斯早就发家致富了（而且他可能也不会分享这些诀窍）。更准确地说，他孜孜以求的问题是是否存在一套可识别的策略，能提升获取巨额财富的机会。在这个探究的过程中，读者得以窥探大量有关富豪们生活方式的细节，也多少了解了莱斯本人。

莱斯的调查令他得以涉足大多数人只能通过电影或猎奇下作的电视节目见识的地方。他走进豪宅，飞抵私家热带岛屿，进入马尔代夫一个水下洞穴中的夜总会。他的采访对象之一是特立独行的英国已故出版商费利克斯·丹尼斯（Felix Dennis），莱斯曾到访他位于沃里克郡（Warwickshire）的庄园。丹尼斯本人曾写过畅销书《富翁是这样炼成的》（How To Get Rich），他认为要积累财富就必须冷酷无情。实际上，他相信在追求财富的过程中，首当其冲的受害者必是财富追求者本人。丹尼斯一生的轨迹生动地演绎了这种悲观的看法，他的成功只是他吸毒成瘾的前奏。

当然，赚钱本身就很让人上瘾。莱斯采访了前股票经纪人乔丹·贝尔福特（Jordan Belfort），他也是《华尔街之狼》（The Wolf of Wall Street）的作者，这本耸人听闻的回忆录后来被马丁·斯科塞斯改编成了电影。贝尔福特贪得无厌，因欺诈罪入狱。不管价值几许，他认为说服力是获得财务成功的关键条件之一。他比大多数人都能说会道：如今已重获自由的他到处开讲座，教人如何致富。当然，他对自己的高见要价不菲。

莱斯深入分析的另一条致富之路是“黑天鹅”策略，这是作家纳西姆·尼古拉斯·塔勒布（Nassim Nicholas Taleb）提出的名词。这种策略涉及大举押注低概率事件——因为赔率高，而且如今的世界愈发超乎所料地混乱和不可预测。作者发现，成功的商业模式通常源于愿意做出艰难的抉择、接受缓慢的进展，以及肯在一开始忍受重大损失。在莱斯的案例研究中，才华横溢的数学家帕特里克·维奇（Patrick Veitch）从赛马投注的失败经验中发展出一套押注方法，后来这让他一年进账100万英镑（125万美元）。莱斯引用的案例还包括大胆决定把意大利咖啡文化引入美国的霍华德·舒尔茨（Howard Schultz），星巴克正是舒尔茨奇思妙想的产物。

但这不是一本教科书。除了对富豪的观察和打入富人世界的方法，它也展现了作者自己狂乱的内心世界。他思考了各种他认为与这本书使命相关的问题，从西部牛仔到黑帮，乃至黑猩猩的进食习惯，令人眼花缭乱。他穿插文中的奇闻趣事和感悟极为主观，往往信马由缰却也耐人寻味。作者自己的财务状况依然水深火热，得知这一点，身家不厚的读者也许会略感安慰。 ■



Airlines

Eyeing the sky

Chinese carriers restart their engines

NEWS FOR the world's airlines goes from bad to worse. In April the International Air Transport Association, their trade body, forecast the industry's global revenues would fall by \$314bn in 2020, down by 55% from last year, owing to pandemic-related travel disruptions. Carriers are laying off thousands of workers. In a vote of no-confidence on their future, on May 2nd Warren Buffett said Berkshire Hathaway, the venerated investor's conglomerate, had dumped all the shares it owned in American airline firms. Skies in one part of the world, though, look a bit less bleak. The aviation industry in China, where covid-19 was first detected, may have the worst behind it.

The pandemic curve began to flatten in China weeks before the rest of the world entered lockdown. As curbs on internal travel ease and offices reopen, domestic flights are regaining lost ground (see chart). In the first week of May, a holiday in China, capacity was scheduled to be only 10% lower than in the same period a year ago, estimates the CAPA Centre for Aviation, a consultancy. In America, meanwhile, it was 73% lower. As Western rivals slash flights, China Eastern this month claimed the title of the world's biggest airline by current seat capacity, according to OAG, an aviation-data firm.

Doubters allege that Chinese firms are flying empty planes to boost stated capacity artificially. Yet (self-reported) data from China's three biggest firms—Air China, China Southern and China Eastern—indicate that the “passenger load factor”, a measure of efficiency, averaged 68% in the first quarter, down from 80-85% in 2019 but still respectable. Spring Airlines, a private low-cost carrier from Shanghai, reported a load factor of 73% in the

first three months of 2020. In a sign of bullishness Spring added or restored 47 domestic routes on May 3rd.

To be sure, Chinese carriers have taken a big hit. Revenues at the big three plunged by 46% in the first quarter, year on year, to 54bn yuan (\$7.7bn). They suffered a combined net loss of 14bn yuan. Their share prices remain 25% or so below the level in January, when covid-19 began to spread fast in the city of Wuhan. But that is positively perky next to rivals elsewhere. The Bloomberg world airlines index, which tracks two dozen global airlines, has fallen by half in the same period.

Kelvin Lau of Daiwa Capital Markets, a broker, reckons that travel bans and lockdowns will cut the big three's revenues by less than a third this year, to 286bn yuan. None has resorted to mass lay-offs. The trio serve the world's second-biggest domestic market after America and, being state-controlled, can tap government support with fewer strings attached than American firms (whose \$58bn bail-out is conditional on suspending payouts to shareholders).

How quickly Chinese air travel returns to pre-pandemic health remains up in the air. A second wave of infections could ground them again. But one thing seems assured: the big three, which accounted for 41% of domestic capacity in 2019, down from 59% in 2010, according to Cirium, a data provider, will reassert their dominance. As firms rush to boost capacity to protect market share, load factors may stay depressed, putting pressure on weaker ones such as Hainan Airlines, China's fourth-biggest (which last month sought to delay payment on 750m yuan in maturing bonds). And if, as seems likely, a strong recovery at home coincides with continued deterioration of the world's legacy carriers, the Chinese state-run giants could grab a bigger slice of international routes, too. ■



航空公司

凝望天空

中国的航空公司重启引擎

关于全球航空业的消息越来越糟糕。4月，行业机构国际航空运输协会（International Air Transport Association）预测，2020年，与疫情相关的出行中断将导致航空业的全球收入下降3140亿美元，较去年降低55%。航空公司正在解雇成千上万名员工。沃伦·巴菲特对它们的未来投下了不信任票：这位备受尊崇的投资人在5月2日表示，他的企业集团伯克希尔·哈撒韦已经抛售了它在美国的航空公司持有的所有股份。不过，世界上有一个地方的天空看起来倒没那么暗淡。在最先发现新冠肺炎的中国，那里的航空业可能已经熬过了最艰难的时刻。

世界其他地区进入封城状态的几周前，中国的疫情曲线开始变平。随着中国国内放宽出行限制并重开办公室，其国内航班正逐步收复失地（见图表）。咨询公司亚太航空中心（CAPA Centre for Aviation）估计，5月第一周的小长假期间，中国编排的航班运力仅比去年同期低10%。同期美国的这一数字下降了73%。航空数据公司OAG称，由于西方竞争对手大幅削减航班，中国东方航空公司本月凭借目前的可供座位数成为全球最大的航空公司。

有人质疑说，中国的航空公司都在“空飞”，人为地提高对外宣称的运力。但国航、南航和东航这三家最大的中国航空公司（自报）的数据显示，第一季度，衡量效率的“乘客负荷系数”平均为68%，虽低于2019年的80%到85%，但仍很可观。上海的私营廉价航空公司春秋航空报告称，其2020年前三个月的负荷系数为73%。春秋在5月3日或新增或恢复了总共47条国内航线，显露行情向好的迹象。

无可否认，中国的航空公司遭受了重创。第一季度三大航的收入同比骤降46%，至540亿元；净亏损合计140亿元。它们的股价仍比1月份新冠肺炎开始在武汉迅速传播时的水平低25%左右。但与其他地方的竞争对手相

比，这样的数字无疑已算亮眼。追踪20多家全球航空公司的彭博世界航空公司指数同期跌去了一半。

经纪公司大和资本市场的刘伟健估计，出行禁令和封城措施将导致三大航今年的收入减少三分之一不到，至2860亿元。还没有哪家公司被迫大规模裁员。这三家公司服务的是仅次于美国的全球第二大国内市场，而且由于其国营性质，它们和美国的公司相比能以更少的附加条件获得政府支持（美国的航空公司获得580亿美元纾困金的条件是暂停向股东分红）。

中国的航空出行能多快恢复到疫情前的状态还不好说。如果出现第二波感染，它们可能会再次停飞。但有一点似乎很明确：三大航将重新确立它们的主导地位。根据数据供应商Cirium的统计，它们在国内运力中的占比从2010年的59%下跌至2019年的41%。随着各家公司争相提升运力以保护市场份额，负荷系数可能会持续低迷，给实力较弱的公司带来压力，如中国第四大航空公司海航（上个月该公司申请推迟支付7.5亿元的到期债券本息）。而如果中国国内的强劲复苏恰逢世界传统航空公司每况愈下——看起来很可能如此——那么中国国营航空巨头可能还会分得国际航线的更大份额。 ■



The stockmarket rally

Uppers and downers

The contrast between a perky equity market and a depressed economy

FINANCIAL MARKETS look forward. Yesterday's news is stale. What matters is the future, in particular the returns that today's buyer of securities can expect. So there is some reason to think the S&P 500 share index might trace the near future of America's economy.

Share prices in America have followed a dramatic V-shape recently. A brutal sell off has given way to a lively recovery (chart 1). Yet a V-shaped path for the economy—a brief recession, followed by a swift recovery—seems unlikely. The scale of job losses suggests the economy is in a hole too deep to climb out of quickly. Claims for unemployment insurance have dwarfed peaks in previous recessions (chart 2).

So why has the stockmarket rallied so hard? In part this reflects the Federal Reserve's efforts to backstop the economy. It has bought bonds on an unprecedented scale, swelling its balance-sheet (chart 3). Bond yields have also become even paltrier (chart 4). Equities are appealing, if only by comparison.

The pattern of share-price changes is revealing. America's have risen faster than Europe's. The industry make-up of each market explains much of this. Europe's bourses are weighed down by cyclical industries—banks, carmakers and energy companies. America's has a bigger tilt toward technology companies, the relative winners of the covid-19 crash. The five largest tech stocks continue to be market darlings (chart 5). Healthcare stocks and consumer staples have also proved resilient (chart 6). Investors are not looking much beyond stocks they judge to be recession-proof. The market's recent "V" is not for victory. ■



股市回升

兴奋剂和镇静剂

活跃的股市和低迷的经济反差强烈

金融市场朝前看。昨天的新闻已经过时。重要的是未来，尤其是今天的证券投资者所能期望的回报。因此，认为标准普尔500股票指数可能追踪美国经济在不久以后的走向，是有一定道理的。

美国的股价近期上演了戏剧性的V型走势。残酷的抛售过后是满血复活（见图表1）。然而经济的V型走势——在短暂的衰退后迅速复苏——似乎不太可能发生。大规模失业表明美国经济陷入深渊，难以迅速脱身。失业金申领人数超过了以往任何一次经济衰退中失业人数的峰值（见图表2）。

那么，为什么股市反弹如此强劲？这在某种程度上反映了美联储为托底经济所做的努力。它以前所未有的规模购买债券，致使其资产负债表膨胀（见图表3）。债券收益率也变得更加微不足道（见图表4）。相比之下，股票更有吸引力。

股价变化的模式很能说明问题。美国股价上涨比欧洲快。这在很大程度上要归因于各个市场的行业构成。欧洲的股市受到银行、汽车制造和能源等周期性行业的拖累。而美国股市中，受新冠肺炎冲击相对较轻的科技公司占比更大。全球五大科技公司的股票仍旧是市场宠儿（见图表5）。医疗股和必需消费品股也表现出强复原力（见图表6）。投资者关注的基本上还是那些他们认为能抗衰退的股票。市场最近的“V”型走势并不代表“胜利”。■



Pandemics past and present

A lesson from history

A peculiarity of Spanish flu may shed light on covid-19

IT IS NOW well established that developing the symptoms of covid-19 when you are old is extremely dangerous, but not so risky when you are young. That might seem unremarkable. Old people are less resilient, and more likely to have specific confounding health problems like diabetes. However, this pattern—that the young live through infection while the old die—is by no means the norm. The influenza outbreak of 1918-19, known (unfairly to Spaniards) as the “Spanish” flu, for example, proved particularly harmful to those aged between 20 and 40, and thus apparently in their prime. Some suspect that fact may cast light on the, albeit different, age-related susceptibility to covid-19.

One suggestion to explain what happened in 1918 is that those older than 40 tended to survive because they had acquired protective immunity from an earlier round of influenza to which younger generations had not been exposed. A second is that the more potent immune systems of the young overreacted to the 1918 virus for some reason, and that this triggered in them a cataclysmic, frequently fatal, immune response known as a cytokine storm. (Cytokine storms, as it happens, are sometimes a cause of death in cases of covid-19.)

Alain Gagnon, a demographer at the University of Montreal, in Canada, has been studying the matter for several years. It was he who spotted, in 2013, that within the two-decade cohort of susceptible individuals in 1918 there was a particular spike in mortality among those exactly 28 years old. Even members of the cohort younger or older than this did considerably better.

Working with a team of immunologists, microbiologists and infectious-

disease experts, Dr Gagnon pointed out that cytokine storms were unlikely to be solely responsible for this spike, since the immune systems of 28-year-olds are just as likely to overreact in such a manner as those of 20-year-olds. He also argued that the notion of older generations having developed immunity through exposure to earlier viruses does not hold up, since this, too, would have left those under 28 just as vulnerable as 28-year-olds.

Instead of these ideas Dr Gagnon and his colleagues support an alternative hypothesis, developed by Dennis Shanks of the Australian Army Malaria Institute, in Queensland, and John Brundage of the Armed Forces Health Surveillance Centre, in Maryland. This is that, in some circumstances, early exposure to a virus can harm subsequent immune responses rather than helping them.

| *Learning the wrong lesson*

Dr Shanks and Dr Brundage observed that in 1890, the birth year of those who were 28 in 1918, a different and less lethal strain of influenza, known as Russian flu, spread around the world. They also knew from experiments on pigs, conducted by others, that exposure to one virus during early life has the potential to make infections of other, quite different, viruses later on much more severe than they otherwise would have been. Based on these observations they argued that the immune systems of those exposed to Russian flu as newborn babies—a period of life when immune systems are especially attuned to learning about which pathogens are circulating—learnt about Russian flu all too well. As a consequence, when faced 28 years later with Spanish flu viruses they mounted the wrong response (ie, to Russian flu rather than to the real threat).

Nor is the example of 1918 unique. According to Dr Gagnon, people who were themselves born during that epidemic showed increased vulnerability to the Hong Kong flu of 1968. And those born during the Asian flu of 1957

showed higher mortality in the face of swine flu in 2009. He therefore wonders if something similar is going on now, with elderly people mounting inappropriate immune responses that reflect the infections of their youth. Since all of his examples relate to influenza viruses, which are different beasts from coronaviruses, this is speculation. But it is a line of inquiry that might be worth following once the immediate crisis is over. ■



大流行病的前世今生

以史为鉴

西班牙大流感的一个奇怪特点可能有助于认识新冠肺炎【新冠报道】

现在已经确知的是，老年人如果出现新冠肺炎的症状会极为危险，而年轻人就没那么严重。这似乎并不奇怪。老年人的复原力较差，也更可能伴有糖尿病等其他特定健康问题。但是，这种年轻人能扛住感染而老年人不行的情况绝非常态。以在1918年至1919年间爆发的“西班牙”大流感（这种称法对西班牙人不公）为例，事实证明受影响特别严重的是20至40岁的人群，显然正处于盛年。一些人认为这也许有助于进一步了解新冠病毒与年龄相关的易感性，尽管两种病毒的情况不同。

对1918年大流感这一特点的一个可能的解释是，40岁以上的人从它之前的一轮流感中获得了保护性免疫力，因而存活率更高，而年轻一代没有接触过前一轮流感。第二个解释是，年轻人更强大的免疫系统由于某种原因对1918年的病毒反应过度，在他们体内引发了极具破坏性、通常致命的免疫反应，这被称为细胞因子风暴。（细胞因子风暴有时也正是新冠肺炎致死的原因。）

加拿大蒙特利尔大学的人口学家阿兰·盖格农（Alain Gagnon）研究这个问题已经有好几年。他在2013年发现，1918年大流感期间，在跨度20岁的易感年龄段中，28岁的人死亡率特别高，而其他人的情况都要好得多。

盖格农与一支由免疫学家、微生物学家和传染病专家组成的团队合作。他指出，细胞因子风暴不太可能是造成这种高死亡率的唯一原因，因为28岁的人和20岁的人免疫系统反应过度的可能性是一样的。他还认为，上一代人通过接触之前的流感病毒而产生免疫力的观点站不住脚，因为按照这种说法，28岁以下的人群也应该和28岁的人一样脆弱。

盖格农和他的同事们支持另一种假设。该假设由位于昆士兰州的澳大利亚陆军疟疾研究所（Australian Army Malaria Institute）的丹尼斯·尚克斯

（Dennis Shanks）和位于马里兰州的武装部队健康监控中心（Armed Forces Health Surveillance Centre）的约翰·布伦达奇（John Brundage）提出，它认为在某些情况下，早期接触过病毒可能对之后的免疫反应有害而非有益。

| 错误的经验

尚克斯和布伦达奇注意到，在1890年（也就是1918年时28岁的人出生那一年），另一种致死率较低的流感曾在世界范围内传播，被称作“俄罗斯”流感。他们还从其他研究者对猪的实验中得知，在人生早期接触过一种病毒的人之后感染另一种不大一样的病毒时，病情可能比没接触过的人要严重得多。基于这些发现，他们认为在新生儿时期（在人生这个阶段免疫系统尤其善于认识正在传播的病原体）接触过俄罗斯流感病毒的人的免疫系统对这个病毒的印象太深刻了。结果，28年后在面对西班牙流感病毒时，他们的免疫系统做出了错误的反应（即把真正的威胁当成了俄罗斯流感）。

1918年流感也非特例。据盖格农说，在西班牙流感期间出生的人面对1968年的香港流感时更为脆弱。在1957年亚洲流感期间出生的人在2009年猪流感期间死亡率更高。因此他怀疑眼下是否发生了类似的情况，也就是说老年人因为在年轻时曾感染过其他病毒而产生了不当的免疫反应。由于他所有的例子都与流感病毒有关，而这些病毒与冠状病毒不同，所以这只是推测。不过，等眼前的危机结束，这条思路也许值得继续探究下去。■



Buttonwood

Pulp fiction

Carson Block, a short-seller, on the joys of detecting false accounting and fraud

LIKE A LOT of people, Carson Block found his vocation by accident. In 2010 he was living in China and trying to set up a business. His father asked him to look at Orient Paper, a Chinese firm listed in New York. He scoured the company's filings and became doubtful of its claims. That scepticism grew when he visited a factory. He decided to publish a damning report. But first he would bet against the stock to cover his costs. The report went viral. The share price collapsed. Lawsuits were soon flying.

It has been like that ever since. Mr Block is an activist short-seller. His firm, Muddy Waters, borrows shares in a shifty-looking company and then sells them. That allows it to profit from a fall in their value. There is something of the gumshoe about him—imagine Philip Marlowe, the private eye created by Raymond Chandler, but with coarser language. (Example: XYZ Corporation is a “predatory shit-bag”). Instead of pounding the mean streets, Mr Block ploughs through reams of company documents. He makes his findings freely available. He then shows up on CNBC's “Squawk Box” to denounce the bad guys.

More appearances seem assured. The stock of covert embezzlement—what John Kenneth Galbraith, a quotable economist, called “the bezzle”—varies with the business cycle. It grows during booms. Tell people that XYZ Corporation is a fraud, and they won't listen. Short-sellers get short shrift. But the cycle always turns. The bezzle peaks just as boom turns to bust. For short-sellers, these are the good times.

Mr Block made his name angling for Chinese scams. His company's name derives from a Chinese proverb: muddy waters make it easy to catch fish.

China is to stock fraud what Silicon Valley is to technology, he says. But there is plenty of dodgy accounting, albeit of a less blatant kind, outside it. Muddy Waters has evolved into a short-seller with a global purview.

The art of the bezzle is to inflate profits, pump up the stock price and quietly sell your shareholdings to credulous outsiders. But money is not the only incentive. Vanity is also a factor. Jeff Skilling, the boss of Enron, a book-cooking firm that went bust spectacularly in 2001, had an unshakable belief in his own acumen. Executives of his kind tend to serve up the financial results that bolster their own delusions. “Once you’ve been put on a pedestal, once you’re on the cover of Business Genius Monthly, it becomes hard to believe you are fallible,” says Mr Block.

Each stock fraud is fraudulent in its own way. But there are common elements. One is a breach between earnings as defined by Generally Accepted Accounting Principles (GAAP) and non-GAAP measures. Another is an increase in “days payable outstanding”, a yardstick of how long it takes a company to settle bills with suppliers. Delay boosts cashflow, at least for a while. So does gathering more quickly payments you are owed. Firms with dressed-up earnings also tend to pile on debt because they lack strong underlying cashflow. And there are grounds to suspect the worst of companies that engage in a lot of acquisitions. Aligning the accounts of acquirer and acquired gives ample scope for fiddling.

But looking only at numbers is not enough. They need to be cross-checked with other information. Finding it is gumshoe work. There may be clues in the firm’s risk disclosures. Lawyers are skilled at writing these in ways that put readers to sleep, says Mr Block. Stay awake, though, because they occasionally slip something important in between all the guff. Transcripts of conference calls with stock analysts can also be revealing. If the company keeps moving the goalposts, then be on alert.

Muddy Waters has built a reputation for diligent research. A pronouncement by Mr Block has the power to move prices. That worries regulators. Like Chandler's detective, Mr Block seems to take as many beatings from cops as from bad guys. Even admirers worry about possible errors and lapses. But he is refreshingly candid about his flaws. A sense of alienation from his "postcard-perfect" surroundings as a youth bred an urge to expose the shallow, the vapid and the fake. "When I discovered there were all these frauds in China, it was a form of therapy," he says.

There are easier ways to earn a living. A few years after shorting Orient Paper, Mr Block totted up the numbers and found that he had lost \$600. No matter. He sees no shortage of firms with accounting that distorts reality. "There are real excesses out there." The bezzle has only grown fatter. ■



梧桐

账本上的低俗小说

卖空者卡森·布洛克讲述挖出会计造假和欺诈的乐趣

和许多人一样，卡森·布洛克（Carson Block）在偶然间找到了自己的使命。2010年，他生活在中国，试图创业。他的父亲让他去看看东方纸业，一家在纽约上市的中国公司。他仔细查看了这家公司的文件，开始怀疑它对外声称的那些说法。当他参观一家工厂时，这种怀疑愈发强烈。他决定发表一份给这家公司“定罪”的报告。但首先他要做空这只股票来弥补自己付出的成本。这份报告迅速传开。该公司股价暴跌。诉讼很快就满天飞了。

自那以后这便成了常态。布洛克是一个维权卖空者。他的公司浑水（Muddy Waters）向看起来有猫腻的公司借入股票后再卖出，这样就能从股价下跌中获利。他身上有种侦探的气息——可以想象一下雷蒙德·钱德勒（Raymond Chandler）塑造的私家侦探菲利普·马洛（Philip Marlowe）这个角色，只不过言语更粗俗。（例如：某某公司就是“一坨掠夺成性的臭狗屎”）。布洛克并不游走在穷街陋巷，而是埋头翻阅大量公司文件。他将自己的发现免费供他人阅读。然后他会出现在全国广播公司商业频道（CNBC）的《财经论坛》节目（Squawk Box）上，谴责那些坏蛋。

看起来他肯定会更频繁地亮相。隐形挪用资金（金句多多的经济学家约翰·肯尼思·加尔布雷思称之为“占款”）的存量随商业周期的变化而变化。繁荣时期占款会增长，这时告诉人们某某公司是骗子他们是听不进去的。卖空者受冷落。但周期总会掉头。随着繁荣转为萧条，占款达到峰值。对于卖空者来说，这是好时期。

布洛克因试图挖出中国企业的骗局而出名。他公司的名字源于一句中国谚语：浑水好摸鱼。他说，中国之于股票欺诈，就像硅谷之于技术。但在中国之外也有很多可疑的会计操作，尽管没那么明目张胆。浑水公司已经发

展成为一家全球性的卖空者。

占款这门技术的要领是夸大利润，抬高股价，然后悄悄地把自己持有的股份卖给好骗的局外人。但金钱并不是唯一的激励，虚荣心也是一个因素。做假账的安然公司在2001年破产，震惊世界。其老板杰夫·斯奇林（Jeff Skilling）对自己的精明强干有着不可动摇的信念。他这种类型的高管往往会呈上能够支撑其妄想的财务业绩。“一旦你被捧上了天，一旦你登上了《商业天才月刊》的封面，就很难相信自己会犯错。”布洛克说。

每一桩股票欺诈都有自己的造假方法，但也有一些共同的元素。一个是利用公认会计准则（GAAP）和非GAAP指标对收益的不同定义。另一个是增加“应付账款周转天数”，该指标统计一家公司与供应商结算账单所需的时间。延迟结算会增加现金流，至少在一段时间内是如此。更快收回欠款也有这样的效果。粉饰收益的公司也容易堆积债务，因为它们缺乏强劲的潜在现金流。另外，也有理由怀疑那些大举收购的公司有很大的问题。在调整收购者和被收购者的账目时会有充分的空间动手脚。

但是光看数字还不够，还需要与其他信息交叉核对。而寻觅这些信息就是类似侦探的活了。线索也许隐藏在公司的风险披露中。布洛克表示，律师们很擅长把这类文件写得让读者昏昏欲睡。但你得保持清醒，因为他们偶尔会在满篇的胡说八道中泄露一些重要信息。与股票分析师的电话会议记录也可能透露内情。如果公司总是朝令夕改，那就要保持警惕了。

浑水树立起了勤勉调查的声誉。布洛克的声明有影响价格的力量，令监管机构担忧。钱德勒笔下的侦探受到的来自警察和坏蛋的打击似乎一样多，布洛克看来也是这样。就连仰慕他的人也担心他可能犯错和疏忽。但他对自身缺点的那种坦诚不多见。年轻时的他对周围“如同明信片般完美”的环境有一种疏离感，这令他生发出揭露肤浅、乏味和虚假的冲动。“当我发现中国存在这些欺诈行为时，心灵得到了一种治愈。”他说。

要谋生，本有更简单的方式。做空东方纸业几年后，布洛克算了算，发现自己亏了600美元。不要紧。他认为不愁找不到做假账的公司。“夸大和越

轨的操作实在不少。”近些年占款的油水有增无减。■



Commodities

Custom of the country

With oil prices so low, China presides over a buyer's market

WHEN OIL supply threatened to overwhelm storage tanks in Cushing, Oklahoma, in April, the pain was felt as far as Chongqing. Retail investors in the Bank of China's oil *bao*, or "treasure", a speculative vehicle linked to crude futures, took a hit as the May contract for West Texas Intermediate settled at an astonishing -\$37.63 a barrel on April 20th. The market's gyrations have led to consternation in China—regulators have reportedly called for an investigation—and revealed unexpected victims. In general, though, plunging prices have served Chinese buyers rather well.

In 2017 China became the world's biggest importer of crude, surpassing America, and the second-largest importer of liquefied natural gas (LNG), behind Japan. Dependence on foreign fuels has long been deemed a strategic vulnerability. But now oil and gas suppliers are toiling to secure Chinese buyers, not the other way round.

China's heft was set to grow even before covid-19 kept cars parked and planes grounded. In the long term the growth of China's population and economy make it a likely source of rising demand, even if climate change clouds prospects for oil and gas elsewhere. Companies and petrostates have worked to secure their share of China's market: Russia's Power of Siberia gas pipeline opened in December; ExxonMobil's efforts include a 20-year deal to supply LNG to Zhejiang Provincial Energy Group.

As the pandemic obliterates energy demand, China is revelling in a buyer's market. It has not been shy about squeezing suppliers. In March Kazakhstan's energy minister said the country had reduced gas exports to China by 20-25%, at China's request. China National Offshore Oil Corp

reportedly invoked *force majeure* to halt LNG shipments from BP, Royal Dutch Shell and Total, three European supermajors.

Chinese buyers have also been opportunistic. Although car, freight and plane travel dropped in the first quarter, crude imports rose by 5%. Neil Beveridge of Bernstein, a research firm, estimates that about 200m barrels of oil went into storage in China in the first three months of the year, as the government, refiners and other buyers stocked up on inexpensive oil. Refineries lifted run rates in March, benefiting from the gap between cheap imported crude and the state-mandated domestic-price floor of \$40 a barrel, which in turn ensured a higher margin for refined products.

Oil suppliers continue to look to China, which has eased its lockdown before other markets. “China is leading demand at the moment, so everyone is trying to sell into that market,” says Ben Luckock of Trafigura, a trading group. Even as covid-19 depressed global energy demand, seaborne oil exports to China in April reached a record level, according to Kpler, a market-data firm, and were 25% higher than last year’s average. On May 1st independent refineries, known as “teapots”, were processing more crude oil than in December. In April the Shanghai International Energy Exchange approved new storage capacity for Sinopec and PetroChina, national energy giants.

It is unclear if China will remain a bright spot. Despite analysts’ best efforts—by, say, using satellite images to track outlines on storage tanks—no one knows precisely when China’s oil stocks may near its capacity to store it, says Mr Beveridge. The International Energy Agency expects Chinese demand to be tepid in the second half of the year, as the global economy remains weak. “Crude imports are going to have to slow down a bit to run down some of the stocks,” argues Chris Midgley of S&P Platts Analytics, a price-reporting firm.

Meanwhile competition to sell to China continues. Saudi Arabia posted steep discounts for crude heading to Asia in May; rivals are nervously awaiting Saudi prices posted for June. Complicating the outlook for gas exporters to China, the government is keen to support domestic gas and the cost of Chinese wells has dropped. The American Petroleum Institute (API), a lobby group, is urging officials to lean on China to import more American oil and gas, as agreed in a recent trade deal. “China has a growing demand for energy,” says Frank Macchiarola of the API, “and we have a growing need for markets.” Join the club. ■



大宗商品

中国的惠顾

油价如此之低，中国统领买方市场

上个月，过剩的石油供应让俄克拉荷马州库欣（Cushing）的储油罐几近满溢，万里之外的重庆也感受到了同样的烦恼。4月20日，西得克萨斯中质原油的5月合约结算价跌至惊人的每桶-37.63美元，使得中国银行“原油宝”（与原油期货挂钩的投机工具）的散户遭受重创。市场波动在中国引发恐慌——据悉监管机构已经要求就此展开调查，并挖出了一些出人意料的受害者。不过，总体而言，油价暴跌对中国买家颇为有利。

中国在2017年超越美国，成为全球最大的原油进口国，并成为仅次于日本的第二大液化天然气（LNG）进口国。长期以来，对能源进口的依赖都被视为一个战略弱点。但现在，石油和天然气供应商正在竭力争取中国买家，而不是反过来。

即便在新冠肺炎导致车辆停开、飞机停飞之前，中国影响力增长的趋势就已明朗。尽管气候变化给其他地区的石油和天然气前景蒙上阴影，但从长远来看，中国的能源需求很可能随着它的人口和经济增长而水涨船高。油气企业和产油国已经在努力确保自己在中国的市场份额：去年12月，俄罗斯的西伯利亚力量（Power of Siberia）天然气管道开通；埃克森美孚与浙江省能源集团签署了一项为期20年的液化天然气供销协议。

大流行病抹杀能源需求之际，中国正沐浴在买方市场中。在压榨供应商方面它没什么顾忌。3月，哈萨克斯坦能源部长表示，应中国要求，该国已把对中国的天然气出口减少了20%至25%。据报道，中海油诉诸于“不可抗力”，提出暂停接收BP、荷兰皇家壳牌和道达尔三家欧洲石油超级巨头的液化天然气货物。

中国买家也在积极投机。尽管第一季度公路客运、货运和航空客运纷纷下降，原油进口却增长了5%。研究公司盛博的尼尔·贝弗里奇（Neil

Beveridge) 估计，随着政府、炼油厂和其他买家持续囤积廉价石油，今年头三个月中国储存了大约2亿桶石油。得益于廉价进口原油和政府设定的40美元每桶的国内最低限价之间的差价，炼油厂在3月份提高了运转率，进而保证了更高的成品油利润率。

中国先于其他市场解除了封城，这让石油供应商继续把希望寄托于中国。贸易集团托克 (Trafigura) 的本·勒科克 (Ben Luckock) 表示：“眼下中国引领需求，因此所有人都想在中国打开销路。”据市场数据公司Kpler称，就在新冠肺炎抑制了全球能源需求之时，4月中国的海运石油进口创下新高，比去年平均水平高出25%。5月1日，被称为“茶壶”的独立炼油厂的原油加工量已经超过了去年12月间的水平。4月，上海国际能源交易中心批准了中石化和中石油两家国有能源巨头的新增库容。

尚不清楚中国能否持续充当需求亮点。贝弗里奇表示，尽管分析人士尽了最大的努力——例如利用卫星图像追踪储油罐的轮廓——但没人确切知道中国的石油库存何时接近它的最大储力。国际能源署预计，由于全球经济依然疲软，中国今年下半年的需求将不温不火。“原油进口将不得不稍微放缓，以消耗部分库存。”价格资讯公司S&P Platts Analytics的克里斯·米奇利 (Chris Midgley) 指出。

与此同时，对中国的销售竞争还在继续。5月，沙特宣布对出口亚洲的原油大幅降价；竞争对手正在紧张地等待沙特公布6月的价格。中国政府正积极支持本国天然气开采，中国气井的开采成本已经下降，这也让国外天然气出口商的前景更加复杂。游说团体美国石油学会 (API) 正在敦促政府官员给中国施压，要它依照前不久达成的贸易协议进口更多美国油气。“中国对能源的需求在不断增长，”API的弗兰克·马基亚罗拉 (Frank Macchiarola) 表示，“而我们对市场的需求也在不断增长。”那就一起来吧。■



The Economist film

Covid-19: How bad will it be for the economy?

The big question that economists are still grappling with is whether it will be a V-shaped recession, or a U-shaped or an L-shaped recession?



经济学人视频

新冠对全球经济的打击有多大？

经济学家们还在试图搞清一个大问题：此次衰退将是V型、U型还是L型的？



Schumpeter

The riddle of Samsung

What is weighing on one of the world's most remarkable companies?

EVEN IN A corporate world rife with despotic founders, complex cross-shareholdings and cultlike initiation rituals, Samsung stands out as the most mysterious of firms. Founded in 1938 as a provincial vegetable and dried-fish shop, it has grown into a conglomerate accounting for a fifth of South Korea's exports. Its crown jewel, Samsung Electronics, has for years been one of the world's biggest seller of smartphones, televisions and chips, with a market capitalisation of more than \$270bn and 310,000 workers in 74 countries. The group's riveting story, chronicled in a new book, "Samsung Rising", by Geoffrey Cain, is one of entrepreneurial derring-do and excruciating work habits mixed with scandals, vendettas and political intrigue. What the author (a former contributor to this newspaper) skips over is how a company with so many well-documented flaws can be such a resounding success.

To get a sense of the Samsung enigma consider first its ruling dynasty. Long before Kim Jong Un, North Korea's dictator, disappeared from view in April, Samsung's chairman, Lee Kun-hee, vanished into hospital. The 78-year-old has not been heard from since 2014. No one outside the family knows how ill he is. His only son and heir-apparent, Lee Jae-yong, aged 50, faces a retrial on charges of influence-peddling, for which he spent almost a year behind bars in 2017-18. Jay, as he calls himself, has exerted huge influence over Samsung Electronics despite directly owning a tiny fraction of its shares and no longer sitting on its board, thanks to an ownership structure set up around other group holdings and family foundations. It is not clear who would represent the clan's interests if Jay were found guilty.

The *chaebol's* corporate culture is no less eyebrow-raising. Mr Cain

describes a leadership style at Samsung Electronics that is military-like, macho and intolerant of mistakes. When the conglomerate turned from fertilisers and transistors to semiconductors in the early 1980s, the ruling family toughened up its chip engineers with an overnight march in midwinter, followed by the usual 16-hour work shift. In 1995, to embarrass its technicians for shoddy workmanship, the elder Mr Lee ordered a bonfire of 140,000 gadgets; \$50m went up in smoke. Mr Cain recounts numerous expletive-filled tirades by the firm's top brass. And yet Samsung Electronics continues to be South Korea's most prestigious employer and a magnet for bright graduates.

Most enigmatic of all is the success bred by this inclement environment. Within a few years of that frosty march, Samsung Electronics' semiconductor business had caught up with its big Japanese competitors. In 2011, just two years after it had introduced its first smartphone, its Galaxy devices edged past Apple's iPhone in sales volume. Its speed is matched by its chutzpah; competitors, like Apple and Sony, are also the biggest customers for its components, from chips to OLED screens. Samsung makes diversification seem like a virtue, not a distraction. When sales of phones and other gadgets suffer, as they did in the first quarter owing to the covid-19 crisis, the memory-chip business provides ballast; it got a boost from lockdown-related use of cloud-based servers, Samsung said on April 29th. Ten years after the Lees decided to further diversify the conglomerate by 2020, the pandemic has helped turn Samsung Biologics, a manufacturer of vaccines and other pharmaceuticals, into South Korea's third-most-valuable company.

So what puts the fire into Samsung's *kimchi*? Mark Newman, a former Samsung Electronics employee now at Bernstein, an investment firm, says the secret ingredient has always been faith in the founding family, who, for all their flaws, retain a godlike status within the firm. As in Western companies, executives bicker over where to spend money. But when a

decision is taken at the top, they quickly fall into line. That helps some of Samsung's bold, strategic bets to pay off. Others, such as Samsung cars and solar panels, have not.

Samsung executives believe it is time for another big flutter on the future—nowhere more so than at Samsung Electronics. For all its strengths, it has two big problems to grapple with. The first is how to become more than just the world's most exemplary slicer-and-dicer of chips, screens and gadgets. It wants to triumph in higher-margin (and chicer) software and services. As smartphone sales peak, Apple is enveloping its customers in wearables, watchables and listenables. The American giant's returns dwarf Samsung's. Rather than develop its own operating system to rival Apple's, the Korean firm outsourced the job to Google's Android. Instead of software, it has recently doubled down on manufacturing non-memory chips and biopharmaceuticals. To make a success of services, especially in the era of the all-connected "Internet of Things", it needs creative skills that it has struggled to nurture.

The second challenge is China. The country is changing both as a market and as a source of competition. Last year Samsung pulled the plug on smartphone production in China after its market share, once in double digits, fell below 1%. Big Chinese firms have the cash and long-term focus to give it a run for its money in semiconductors. Phone companies like Xiaomi are better at software and apps. As one of the biggest beneficiaries of globalisation, Samsung will draw little consolation from the prospect of supplying the West if the tech cold war gets worse.

| *Less leeway*

Despite \$81bn of net cash (more than the market value of Sony) to invest, a sense of gloom pervades Samsung Electronics. With the Lee family in an agonising limbo, it is unable to place big strategic wagers, jeopardising its ability to move beyond manufacturing or compete with Chinese rivals.

There is a way forward. Like most dynastic firms, Samsung will eventually have to put all its faith in professional managers, rather than in its founding family. Now is as good a time as any to start. To be sure, it will take the mystery out of the firm. It doesn't have to kill its mojo. ■



熊彼特

三星之谜

世界上最杰出的公司之一有何压力？

即便在满是专横的创始人、复杂的交叉持股和邪教般的加入仪式的企业界，三星仍然是最神秘的企业。1938年创立时它只是一家在地方上卖蔬菜和鱼干的商店，如今已成长为占韩国出口总额五分之一的企业集团。它“皇冠上的明珠”三星电子多年来一直是全球最大的智能手机、电视和芯片销售商之一，市值超过2700亿美元，在74个国家雇有31万名员工。杰弗里·凯恩（Geoffrey Cain）的新书《三星崛起》（Samsung Rising）记录了这家集团引人入胜的历史故事：创业者的蛮勇和折磨人的工作习惯，夹杂着丑闻、复仇和政治阴谋。作者（曾为本刊撰稿）略去不提的是，一家公司既然有这么多证据确凿的缺陷，怎么会取得如此巨大的成功？

要想了解三星之谜，先来看看它的统治家族。今年4月朝鲜独裁者金正恩从公众视野里消失，早在这之前很久，三星会长李健熙就进了医院，从此销声匿迹。自2014年以来没有任何关于这位78岁老人的消息。除了家人，没有人知道他病情如何。他唯一的儿子、当然的接班人李在镕面临行贿案的重审，50岁的他为此已在2017年到2018年间坐了近一年牢。李在镕（英文名Jay）直接持有三星电子的股份很少，也不再是它的董事，但他已经对三星电子产生了巨大的影响力，这得益于围绕其他集团控股和家族基金会建立的所有权结构。目前还不清楚如果李在镕被判有罪，谁将代表这个家族的利益。

这个财阀的企业文化同样令人惊异。凯恩讲述了三星电子军事化、大男子主义、不容犯错的领导风格。上世纪80年代初这家企业集团从化肥和晶体管转向半导体时，它的统治家族在隆冬时节的某天让芯片工程师们通宵行军，紧接着像往常一样16小时轮班，以使他们意志更坚强。1995年，为了让技术人员为自己粗制滥造的工艺感到羞愧，李健熙下令将14万件电子产品付之一炬，5000万美元就这样灰飞烟灭。凯恩记述了大量公司高层充斥着脏话的、激烈的长篇大论。不过，三星电子仍然是韩国最负盛名的雇

主，也是吸引杰出毕业生的磁石。

最神秘的事是在这种严酷的环境下孕育出的成果。在那场寒冬行军之后的几年里，三星电子的半导体业务就赶上了它主要的日本竞争对手。2011年，就在它推出首款智能手机的两年后，它的盖乐世手机销量略微超过了苹果的iPhone。与速度相匹配的是它的胆识；它的竞争对手，如苹果和索尼，也是它从芯片到OLED屏幕等零部件的最大客户。三星让多元化看起来像是优势，而不是分散精力。当手机和其他电子产品的销售变差时，就像今年第一季度受新冠疫情影响的情况那样，内存芯片业务托了底——三星在4月29日表示，它从与封城相关的云服务器的使用中提振了收益。十年前李氏家族决定到2020年前要进一步多元化企业集团，如今新冠大流行帮助生产疫苗和其他药品的三星生物制品成为了韩国市值第三高的公司。

那么是什么让三星的泡菜如此香辣可口？前三星电子雇员、现就职于投资公司盛博的马克·纽曼（Mark Newman）认为，秘密配料始终是对创始家族的信任——尽管他们有种种缺陷，但仍在公司内部保持着神一般的地位。像在西方企业里一样，高管们也会为该把钱花在哪里争论不休。但一旦最高层做出了决定，他们就会迅速团结一致行动。这让三星的一些大胆的战略押注收获了回报。不过三星汽车和太阳能电池板等其他押注没能成功。

三星的高管们认为现在是时候再为未来做一番忙碌的调整了，尤其是在三星电子这个部门。尽管它实力强大，但仍有两大问题要解决。首先是如何做到不只是全球最值得效仿的芯片、屏幕和电子产品生产商。它想要在利润更高（且更时髦）的软件和服务领域胜出。随着智能手机的销量见顶，苹果公司开始向消费者提供可穿戴设备、可视设备及可听设备。这家美国巨头的收益让三星相形见绌。三星没有开发自己的操作系统来和苹果竞争，而是使用谷歌的安卓系统。它近年没有在软件领域发力，而是加倍下注非存储芯片制造和生物制药。要想在服务行业取得成功，尤其是在万物互联的“物联网”时代，三星需要创新力，而这是它一直难以培育的能力。

第二个挑战是中国。既是市场又是竞争源头的中国正在发生变化。三星智

能手机在中国的市场份额曾经达到两位数，但去年跌至1%以下，于是停止了在中国的生产。中国的大公司有充足的资金和长远的目标，可以在半导体领域和三星一决高下。像小米这样的手机公司更擅长软件和应用。三星是全球化的最大受益者之一，如果科技冷战愈演愈烈，它为西方市场供应产品的前景不佳，无法从这一块获得安慰。

| 空间更小

尽管有810亿美元的净现金（超过索尼的市值）可供投资，但三星电子仍弥漫着一股悲观情绪。随着李氏家族陷入痛苦的不定状态，它无法做出重大的战略押注，危及它在制造业之外的拓展或与中国对手竞争的能力。但有一条出路。与大多数家族企业一样，三星最终将不得不把全部信心放在职业经理人身上，而不是创始家族。现在开始改变还来得及。这必然会揭开它神秘的面纱，但并不需要销毁它的魔力。■



Closing schools

No more pencils, no more books

Closing schools for covid-19 does lifelong harm and widens inequality

IN THE STREETS of Amsterdam children spend the “corona holiday” whizzing around on scooters; their peers in Madrid are mostly stuck at home with video games; those in Dakar look after younger siblings. The one place they are not is at school. Over three-quarters of the world’s roughly 1.5bn schoolchildren are barred from the classroom, according to UNESCO, a UN agency. In most of China and in South Korea they have not darkened school doors since January. In Portugal and California they will not return before September.

Schools have striven to remain open during wars, famines and even storms. The extent and length of school closures now happening in the rich world are unprecedented. The costs are horrifying. Most immediately, having to take care of children limits the productivity of parents. But in the long run that will be dwarfed by the amount of lost learning. Those costs will fall most heavily on those children who are most in need of education. Without interventions the effects could last a lifetime.

For these reasons Singapore in 2003 cut its month-long June holiday by two weeks to make up for a fortnight of school closures during the SARS epidemic. Closing schools even briefly hurts children’s prospects. In America third-graders (seven-year-olds) affected by weather-related closures do less well in state exams. French-speaking Belgian students hit by a two-month teachers’ strike in 1990 were more likely to repeat a grade, and less likely to complete higher education, than similar Flemish-speaking students not affected by the strike. According to some studies, over the long summer break young children in America lose between 20% and 50% of the skills they gained over the school year.

Closures will hurt the youngest schoolchildren most. “You can make up for lost maths with summer school. But you can’t easily do that with the stuff kids learn very young,” says Matthias Doepke of Northwestern University. Social and emotional skills such as critical thinking, perseverance and self-control are predictors of many things, from academic success and employment to good health and the likelihood of going to jail. Whereas older children can be plonked in front of a computer, younger ones learn far more when digital study is supervised by an adult.

Then there are those who are missing crucial exams. Germany is reopening schools for final-year high-school students who face exams soon. But most countries are not willing to do that. China has postponed its Leaving Certificate exam (*gaokao*) until July. Britain and France have cancelled this year’s exams. Grades will in part be decided by teachers’ predictions of how a student might have performed. This fuels fears about inequality, as some experts worry teachers unconsciously discriminate against disadvantaged children and give them unfairly low marks.

Statistics Norway estimates “conservatively” that the country’s educational shutdowns—from crèches to high schools—are costing Nkr1,809 (\$173) per child each day. Most of that is an estimate of how much less today’s schoolchildren will earn in the future because their education has been disrupted. (It is assumed they are learning roughly half of what they normally would.) The rest is lost parental productivity today.

Of course schooling has not stopped completely, as it does during holidays. Nearly nine in ten affected rich countries are providing some form of distance-learning (compared with fewer than one in four poor countries). But video-conferencing has its limits. For poorer children, internet connections may be ropey. Devices may have to be shared and homes may be overcrowded or noisy. Of the poorest quarter of American children, one in four does not have access to a computer at home.

Less well-off children everywhere are less likely to have well-educated parents who coax them to attend remote lessons and help them with their work. In Britain more than half of pupils in private schools are taking part in daily online classes, compared with just one in five of their peers in state schools, according to the Sutton Trust, a charity (private schools are more likely to offer such lessons). In the first weeks of the lockdown some American schools reported that over a third of their students had not even logged in to the school system, let alone attended classes. Meanwhile, elite schools report nearly full attendance and the rich have hired teachers as full-time tutors.

Ashley Farris, an English teacher at KIPP high school in Denver, Colorado, says several of “her” kids are virtual truants. Her school worked hard to get students computers and Wi-Fi access, but the digital gap is only part of the story. Some must work to make up for parents’ lost wages. Others must look after younger siblings.

Closures in Britain could increase the gap in school performance between children on school meals (a proxy for economic disadvantage) and those not on school meals, fears Becky Francis of the Education Endowment Foundation, another charity. Over the past decade the gap, measured by grades in tests, has narrowed by roughly 10%, but she thinks school closures could, at the very least, reverse this progress. At least over summer, teachers are not on tap for anyone. In the current lockdown some students can still quench their thirst for education not just with highly educated parents but also with teachers; others will have access to neither.

Primary school is normally a crucial opportunity for gaps that emerged in early-years development to start narrowing, or at least to stop widening. That opportunity is now being missed. For a glimpse of the cost to the unluckiest young children, consider the Perry pre-school project of the 1960s, a study conducted in Ypsilanti, Michigan, which found that a control

group of young children from disadvantaged backgrounds who did not attend pre-school suffered lifelong consequences.

Mr Doepke estimates that by the autumn the sizeable group of American children whose learning loss started when schools closed might have lost as much as a year's learning. Since every year of education is associated with an increase in annual earnings of roughly 10%, the consequences for those children become clear. "I fear we will see further inequality and less social mobility if nothing is done," he adds.

What can be done to limit the costs? Finland started distance learning only when it was satisfied that almost every child would be able to take part. South Korea extended its school holiday to prepare teachers and distribute devices where needed. "For my school of 1,000 students, just 13 borrowed tablets because they had several siblings in their house," says Hyunsu Hwang, an English teacher at Inmyung Girls High School, in Incheon. Teachers now use a mixture of real-time interactive classes, pre-recorded material and homework-based digital classes. When schools began to reopen on April 9th, official attendance was 98%.

School systems where children are used to having to teach themselves will do better, reckons Andreas Schleicher of the OECD, a club of rich countries. "The real issue is if you've been spoon-fed by a teacher every day and are now told to go it alone, what will motivate you?" In Estonia and Japan students are used to "self-regulated activities"; across the OECD the share is nearly 40%. But in countries such as France and Spain, such autonomy is rare.

In the end, the only way to ensure all children get an education is to reopen the doors. At the Alan Turing primary school in Amsterdam, it quickly became clear that 28 of its 190 pupils could not take part in online classes. The school now opens its doors for 15 from this group three mornings a

week and has found other ways to help the remaining 13, such as arranging for them to get assistance from their neighbours. “At first it felt like we were doing something illegal,” says Eva Naaijkens, the headmistress, “but how can you accept a situation where a number of children just drop out?” She estimates that, working remotely, her teachers can impart perhaps 40% of the education they would normally.

As well as letting final-year secondary-school students facing exams resume classes, Denmark has also begun to reopen crèches and primary schools. It has made a priority of the very young for several reasons. The early stage of learning is crucial. The burden toddlers place on parents is heavy. And the risk of young kids getting or spreading the virus appears low.

Around the world many parents will be hoping their children’s schools can also safely reopen soon. Some children may have mixed feelings about swapping extra Xbox time for geography lessons. Tough luck: holidays have to end sometime. For the future well-being of whippersnappers scooting around the streets of Amsterdam, it is good news that Dutch primary schools will partially reopen on May 11th. ■



停课

扔掉铅笔书本

因新冠疫情停课让学生终生受害，加剧不平等【新冠报道】

在阿姆斯特丹，放“新冠长假”的孩子们踩着滑板车在街头嗖嗖而过。他们在马德里的同龄人大多正在家中玩电子游戏解闷。在达喀尔的那些在照顾弟妹。就是学校里不见孩子们的踪影。联合国教科文组织称，全球约15亿学童中有超过四分之三不能返回校园。在中国大部分地区和韩国，他们自1月以来就没踏进过校门。在葡萄牙和美国加州，他们在9月前都不会返校。

即使在战争、饥荒甚至风暴灾害期间，学校也都尽量不停课。富裕国家当前停课的范围和时长前所未有，代价之大令人忧惧。最直接的影响是家长要照顾停课的孩子，不能充分投入工作。但长期而言，大量孩子损失的学习机会是更大的问题。最需要教育的孩子承受的损失将最为沉重。如果不加干预可能祸及终生。

正因如此，新加坡在2003年把原本四周的6月假期缩短两周，以弥补在SARS疫情期间停课的两周时间。关闭学校甚至会短暂损害孩子们的升学前途。在美国，因天气原因被迫停课的三年级学生（七岁）在州内统考的表现相对较差。1990年，比利时的法语区学生因教师罢工而停课两个月，相比未受罢工影响的佛兰德语区同级学生，前者留级的比例更高，完成高等教育的几率更低。一些研究显示，过完漫长的暑假，美国学童会遗忘之前一整个学年所学技能的20%至50%。

停课对最年幼学童的伤害最大。“耽误掉的数学课可以通过暑期班补上。但幼童要学习的东西却无法通过这样的方式轻易弥补。”美国西北大学的马赛厄斯·德普克（Matthias Doepke）说道。批判性思维、毅力和自制力等社交和情感能力会影响孩子未来的学业成就、就业、健康乃至犯罪几率等方方面面。大一点的孩子可以直接被扔到电脑前去学习，但对幼童来说，有成年人从旁指引，线上学习的效果会大大加强。

还有那些错过关键考试的学生。德国正在让即将面临考试的高中毕业班学生返校。但大多数国家都不愿意这样做。中国已经把高考推迟至7月。英国和法国已经取消了今年的考试。学生成绩有一部分将由老师对考试成绩的预估来决定。这加剧了不平等之忧，因为一些专家担心教师会不自觉地歧视弱势学生，不公平地给他们打低分。

据挪威统计局“保守”估计，从幼儿园到高中的停课导致每名学童每天损失1809挪威克朗（173美元）。其中大部分是对如今停课导致学童未来收入减少的估计。（假设他们目前所学知识约为正常情况的一半。）其余则是学童父母当前生产力的损失。

当然，教学并没有像在假期时那样完全停止。受影响的富裕国家中，有近90%都在推行某种形式的远程学习（相比之下贫困国家这样做的比例不到25%）。但远程视频教学有其局限性。在贫困家庭里，联网可能不稳定，设备也许要共用，家里也可能人多嘈杂。在美国最贫困的25%的儿童中，四分之一家里没有电脑。

家境不好的孩子，其父母受过良好教育的几率普遍也较低，难以引导孩子上网课并辅导学习。慈善机构萨顿信托（Sutton Trust）的数据显示，在英国，私立学校有一半以上的学生每天上网课，而公立学校只有五分之一（私立学校更有可能提供网上课程）。在封城的头几周，美国一些学校报告称超过三分之一的学生没有登录学校系统，更别说上网课了。与此同时，精英学校报告说网课几乎全勤，而且富人还请来了老师给孩子全天辅导功课。

美国科罗拉多州丹佛市KIPP高中的英语老师阿什丽·法里斯（Ashley Farris）表示，她的好几个学生“逃学”不上网课。她所在的学校努力为学生提供电脑，帮他们接入无线网络，但数字鸿沟只是问题的一部分。有些学生要打工来弥补父母的收入损失，还有一些必须照顾弟妹。

另一家慈善机构英国教育捐助基金会（Education Endowment Foundation）的贝基·弗朗西斯（Becky Francis）担心，英国停课可能会

拉大在校就餐学童（表明家中经济状况不佳）和其他学童间的成绩差距。过去十年，按考试成绩衡量，这一差距缩小了约10%，但她认为停课至少会让这一进展倒退。起码在夏天，并非人人都能得到老师的指导。在当前封城时期，有些学生既有受过高等教育的父母又有老师来满足求知欲，但另一些学生两者都缺。

小学通常是缩窄早期发展差距或至少令其停止扩大的关键机会。现在这个机会正在错失。要了解最弱势的孩子在受教育上付出的代价，可以看看上世纪60年代在密歇根州伊普西兰蒂（Ypsilanti）进行的“佩里学前教育项目”（Perry pre-school project）。该研究发现对照组中没上过学前班的底层家庭孩子终生都受到了影响。

德普克估计，到今年秋天，这些为数不少的自学校停课起就开始遭受损失的美国学童可能损失了相当于一整年的学业。鉴于每多接受一年教育意味着日后年收入增加约10%，这些孩子承受的后果显而易见。他还表示：“如果不采取任何行动，我们恐怕会看到不平等加剧，社会流动性减少。”

如何减轻这种损害？在芬兰，学校要确保基本上每位学生都能参与才能开始远程教学。韩国延长了学校假期，方便教师做准备以及向有需要的学生分发设备。韩国仁川仁明女子高中的英语老师黄贤秀（音译）说：“在我们学校，一千名学生中只有13人因家中还有兄弟姐妹而需要借用平板电脑。”现在，老师们综合使用直播互动课堂、录播资料以及基于作业的数字课堂等方式。学校于4月9日开课时，官方统计的出勤率达98%。

成员为富裕国家的经合组织的安德里亚斯·施莱希尔（Andreas Schleicher）认为，有培养学童自学习惯的学校体系能更好地应对目前的状况。“真正的问题是，如果你习惯了老师的填鸭式教学，现在让你自己去学，动力从哪里来？”在爱沙尼亚和日本，学生习惯了“自主学习”；在经合组织国家中这类教学体系的比例占近40%。但在法国和西班牙等国家则鲜见这种自主性。

最终，能确保所有孩子都获得教育的唯一方法就是重开校门。阿姆斯特丹

的艾伦图灵小学很快了解到190名学生中有28人无法上网课。学校现在让这群学生中的15人每周有三个上午返校上课，同时用其他方法帮助其余13人，例如安排他们的邻居提供帮助。校长伊娃·奈艾肯斯（Eva Naaijkens）表示：“一开始我们感觉好像在做一桩违法的事，但你怎么能眼看着一些孩子没课上呢？”据她估计，老师远程授课只能传授大概正常情况下40%的内容。

丹麦除了让面临毕业考试的中学毕业班复课外，还开始逐步重开幼儿园和小学。优先让幼龄学童复课有几方面考虑：早期阶段的学习至关重要；幼儿停课在家对父母构成了沉重负担；幼儿感染或传播新冠病毒的风险似乎较低。

世界各地的众多父母都希望自己孩子的学校也能尽快安全地重开。对一些孩子来说，把可以多多玩Xbox的时间换成地理课，心情可能喜忧参半。但可惜假期终究要结束。考虑到在阿姆斯特丹街头玩耍的“神兽”们的前途，这里有一个好消息：荷兰宣布小学将于5月11日部分复课。■



The post-covid economy

Not quite all there

The new “nearly normal” will be a long way from the status quo

IN THE 1970s Masahiro Mori, a professor at the Tokyo Institute of Technology, observed that there was something disturbing about robots which looked almost, but not quite, like people. Representations in this “uncanny valley” are close enough to lifelike for their shortfalls and divergences from the familiar to be particularly disconcerting. Today’s Chinese economy is exploring a similarly unnerving new terrain. And the rest of the world is following in its uncertain steps.

Whatever the drawbacks of these new lowlands, they are assuredly preferable to the abyss of lockdown. Measures taken to reverse the trajectory of the pandemic around the world have brought with them remarkable economic losses.

Not all sectors of the economy have done terribly. New subscriptions to Netflix increased at twice their usual rate in the first quarter of 2020, with most of that growth coming in March. In America, the sudden stop of revenue from Uber’s ride-sharing service in March and April has been partially cushioned by the 25% increase of sales from its food-delivery unit, according to 7Park Data, a data provider.

Yet the general pattern is grim. Data from Womply, a firm which processes transactions on behalf of 450,000 small businesses across America, show that businesses in all sectors have lost substantial revenue. Restaurants, bars and recreational businesses have been badly hit: revenues have declined some two-thirds since March 15th. Travel and tourism may suffer the worst losses. In the EU, where tourism accounts for some 4% of GDP, the number of people travelling by plane fell from 5m to 50,000; on April

19th less than 5% of hotel rooms in Italy and Spain were occupied.

According to calculations made on behalf of *The Economist* by Now-Casting Economics, a research firm that provides high-frequency economic forecasts to institutional investors, the world economy shrank by 1.3% year-on-year in the first quarter of 2020, driven by a 6.8% year-on-year decline in China's GDP. The Federal Reserve Bank of New York draws on measures such as jobless claims to produce a weekly index of American economic output. It suggests that the country's GDP is currently running about 12% lower than it was a year ago (see chart 1).

These figures fit with attempts by Goldman Sachs, a bank, to estimate the relationship between the severity of lockdowns and their effect on output. It finds, roughly, that an Italian-style lockdown is associated with a GDP decline of 25%. Measures to control the virus while either keeping the economy running reasonably smoothly, as in South Korea, or reopening it, as in China, are associated with a GDP reduction in the region of 10%. That chimes with data which suggest that if Americans chose to avoid person-to-person proximity of the length of an arm or less, occupations worth approximately 10% of national output would become unviable.

The "90% economy" thus created will be, by definition, smaller than that which came before. But its strangeness will be more than a matter of size. There will undoubtedly be relief, fellow feeling, and newly felt or expressed esteem for those who have worked to keep people safe. But there will also be residual fear, pervasive uncertainty, a lack of innovative fervour and deepened inequalities. The fraction of life that is missing will colour people's experience and behaviour in ways that will not be offset by the happy fact that most of what matters is still available and ticking over. In a world where the office is open but the pub is not, qualitative differences in the way life feels will be at least as significant as the drop in output.

The plight of the pub demonstrates that the 90% economy will not be something that can be fixed by fiat. Allowing pubs—and other places of social pleasure—to open counts for little if people do not want to visit them. Many people will have to leave the home in order to work, but they may well feel less comfortable doing so to have a good time. A poll by YouGov on behalf of *The Economist* finds that over a third of Americans think it will be “several months” before it will be safe to reopen businesses as normal—which suggests that if businesses do reopen some, at least, may stay away.

| *Ain't nothing but tired*

Some indication that the spending effects of a lockdown will persist even after it is over comes from Sweden. Research by Niels Johannesen of Copenhagen University and colleagues finds that aggregate-spending patterns in Sweden and Denmark over the past months look similarly reduced, even though Denmark has had a pretty strict lockdown while official Swedish provisions have been exceptionally relaxed. This suggests that personal choice, rather than government policy, is the biggest factor behind the drop. And personal choices may be harder to reverse.

Discretionary spending by Chinese consumers—the sort that goes on things economists do not see as essentials—is 40% off its level a year ago. Haidilao, a hotpot chain, is seeing a bit more than three parties per table per day—an improvement, but still lower than the 4.8 registered last year, according to a report by Goldman Sachs published in mid-April. Breweries are selling 40% less beer. STR, a data-analytics firm, finds that just one-third of hotel beds in China were occupied during the week ending April 19th. Flights remain far from full (see chart 2).

This less social world is not necessarily bad news for every company. UBS, a bank, reports that a growing number of people in China say that the virus has increased their desire to buy a car—presumably in order to avoid the

risk of infection on public transport. The number of passengers on Chinese underground trains is still about a third below last year's level; surface traffic congestion is as bad now as it was then.

Wanting a car, though, will not mean being able to afford one. Drops in discretionary spending are not entirely driven by a residual desire for isolation. They also reflect the fact that some people have a lot less money in the post-lockdown world. Not all those who have lost jobs will quickly find new ones, not least because there is little demand for labour-intensive services such as leisure and hospitality. Even those in jobs will not feel secure, the Chinese experience suggests. Since late March the share of people worried about salary cuts has risen slightly, to 44%, making it their biggest concern for 2020, according to Morgan Stanley, a bank. Many are now recouping the loss of income that they suffered during the most acute phase of the crisis, or paying down debt. All this points to high saving rates in the future, reinforcing low consumption.

A 90% economy is, on one level, an astonishing achievement. Had the pandemic struck even two decades ago, only a tiny minority of people would have been able to work or satisfy their needs. Watching a performance of Beethoven on a computer, or eating a meal from a favourite restaurant at home, is not the same as the real thing—but it is not bad. The lifting of the most stringent lockdowns will also provide respite, both emotionally and physically, since the mere experience of being told what you can and cannot do is unpleasant. Yet in three main ways a 90% economy is a big step down from what came before the pandemic. It will be more fragile; it will be less innovative; and it will be more unfair.

Take fragility first. The return to a semblance of normality could be fleeting. Areas which had apparently controlled the spread of the virus, including Singapore and northern Japan, have imposed or reimposed tough restrictions in response to a rise in the growth rate of new infections. If

countries which retain relatively tough social-distancing rules do better at staving off a viral comeback, other countries may feel a need to follow them. With rules in flux, it will feel hard to plan weeks ahead, let alone months.

| *Can't start a fire*

The behaviour of the economy will be far less predictable. No one really knows for how long firms facing zero revenues, or households who are working reduced hours or not at all, will be able to survive financially. Businesses can keep going temporarily, either by burning cash or by tapping grants and credit lines set up by government—but these are unlimited neither in size nor duration. What is more, a merely illiquid firm can quickly become a truly insolvent one as its earnings stagnate while its debt commitments expand. A rise in corporate and personal bankruptcies, long after the apparently acute phase of the pandemic, seems likely, though governments are trying to forestall them. In the past fortnight bankruptcies in China started to rise relative to last year. On April 28th HSBC, one of the world's largest banks, reported worse-than-expected results, in part because of higher credit losses.

Furthermore, the pandemic has upended norms and conventions about how economic agents behave. In Britain the share of commercial tenants who paid their rent on time fell from 90% to 60% in the first quarter of this year. A growing number of American renters are no longer paying their landlords. Other creditors are being put off, too. In America, close to 40% of business-to-business payments from firms in the spectator-sports and film industries were late in March, double the rate a year ago. Enforcing contracts has become more difficult with many courts closed and social interactions at a standstill. This is perhaps the most insidious means by which weak sectors of the economy will infect otherwise moderately healthy ones.

In an environment of uncertain property rights and unknowable income streams, potential investment projects are not just risky—they are impossible to price. A recent paper by Scott Baker of Northwestern University and colleagues suggests that economic uncertainty is at an all-time high. That may go some way to explaining the results of a weekly survey from Moody's Analytics, a research firm, which finds that businesses' investment intentions are substantially lower even than during the financial crisis of 2007-09. An index which measures American nonresidential construction activity 9-12 months ahead has also hit new lows.

The collapse in investment points to the second trait of the 90% economy: that it will be less innovative. The development of liberal capitalism over the past three centuries went hand in hand with a growth in the number of people exchanging ideas in public or quasi-public spaces. Access to the coffeehouse, the salon or the street protest was always a partial process, favouring some people over others. But a vibrant public sphere fosters creativity.

Innovation is not impossible in a world with less social contact. There is more than one company founded in a garage now worth \$1trn. During lockdowns, companies have had to innovate quickly—just look at how many firms have turned their hand to making ventilators, if with mixed success. A handful of firms claim that working from home is so productive that their offices will stay closed for good.

Yet these productivity bonuses look likely to be heavily outweighed by drawbacks. Studies suggest the benefits of working from home only materialise if employees can frequently check in at an office in order to solve problems. Planning new projects is especially difficult. Anyone who has tried to bounce ideas around on Zoom or Skype knows that spontaneity is hard. People are often using bad equipment with poor connections. Nick

Bloom of Stanford University, one of the few economists to have studied working from home closely, reckons that there will be a sharp decline in patent applications in 2021.

Cities have proven particularly fertile ground for innovations which drive long-run growth. If Geoffrey West, a physicist who studies complex systems, is right to suggest that doubling a city's population leads to all concerned becoming on aggregate 15% richer, then the emptying-out of urban areas is bad news. MoveBuddha, a relocation website, says that searches for places in New York City's suburbs are up almost 250% compared with this time last year. A paper from New York University suggests that richer, and thus presumably more educated, New Yorkers—people from whom a disproportionate share of ideas may flow—are particularly likely to have left during the epidemic.

| *Something happening somewhere*

Wherever or however people end up working, the experience of living in a pandemic is not conducive to creative thought. How many people entered lockdown with a determination to immerse themselves in Proust or George Eliot, only to find themselves slumped in front of "Tiger King"? When mental capacity is taken up by worries about whether or not to touch that door handle or whether or not to believe the results of the latest study on the virus, focusing is difficult. Women are more likely to take care of home-schooling and entertainment of bored children, meaning their careers suffer more than men's. Already, research by Tatyana Deryugina, Olga Shurchkov and Jenna Stearns, three economists, finds that the productivity of female economists, as measured by production of research papers, has fallen relative to male ones since the pandemic began.

The growing gender divide in productivity points to the final big problem with the 90% economy: that it is unfair. Liberally regulated economies operating at full capacity tend to have unemployment rates of 4-5%, in part

because there will always be people temporarily unemployed as they move from one job to another. The new normal will have higher joblessness. This is not just because GDP will be lower; the decline in output will be particularly concentrated in labour-intensive industries such as leisure and hospitality, reducing employment disproportionately. America's current unemployment rate, real-time data suggest, is between 15-20%.

The lost jobs tended to pay badly, and were more likely to be performed by the young, women and immigrants. Research by Abi Adams-Prassl of Oxford University and colleagues finds that an American who normally earns less than \$20,000 a year is twice as likely to have lost their job due to the pandemic as one earning \$80,000-plus. Many of those unlucky people do not have the skills, nor the technology, that would enable them to work from home or to retrain for other jobs.

The longer the 90% economy endures, the more such inequalities will deepen. People who already enjoy strong professional networks—largely, those of middle age and higher—may actually quite enjoy the experience of working from home. Notwithstanding the problems of bad internet and irritating children, it may be quite pleasant to chair fewer meetings or performance reviews. Junior folk, even if they make it into an office, will miss out on the expertise and guidance of their seniors. Others with poor professional networks, such as the young or recently arrived immigrants, may find it difficult or impossible to strengthen them, hindering upward mobility, points out Tyler Cowen of George Mason University.

The world economy that went into retreat in March as covid-19 threatened lives was one that looked sound and strong. And the biomedical community is currently working overtime to produce a vaccine that will allow the world to be restored to its full capacity. But estimates suggest that this will take at least another 12 months—and, as with the prospects of the global economy, that figure is highly uncertain. If the adage that it takes

two months to form a habit holds, the economy that re-emerges will be fundamentally different. ■



后疫情时代的经济

不太一样

从现状到新的“新常态”还有很长一段路【新冠报道】

上世纪七十年代，东京工业大学的教授森政弘发现，那些看起来和真人几乎一样但又不完全一样的机器人会给人带来某种不适。处于这个“恐怖谷”区间的机器非常逼真，以至于它们那些与人类的不同之处尤其让人不安。眼下的中国经济正在探索同样令人不安的新地域。而世界其他地区正跟随它走上不确定的道路。

无论这些新低地有何不足，肯定也好过封城的深渊。世界各地为逆转这场大流行病的传播轨迹所采取的措施同时也造成了巨大的经济损失。

并非所有部门的情况都那么糟糕。奈飞（Netflix）在2020年第一季度的新订户增速是正常水平的两倍，其中大部分增长发生在3月。数据供应商7Park Data的统计显示，在美国，优步的网约车服务在3月和4月“断流”，但其食品配送业务的销售额增长了25%，弥补了部分损失。

但总体形势很严峻。为美国各地的45万家小企业处理交易的Womply的数据显示，各行各业的企业都遭受了相当大的收入损失。餐馆、酒吧和娱乐业受到了严重打击：自3月15日以来它们的收入下降了约三分之二。出行和旅游业的损失可能最为惨重。在旅游业占GDP约4%的欧盟，乘飞机出行的人数从500万跌到五万；4月19日，意大利和西班牙的酒店客房入住率不足5%。

向机构投资者提供高频率经济预测的研究公司Now-Casting Economics为本刊所做的计算显示，在中国GDP同比下降6.8%的影响之下，2020年第一季度世界经济同比萎缩1.3%。纽约联储采用失业救济申领人数等数据，生成了一个美国每周经济产出指数。该指数显示目前美国的GDP比去年同期下降了约12%（见图表1）。

这些数字与高盛得出的结果相吻合。这家投资银行估计了封城措施的严厉程度与它们对经济产出的影响之间的关系，经粗略计算后发现，意大利式的封城措施与25%的GDP下降相关联。像韩国那样在控制疫情的同时保持经济基本平稳运行或像中国那样在控制住疫情后重新开放经济的措施与本地区10%的GDP下降相关联。有数据表明，如果美国人选择避免与人近距离接触，那么贡献了全美产出约10%的职位将难以为继。这与高盛的发现相吻合。

这就造成了“九成经济”，顾名思义，经济的规模将小于从前。但其中的不寻常之处不仅仅是规模大小。毫无疑问，疫情过后人们会有解脱和同舟共济的感觉，并将重新对那些努力保护人们安全的人产生或表达敬意。但同时也会有残留的恐惧感、普遍的不确定性、匮乏的创新激情，以及加剧的不平等。尽管大部分生活必需品还在供应和缓慢运转，但这带来的宽慰并不能弥补生活中缺失的那一小部分事物对人们的体验和行为产生的影响。在一个照常上班却不能照常去酒吧的世界里，人们会感受到相当大的生活品质的落差，至少与经济产出下滑的程度相当。

酒吧行业的困境表明，“九成经济”的问题将无法通过政令来解决。如果人们不愿意去酒吧和其他社交娱乐场所，那么即使开放这些场所也没什么用。很多人以后还是得走出家门去上班，但他们很可能会觉得不安心，也就没法保持愉快的心情。YouGov为本刊做的一项民意调查发现，超过三分之一的美国人认为，还要“再过几个月”，企业重新正常营业才够安全。这表明，即使企业重新开门营业，至少有一部分人可能还是不会光顾。

| 无精打采

瑞典的一些迹象表明，封城对支出的影响即使在封城结束后也将持续。哥本哈根大学的尼尔斯·约翰内森（Niels Johannesen）及其同事研究发现，虽然丹麦实行了相当严格的封锁措施，而瑞典的官方规定特别宽松，但过去几个月里两国的总体支出似乎出现了同样程度的减少。这表明，造成这一下降的最大因素是个人选择而不是政府政策。而个人选择可能更难逆转。

中国消费者的可自由支配支出（即经济学家视为非必需品的那部分消费支出）比一年前下降了40%。高盛4月中旬发布的一份报告显示，火锅连锁店海底捞日均翻台三次多一点，虽然有好转，但仍低于去年的4.8次。啤酒厂的啤酒销量减少了40%。数据分析公司STR发现，在截至4月19日的一周里，中国酒店的入住率只有三成。航班上座率也很低（见图表2）。

社交活动减少不一定对每家公司都是坏消息。根据瑞银（UBS）的报告，越来越多的中国人表示疫情提升了他们购车的欲望，这大概是为了避免公共交通上的感染风险。中国地铁的乘客人数仍比去年少约三分之一。地面交通拥堵和去年一样严重。

但是，想买车不一定就买得起。可自由支配支出下降并非完全缘于残留的安全隔离心理。它还反映出—个事实：封城结束后，部分人口袋里的钱少了很多。并非所有失业的人都能很快找到新工作，尤其是因为对休闲接待业之类的劳动密集型服务业的需求很小。中国的情况表明，即使有工作的人也没有安全感。摩根士丹利称，自3月下旬以来，担心降薪的人占比略有上升，达到44%，降薪成了2020年人们最大的担忧。现在，许多人正在弥补疫情最严重时期的收入损失或在偿还债务。所有这些都表明未来的储蓄率会很高，这将进一步强化低消费趋势。

某种程度上，能保持“九成经济”已经是一个惊人的成就。这次疫情哪怕只提前20年爆发，也将只有极少数人能够保住工作或满足生活需求。在电脑上看人演奏贝多芬作品或在家里吃最喜欢的餐馆的外卖无法比拟现场体验，但也还不赖。解除最严格的封城措施也会让人身心都松一口气，因为能做什么和不能做什么都要听指挥的感觉让人很不愉快。然而，与疫情之前的经济状况相比，“九成经济”将在三大方面大幅倒退：它更脆弱，更缺乏创新，更不公平。

先来看脆弱性。表面上的恢复正常可能是短暂的。在那些似乎已经控制了病毒传播的地区，包括新加坡和日本北部，为应对新增感染病例加速上升已经实施或再度实施了严格的限制。如果保留了相对严格的社交隔离规定的国家在防止疫情复发方面做得更好，那么其他国家可能就会觉得有必要

效仿。规定在不断变化，要为未来几周制定计划都很难，更不用说几个月了。

| 红火不起来

相比过去，未来的经济运行状况将难以预测得多。没人确切知道，面临零收入的企业或者工作时间减少或根本没有工作的家庭在财力上能够坚持多久。企业可以通过消耗现金或申请政府的补贴和贷款来暂时维持运营，但这些都规模和期限上都不是无限的。而且，随着债务越来越多而收入没有起色，一家本来只是流动性差的公司可能很快就会真的陷入破产境地。在疫情看似最严重的阶段过去很久之后，公司和个人破产数量似乎很有可能上升，尽管政府正在努力先发制人。过去两周，中国的破产数量较去年同期开始增加。4月28日，全球最大银行之一的汇丰银行公布的业绩逊于预期，部分原因是信贷损失增加。

此外，疫情还破坏了经济主体行为方式的规范和惯例。在英国，今年第一季度按时支付租金的商业租户比例从90%下降到60%。越来越多的美国租户不再向房东交租金。其他债权人也遇到了拖欠。3月，近40%的美国观赏性体育和电影业的公对公付款出现拖欠，比例是一年前的两倍。由于许多法院关闭，社交互动停滞，执行合同变得更加困难。经济中的薄弱部门也许会以这种最隐匿的方式感染原本较健康的部门。

在产权不确定和收入流不明的环境中，潜在的投资项目不仅有风险，而且无法定价。西北大学的斯科特·贝克（Scott Baker）及其同事最近发表的一篇论文称，经济不确定性正处于历史最高水平。这也许能在一定程度上解释研究公司穆迪分析（Moody's Analytics）一项每周调查的结果。该调查发现企业的投资意向明显低于2007至2009年金融危机期间。一个衡量未来9至12个月美国非住宅建筑活动的指数也创下新低。

投资的大幅减少指向了“九成经济”的第二个特点：创新减弱。在过去的三个世纪里，在公共或准公共场所交换思想的人不断增加，这与自由资本主义的发展紧密相关。能进入咖啡馆、沙龙或参与街头抗议活动的从来只是一部分人，其他人可能无缘参与。但充满活力的公共领域可以促进创造

力。

在社交减少的世界里创新也不是不可能。在车库里成立而市值达到一万亿美元的公司不止一家。在封城期间，公司不得不快速创新，只要看看有多少公司转型生产呼吸机就知道了（尽管成败不一）。少数公司声称远程办公效率很高，以后干脆都不需要办公室了。

然而，这些提升生产率的好处看起来远远敌不过隔绝的坏处。研究表明，只有员工可以经常性地回到办公室解决问题时，居家办公的好处才能实现。规划新项目尤其困难。任何试过在Zoom或Skype上集思广益的人都知道，要激发即兴灵感绝非易事。人们经常是在不怎么好的网络上使用不怎么好的设备。斯坦福大学的尼克·布鲁姆（Nick Bloom）是为数不多的深入研究居家办公的经济学家之一，他认为2021年专利申请量将急剧下降。

创新能推动长期增长，而城市已被证明是创新的沃土。研究复杂系统的物理学家杰弗里·韦斯特（Geoffrey West）认为，城市人口增加一倍，所有相关人群的总财富会增加15%。如果他是对的，那么撤离城市就是个坏消息。搬迁网站MoveBuddha表示，与去年同期相比，纽约市郊区住宅的搜索量增长了近250%。纽约大学的一篇论文表明，更富有（因此也应该是受过更高教育）的纽约人在疫情期间尤其有可能搬离纽约市，而这一人群可能是创新思想的最大源头。

| 热闹在别处

无论人们最终困在何地以何种方式工作，疫情期间的生活体验都不利于创造性思维。有多少人刚开始居家隔离时决心让自己沉浸到普鲁斯特或乔治·艾略特的作品中，到头来却是整天瘫坐着看《养虎为患》（Tiger King）？如果大脑常常都在顾虑能不能碰门把手，或该不该相信关于病毒的最新研究结果，那就很难集中注意力。女性更有可能担负起辅导孩子在家学习以及陪他们解闷的责任，这意味着她们的事业受到的影响比男性更多。经济学家塔季扬娜·德雷乌吉纳（Tatyana Deryugina）、奥尔加·舍契诃夫（Olga Shurchkov）和珍娜·斯登（Jenna Stearns）的研究已发现，若以研究论文篇数来衡量，自疫情开始以来，女性经济学家的生产率

较她们的男性同僚已有所下降。

生产率性别差距的扩大指向了“九成经济”的最后一个大问题：不公平。自发调节的经济体满负荷运转时失业率往往为4%至5%，一定程度上是因为总有一些人在转换工作期间处于暂时失业状态。新常态下失业率将更高。这不仅因为GDP会降低，还因为产出降低将尤其集中在休闲接待业等劳动密集型行业，从而导致更多失业。实时数据显示，美国目前的失业率在15%至20%之间。

流失的工作往往薪酬低，而且更有可能由年轻人、妇女和移民从事。牛津大学的阿比·亚当斯-普拉斯尔（Abi Adams-Prassl）及其同事的研究发现，与年收入超过八万美元的美国人相比，年收入通常低于两万美元的美国人因疫情失业的可能性要高出一倍。许多不幸失业的人既没有技能，也没有技术设备，无法在家工作或为找新工作开展再培训。

“九成经济”持续越久，这类不平等越会加剧。已经拥有强大职场人脉的人们（大部分是中年或老年人）实际上可能会很享受居家工作。尽管存在网络不畅和神兽之扰，但能少主持点会议或少做几次绩效考核可能还是挺令人愉快的。初级员工即使能回办公室上班，也会错过向前辈学习专业知识和接受指导的机会。乔治梅森大学（George Mason University）的泰勒·科恩（Tyler Cowen）指出，年轻人或新移民等职业人脉较薄弱的人可能很难甚至无法提升这种人际网络，从而阻碍向上流动。

在疫情威胁生命的影响下，曾经看起来强劲而稳健的世界经济在3月陷入衰退。生物医学界目前正在加班加点地研发疫苗，以求让世界恢复全负荷运转的状态。但据估计这至少还需要12个月的时间——而且和全球经济的前景一样，这个数字也高度不确定。如果养成一个习惯需要两个月的说法属实，那么疫情过后的经济面貌将会根本不同。■



Corporate innovation

Crucible of creative disruption

The crisis is liberating firms to experiment with radical new ideas

WHEN MOUNT TAMBORA erupted in April 1815 the dust and ash from the volcano in what is now Indonesia blotted out the sun and lowered global temperatures, hurting harvests everywhere. As food prices soared, tens of thousands of people died from famine and disease. So did thousands of horses, because their owners could no longer afford to feed them oats. It was against this dismal backdrop that Karl von Drais, a German inventor, dreamed up the *Laufmaschine* to replace equine locomotion. Today his “running machine” is known as the bicycle.

The pandemic is, like Tambora, an unmitigated calamity. But in some quarters it, too, is spurring innovation, as firms come up with new ways to keep making existing products despite disrupted supply chains, or, as demand collapses amid self-isolation, create new ones. Some are changing the very way they innovate.

The first thing about corporate innovation that the pandemic has changed is its cost. Doing anything novel at large firms typically involves oodles of capital. Right now, while companies preserve cash to stay liquid as revenues dry up, fresh investments are the last thing on most bosses’ minds. Some are discovering ways to do things differently without huge outlays.

The chief executive of a big European food retailer explains how his firm managed to increase online fulfilment by more than 50%, with no new capital investments, thanks to all-night picking and packing at stores. Evergrande, a big Chinese property firm, encouraged its sales force to use social media and virtual-reality technology to promote homes during the

country's covid shutdown; its sales more than doubled in February to \$6.4bn. One foreign buyer recently paid £6m (\$7.4m) for a home in London after only a 3D virtual tour. Matterport, a Californian firm, says its 3D cameras are selling like loo rolls.

Besides being expensive, corporate innovation has also historically been insular. This closed approach carries an opportunity cost, notes Henry Chesbrough of the Haas School at the University of California, Berkeley. Most large companies do not use or license most of their patents, save their "crown jewels". Some of these vaults are being opened up, and their contents shared with others.

Usually prickly pharmaceutical rivals are working arm in arm in the race to develop drugs and vaccines against the coronavirus. IBM is leading a consortium that will pool supercomputing resources to help in the search for therapies. On April 21st Microsoft, once a staunch advocate of the "walled garden" approach to software, declared its support for the open-data movement.

Big companies have largely favoured the advice of insiders and elite consultancies over the wisdom of the crowds, notes Karim Lakhani of Harvard Business School. This, too, is changing. Ericsson, a Swedish telecoms-equipment firm, is now investing more in open-source software and engaging customers in open-innovation efforts to speed up the adoption of its 5G kit.

Firms' embrace of outsiders is boosting businesses like Tongal, a marketplace for creative video work used by multinationals including Lululemon, a Canadian athletic-wear firm, and Lego, a Danish toy company. Its new creator registrations were five times higher in March than in February, and monthly activity rose by 150%. Topcoder, which provides on-demand tech talent, has also seen a surge.

But the defining feature of the latest innovation revolution is breakneck speed. Companies are being forced to raise their corporate metabolism and overcome “analysis paralysis”, an affliction caused by top managers having pored over the same irrelevant case studies at business school. In a recent briefing consultants at Bain urged companies to throw out old data, test quickly and often, and assume you will be in testing mode for some time to come.

Confronted with the sudden closures of its primary distribution channel to restaurants and institutions, Sysco, a big American food-distribution firm, built an entirely new supply chain and billing system to serve grocery stores in less than a week. Long-delayed initiatives have suddenly been rolled out at scale overnight. A global standards body converted one of its main customer offerings from in-person to online in two weeks, says a person close to it.

The crisis has emboldened managers to move faster and to try out risky new ideas on larger groups of customers. As the boss of a Fortune 500 firm recently put it, “We are learning more by testing than [from] months spent [with] analysts and endless meetings.” Despite a worldwide retail apocalypse, Nike saw global internet sales of its sporting goods rise by over a third in the three months to February, thanks to a deft digital pivot inspired by its early covid-19 experience in China. Revenues from its Chinese online offering grew by triple digits in January and February, year on year, as consumers shared workouts through WeChat and other social media. Its sweat-inducing masterclass is being streamed more than 800,000 times a week on YouTube.

The desire for speed is reflected in the performance of firms that make 3D-printing equipment, which slashes the time from prototype to final product and, by replacing faraway suppliers with nearby 3D contractors, speeds up distribution. HP is accelerating the roll-out of “3D as a service”,

which allows customers to pay just for what they print rather than purchasing the pricey kit and supplies. Early customers include Wallbox, which makes electric-vehicle chargers, and HIPP Medical, which makes tools for orthopaedists and dentists.

Companies are also experimenting with new distribution channels. With workers scarce and customers happier to get a delivery from a machine rather than a human these days, automated deliveries have been embraced by Chinese e-commerce giants such as Alibaba, JD.com and Meituan. Edward Tse of Gao Feng, a consultancy, believes that autonomous delivery will be widespread within 12-18 months, much faster than he previously thought possible. Zipline, a Californian startup that is already delivering blood and medical samples by drone in Africa, now wants to do the same with coronavirus samples in America. Google has expanded the use of its Wing drones to deliver medicines and other necessities in rural Virginia.

Weighed down by legacy assets and protected by oligopolistic profits, many big firms are not natural innovators. Most corporations that have them relegate geeky innovationistas to skunk works that besuited types steer from the C-suite.

In quiet, predictable times this command-and-control approach to innovation works fine, says Darrell Rigby of Bain. And, adds Gary Hamel of the London Business School, “In a small crisis power moves to the centre.” But, he reflects, in a big one “it moves to the periphery”. It may stay there for a while after the pandemic passes. ■



企业创新

颠覆的熔炉

疫情危机让企业能自由尝试激进的新想法【新冠报道】

当如今位于印度尼西亚境内的坦博拉火山（Tambora）在1815年4月大爆发时，烟尘和灰烬遮蔽了太阳，全球气温降低，世界各地粮食减产。随着粮价飞涨，几万人死于饥荒和疾病。成千上万匹马也死了，因为马主人买不起喂它们的燕麦了。正是在这样凄惨的大背景下，德国发明家卡尔·冯德莱斯（Karl von Drais）构想出了“奔跑的机器”（*Laufmaschine*）来代替马的运动——今天我们把它叫做“自行车”。

和坦博拉火山爆发一样，今天的新冠肺炎大流行是一场不折不扣的灾难。但在某些领域，它也在刺激着创新。企业在供应链中断的情况下想出了维持既有生产的新办法，或者，面对人们自我隔离而导致需求骤跌，它们创造出了新产品。有些企业正在改变它们创新的方式本身。

大流行病改变企业创新的第一点是创新的成本。在大公司尝试任何新鲜事物通常都涉及大量资金。而眼下，随着收入枯竭，企业要保存现金以保持流动性，大多数老板最不会考虑的就是新投资。一些企业正在发现无需大笔支出就能做事的新方法。

欧洲一家大型食品零售商的CEO说，他的公司在没有新资本投入的情况下，靠着整夜在商店拣选打包，把线上销量提高了50%以上。在中国因疫情停工期间，大型房地产公司恒大集团鼓励其销售人员利用社交媒体和虚拟现实技术推销房屋。该公司2月份的销售额增长了一倍以上，达到64亿美元。一名外国买家最近在三维虚拟看房后就支付了600万英镑（740万美元）买下了伦敦的一套房子。加州公司Matterport说自己的3D相机卖得和卷筒纸一样快。

一直以来，企业创新除了花费巨大外，还都彼此隔绝。加州大学伯克利分校哈斯商学院的亨利·切斯布鲁夫（Henry Chesbrough）指出，这种封闭

的方式有其机会成本。大部分大公司并不使用或授权自己的大部分专利，而是守着自己“皇冠上的宝石”。现在，一些保险库正在打开，与他人共享里头的珍藏。

通常都彼此防范的药品竞争对手如今正在研发新冠药物和疫苗的竞赛中携手合作。IBM正在领导一个联盟来汇集超级计算资源，帮助寻找疗法。4月21日，曾经坚定主张软件业应是“带围墙的花园”的微软宣布支持开放数据运动。

哈佛商学院的卡里姆·拉哈尼（Karim Lakhani）指出，大企业原本在很大程度上更看重业内人士和精英顾问的建议，而非大众的智慧。而这一点也在改变。瑞典电信设备公司爱立信正对开源软件加大投资，并让客户参与开放创新的工作以加速其5G套件的推广。

这种对外部力量的接纳正在推动像Tongal这样的业务。Tongal是一个以众包方式为跨国公司创作视频的交易市场，这些公司包括加拿大运动服装公司露露乐蒙（Lululemon）和丹麦玩具公司乐高。3月新增注册创作者较2月增长了五倍，月交易量增加了150%。按需供应技术人才的Topcoder业务量也飞速增长。

但这场最新创新革命的标志性特征是惊人的速度。企业被迫加快自身新陈代谢，克服“分析瘫痪”——这个通病的存在是因为企业高层都曾在商学院钻研过同一堆无甚紧要的案例。在最近一次简报中，贝恩公司（Bain）的顾问敦促企业把旧数据丢一边，快速而频繁地测试，并假设自己在接下来的一段时间内都会处于测试模式。

美国大型食品分销商Sysco面向餐馆和机构的主要分销渠道突然关停后，在不到一周的时间内建成了全新的供应链和结账系统，改为向食品杂货店供货。众多拖延已久的计划突然在一夜间大规模推出。知情人士称，一家全球标准制定机构在两周内将其主打产品之一从面对面互动转换成线上系统。

这场危机让管理人员敢于加快行动，在更大的客户群中尝试冒险的创意。

正如一家财富500强企业的老板最近所言：“相比和分析师商量好几个月，无休止地开会，我们正通过测试学到更多东西。”面对全球零售业大灾难，耐克的全球线上销量却在截至2月的三个月里增长了超过三分之一。这是因为它从早期中国疫情期间获得经验，敏捷地把重点转向了数字方式。随着消费者通过微信等社交媒体分享健身动态，其中国区在线销售收入在1月和2月同比增长了三位数。它让人大汗淋漓的运动大师课每周在YouTube上的播放量超过80万次。

对速度的渴望也体现在那些制造3D打印设备的公司上。它们大幅减少了从原型到终成品的时间，并用附近的3D承包商替代遥远的供应商以加快配送速度。惠普正在加速推出“3D即服务”，让客户可以只为打印的内容付费，而不必购买昂贵的工具和耗材。早期客户包括制造电动汽车充电器的Wallbox和为骨科医师和牙医制造工具的HIPP Medical。

企业也在尝试新的分销渠道。如今工人稀缺，而客户更愿意从机器而不是人那里收货，诸如阿里巴巴、京东和美团等中国电商巨头已经纷纷采用自动送货。高风咨询公司的谢祖墀认为，自动送货将在12至18个月内普及，这比他以前预期的可能性要快得多。加州创业公司Zipline已经在非洲用无人机运送血液和医疗样本，现在也想要在美国这样递送新冠病毒样本。谷歌已经扩大了其Wing无人机的使用范围，在弗吉尼亚的乡村运送药品和其他必需品。

许多大企业受到传统资产的重压和寡头垄断利润的保护，并不是天生的创新者。拥有这些特点的企业大多把自家的怪才发明家团队贬为了受西装革履的高层指挥的臭鼬工厂。

贝恩的达雷尔·里格比（Darrell Rigby）说，在一切太平、可预测的时期，这种“命令-控制”的创新模式效果尚可。伦敦商学院的加里·哈默尔（Gary Hamel）补充道：“在小型危机中，权力转移到中心。”但他寻思道，在一个大的危机中，“权力会转移到外围”。大流行病过后，它可能还会在那里待上一阵。■



Graduate unemployment

Spring freeze

Millions of students brace for joblessness. The government is anxious, too

“GRADUATION EQUALS unemployment” has long been a common saying in China (the nouns share a character). It is often used in jest by university students as final exams loom. But for the 9m or so due to graduate in June—a record high—the words convey a dark reality. As China limps back to work after covid-19, their job prospects are truly bleak. They will enter the workforce as prospective employers mull lay-offs or hiring freezes. For a middle class used to relentlessly strong economic growth, the shock will be great.

As it surveys an economy ravaged by the disease, the leadership’s biggest worry is unemployment. In February the urban jobless rate jumped to 6.2%, the highest ever. In March it fell slightly to 5.9% as businesses reopened. But official figures mask the scale of the problem. Urban unemployment could reach 10% this year, reckons the Economist Intelligence Unit, a sister company of *The Economist*. And that does not include the tens of millions of migrants who sat out the epidemic in their ancestral villages. Many of them now have no jobs to return to in the cities.

China’s leaders describe the problem of graduate unemployment as a matter of “paramount importance”. In recent days university officials around the country have been holding meetings to discuss how to ensure that as many as possible find jobs. They have often used similar language, stressing the “urgency” of this “political task” relating to “social stability”. Jobless migrants make officials anxious, too. But the party frets more about threats involving better-educated people with urban roots and strong social networks.

Last year just over half of entrants to China's urban workforce were university graduates. Usually about 60% of them would be hired by small- and medium-sized enterprises. But such firms have been among those hardest-hit by the coronavirus. On April 14th Li Keqiang, the prime minister, told his cabinet that the situation for this year's graduates was "grim".

Companies normally begin scouring campuses for recruits soon after the spring-festival holiday (another big hiring round takes place in the autumn). This time, however, with universities shut and big gatherings banned, the entire process was "wiped out", says a business veteran.

Some employers have gone digital, using video interviews and online tests. But many, reeling from the impact of work stoppages and still-tepid consumer demand, have cut hiring. A survey of 1m companies by Peking University's Guanghua School of Management and Zhaopin, a job-search site, found there were 30% fewer openings in the first quarter compared with last year. Those for fresh graduates in finance fell by more than 50% this spring, according to Boss Zhipin, another recruitment website—even as the number of final-year students searching for a job rose by half. With less competition, firms that are still hiring can pick the best and brightest. But they are also likely to plump for old hands rather than trainees.

Competition for graduate jobs had already grown fierce in recent years, particularly for the most prestigious positions. Now it is cut-throat. Miriam Zhang, a graduate from Weifang, a city in the northern province of Shandong, has sent out 100 applications in the past two months and got responses only to six. One job, she heard, had attracted 3,000 hopefuls.

At least the epidemic has helpfully "weeded out" weak or dodgy companies, Ms Zhang notes. She is now keener than ever to get hired by a big firm, and is mainly searching for openings at state-owned companies. In a survey by

China Youth Daily, an official newspaper, more than 60% of respondents said covid-19 had steered them towards “more stable” work. To many that means finding an employer with links to the government.

Officials are trying to satisfy such demand. They have promised more openings in the civil service (not least in rural areas) as well as in the army. They have directed state-owned businesses to boost their recruitment of new graduates. Sinopec, an oil giant, is hiring another 3,500 on top of the 6,600-odd it has already taken on—the most people it has ever signed up in a year. Other state-owned firms are also taking on record numbers. They are giving preference to graduates from Hubei province, where the outbreak began. (This is in response to an appeal from the central government that firms should stop discriminating against Hubei residents, who are often treated with suspicion because of their province’s reputation as a covid-19 disaster zone.) The government has also told universities to offer an additional 200,000 places for graduate studies.

Until recently, job-hunting involving intercity travel was hampered by quarantine-related restrictions. Even though such measures have been eased in most places, hassles remain. Wang Zheqi, who is meant to graduate this year in Shanghai, had hoped to use her dorm room as a base for job-hunting. Instead she is stuck in her hometown because her university is still closed and she cannot afford off-campus accommodation in Shanghai.

Students did not have to search for jobs until the 1990s. Instead they had to take positions assigned to them by the government. As a result of covid-19, officials are getting more involved in finding work for students than they have been since those days. Xinchao Media, an advertising company, says that the government of Chengdu, the south-western city where the firm is headquartered, has offered to recommend graduates for its job openings. The city of Beijing, among others, has launched a recruitment website for

people preparing to graduate.

Many governments are also rewarding firms that hire graduates. In Shanghai, the district of Pudong is offering them subsidies and reduced social-security payments worth up to 2,000 yuan (\$282) for each local graduate they take on. Others are giving refunds on social-security contributions to companies that do not lay off workers.

The government is right to worry about social stability. Well-educated young people have been in the vanguard of many of China's biggest protest movements of the past century. Students whose futures are clouded by the unaffordability of housing and competition for jobs with immigrants from the Chinese mainland were at the forefront of last year's unrest in Hong Kong. As the covid crisis subsides in China, social tensions are becoming more evident. Hundreds of shop owners recently took to the streets of the southern city of Guangzhou and dozens gathered outside a mall in Wuhan, the capital of Hubei, to demand rent deductions after weeks of unemployment. (Videos of the protests were swiftly removed from the internet.)

Graduating at a time of such economic hardship could be more than just a temporary setback. Studies show that it can have "a huge impact" on lifetime earnings, says Li Jin of the University of Hong Kong. That is because many will go into a different line of work from the one they had hoped to pursue, and for lower pay. In normal times, according to Zhaopin, a third of Chinese graduates aim to earn between 6,000 and 8,000 yuan a month in their first jobs, but fewer than one in five end up doing so. Their disappointment will be far greater this year—and may last well beyond it.





毕业即失业

春寒

几百万大学生面临失业。政府也很焦虑【新冠报道】

长期以来中国一直流传着“毕业即失业”的说法。最后的期末考临近时，大学生们常用这句话来自我调侃。但对于即将在6月毕业的约900万（人数创历史新高）大学生来说，它反映的却是灰暗的现实。新冠肺炎过后，中国企业复工步履维艰，毕业生的就业前景委实堪忧。在他们进入劳动力市场的当口，雇主们却在考虑裁员或暂停招聘。对于习惯了经济持续强劲增长的中产阶级来说，打击将是巨大的。

中国领导人在审视受新冠肺炎重创的经济时，最大的担忧就是失业问题。2月，城镇失业率跃升至6.2%，创历史新高。随着3月企业陆续复工，失业率小幅下降至5.9%。但官方数据未反映出问题的严重性。据本刊的姊妹公司经济学人智库估计，今年的城镇失业率可能达到10%。这还不包括数千万在老家坐等疫情结束的农民工，如今他们中的许多人就算回到城市也找不到工作。

中国领导人将大学毕业生就业称作“至关重要”的问题。最近，全国各地的高校官员一直在开会，讨论如何确保让尽可能多的毕业生找到工作。他们的措辞大多雷同，强调这项关系到“社会稳定”的“政治任务”的“紧迫性”。农民工失业问题也让政府官员焦虑。但更让共产党担心的还是那些来自城市、有着强大社会关系网络、受过良好教育的人失业所构成的威胁。

去年，中国城镇新增就业人口中高校毕业生所占比例刚刚过半。他们中通常有大约60%的人会进入中小企业。但这类公司是受疫情打击最严重的部门之一。4月14日，李克强总理在国务院常务会议上指出，今年毕业生的就业形势“严峻”。

通常，企业会在春节后不久开始校园招聘（另一轮大规模招聘在秋季）。然而，一位商界资深人士表示，这次由于大学校园关闭、大型聚集性活动

被禁，整个校园招聘环节“荡然无存”。

一些雇主已经开始采用视频面试和在线考试等数字化手段。但受停工和消费需求仍然不温不火的影响，许多企业削减了招聘。北京大学光华管理学院和求职网站智联招聘调查了100万家公司后发现，今年第一季度的岗位空缺比去年同期减少了30%。另一家招聘网站Boss直聘的数据显示，今年春季金融行业中面向应届生的岗位空缺数下降了超过50%——而求职的应届毕业生人数却增加了一半。在竞争减少的情况下，仍在招聘的公司大可掐尖录用人才。但它们也很可能选择有工作经验的人，而不是新手。

近年毕业生的就业竞争本已变得非常激烈，尤其是围绕那些知名公司的职位。如今竞争已呈白热化。山东潍坊的毕业生米利亚姆·张在过去两个月里发出了100份求职信，只收到了六个回覆。她听说有一个职位吸引了3000个求职者。

张同学指出，这场流行病至少帮助“剔除”了实力不济或不可靠的公司。她现在比以往更加渴望进入大公司，她的求职目标大多是国有企业。官方报刊《中国青年报》的一项调查显示，超过60%的受访者表示，新冠肺炎让他们趋向于选择“更稳定的”工作。对很多人来说，这意味着要找一个有政府背景的用人单位。

政府官员正努力满足这种需求。他们已承诺增加公务员（尤其是农村地区）以及部队岗位。他们指示国有企业扩大应届毕业生的招聘规模。石油巨头中石化在已经聘用了6600多人的基础上正追加招聘3500人，创单年入职员工数新高。其他国有企业接纳的毕业生人数也创下纪录。它们还优先考虑来自疫情爆发地湖北的毕业生。（这是响应中央要求企业不得歧视湖北籍人员的号召。由于湖北是新冠肺炎的重灾区，人们对湖北籍人员往往存有戒心。）政府还要求大学扩招20万名研究生。

直到最近，跨城求职受到了隔离相关限制的影响。尽管这类限制在大多数地方已经放松，但仍存在各种不便。在上海读书的王哲琦（音译）本该今年毕业，她曾想把自己的宿舍作为求职时的落脚点。但现在她被困在了家

乡，因为大学还没开学，她也负担不起在上海的校外住宿。

上世纪90年代之前，大学毕业生不用自己找工作，而是得接受政府分配。如今因为新冠肺炎的影响，官员参与到帮助毕业生找工作中，程度为90年代以来所未见。总部位于成都的广告公司新潮传媒表示，成都市政府已经提出为它的空缺岗位推荐毕业生。北京等不少城市推出了针对应届毕业生的招聘网站。

许多地方政府还向雇用毕业生的公司提供奖励。在上海，浦东新区对录用浦东户籍毕业生的企业提供补贴并减免企业社保缴费，标准为每名毕业生最高2000元。另一些地方政府则向不裁员的公司退还社保缴费。

政府担忧社会稳定确有其道理。受过良好教育的年轻人一直是过去一个世纪里中国许多最大规模抗议活动的先锋。在香港，由于无力负担高房价，加上大陆移民带来的就业竞争，本地学生的未来蒙上了阴影，他们在去年的动乱中就冲在最前线。随着新冠危机在中国缓解，社会矛盾正日益凸显。最近，在停业数周后，几百名店主走上广州街头，还有几十名店主聚集在武汉一家购物中心外，要求减免租金。（抗议活动的视频很快从互联网上删除。）

毕业于这样一个经济困难期可能不仅仅是暂时的挫折。香港大学的李晋表示，研究表明这可能对终身收入产生“巨大影响”。这是因为很多人会进入一个自己本不希望从事的行业，而且薪水也低于预期。智联招聘称，正常情况下，中国三分之一的毕业生对自己第一份工作的期望月薪是6000至8000元，但达到这一目标的毕业生不到五分之一。今年他们更是会大失所望——而且可能会持续很久。 ■



The Hua-war

Some body to hold

The fight with Huawei has diminished America's ability to shape tech rules

THE PROCESS of setting standards attracts little attention, probably because it is very boring. Its magi gather regularly to seek consensus on mind-numbing technical details for the running of things like cell phone networks, artificial intelligence services and global shipping. Meetings are arranged through bodies with names like ISO (International Organisation for Standardisation) or 5GAA (the 5G Automotive Association, a specialist body focused on building 5G connectivity into autonomous cars). There are hundreds of these things.

Standards are important, despite appearances. The internet protocol, written by Vint Cerf and Bob Kahn in California in 1973, is the fundamental standard on which the rest of the internet runs. Mr Cerf now works for Google, and America holds significant sway over the net. Those who set the rules for a piece of technical infrastructure, such as the internet, gain power over its future workings. This is why America worries about China's growing contributions to standards for 5G networks and other technologies. Yet for the past year technology companies with operations in America have been frozen out of some standard-setting as an accidental consequence of the American government's attack on the Chinese tech giant, Huawei.

This started with the addition of Huawei to the entity list in May 2019. That made it illegal for any company to export products to Huawei that had been made in America. Tech-company lawyers looked at the regulations and decided that the law prohibited interaction with Huawei during the course of standard-setting, too. They worried that, in the course of discussion, American-made technologies would in effect be transferred to Huawei,

placing their employer in breach of the rules.

That legal decision created a problem. Huawei plays a big role in setting standards on artificial intelligence, 5G and other connectivity technologies, so avoiding interactions with the firm while simultaneously getting involved in the rigorous nerdery of standard-setting was impossible. As a result, some companies with American operations have removed themselves from the standard-setting processes in which they used to join. In areas where Huawei is active, this has left America voiceless in setting the tech rules of the future.

The effect has been particularly acute at standards bodies that convene outside America, where the organisers are less inclined to make arrangements to accommodate firms that are subject to export-control rules. At those meetings, in some instances, Huawei and other Chinese companies have had a voice where American companies have not. Some, such as 3GPP, a body that deals with 5G, and IEEE, an engineering body, have declared themselves to be “open” meetings, in an attempt to remove liability from firms with American operations. But uncertainty persists.

Standards bodies with American operations, such as the Wi-Fi Alliance in Austin, Texas, or the Bluetooth Special Interest Group in Kirkland, Washington, have faced their own version of the problem. Some have excluded Huawei. While this does mean that American companies can take part in Huawei-free discussions, it threatens to undermine the standards bodies’ legitimacy as the single forum for the issues they cover. There is talk of competing bodies being set up outside America, to make truly global discussion possible.

American lawmakers have noticed. On April 14th a group of Republican senators wrote to the Departments of Commerce, Defence, Energy and State fretting that American companies had been locked out of standards

discussions on 5G and urging the departments to fix it. The senators said they were “deeply concerned” about the loss of soft power America derives from standard-setting by American companies.

Few in Washington disagree, yet the fix is not straightforward. Tweaking rules in favour of engagement with Huawei is politically unpalatable, even when that engagement is in forums as innocuous and dull as standards bodies. Meanwhile, Huawei is still building 5G networks around the world, networks which will carry the whizzy internet services of the future. And for almost a year, by its own hand, America’s best companies have been frozen out of discussions which define that future. ■



华为之战

会总要开

与华为的较量削弱了美国制定技术规则的能力

制定标准的过程少有人关注，可能是因为它相当无趣。“贤士”们定期碰头，寻求就运行手机网络、人工智能服务和全球航运等事务的枯燥乏味的技术细节达成共识。这类会议由各种机构举办，它们带有一串字母组成的名字，如ISO（国际标准化组织）或5GAA（5G汽车协会，一个专门为无人驾驶汽车建构5G连接的组织）。这样的团体成百上千。

标准很重要，尽管表面上看不出来。温特·瑟夫（Vint Cerf）和鲍勃·卡恩（Bob Kahn）于1973年在加州撰写的互联网协议是互联网其余部分赖以运行的基本标准。瑟夫现在为谷歌工作，而美国对互联网拥有强大的支配力。那些为技术基础设施的某一个部分（如互联网）制定规则的人会获得对其未来运作的影响力。这就是为什么美国会担心中国在5G网络和其他技术的标准投入日益增多。然而，美国政府对科技巨头华为的进攻产生了一个意外后果：过去一年，有美国业务的科技公司被排除在一些标准的制定议程之外。

这始于2019年5月华为被列入“实体清单”，之后任何公司向华为出口美国制造的产品都属非法。科技公司的律师研究了相关规定后，认为法律也禁止了在标准制定过程中与华为互动。他们担心，在协商过程中美国发明的技术实际上会转移到华为那里，而使自己的公司违反出口禁令。

这个法律决策制造了一个问题。华为在制定人工智能、5G和其他连接技术的标准方面扮演重要角色，因此既要避免与这家公司互动，同时又要参与到严谨的标准制定中是不可能的。其结果就是，一些有美国业务的公司主动离开了过去参与过的标准制定流程。在华为活跃的领域，这已经让美国在制定未来的技术规则方面集体失声。

在那些在美国境外召开会议的标准制定机构中，这种影响尤为突显，因为

会议主办方更不愿意做出安排，去邀请那些受到出口禁令约束的公司。有些时候，在这些会议上华为和其他中国公司拥有发言权，而美国公司没有。一些机构，比如处理5G事宜的第三代伙伴计划协议（3GPP）和工程行业的电气和电子工程师协会（IEEE），已经宣布自己是“公开”会议，试图让有美国业务的公司免于担上责任。但不确定性依然存在。

有美国业务的标准制定机构，比如得州奥斯汀的Wi-Fi联盟（Wi-Fi Alliance）或华盛顿州柯克兰的蓝牙技术联盟（Bluetooth Special Interest Group），也面临自己的问题。一些已经把华为拒之门外。虽然这确实意味着美国公司可以参加华为缺席的协商了，它却有可能破坏这些机构充当相关议题的唯一论坛的合法性。有传言称，在美国之外的地方正在创建一些竞争性机构，以使真正的全球协商成为可能。

美国的立法者已经注意到了这个问题。4月14日，一批共和党参议员致信美国商务部、国防部、能源部和国务院，表达对美国公司被排除在5G标准商议之外的忧虑，敦促这些部门纠正问题。这些参议员表示，他们“深切关注”美国丧失从由美国企业制定标准中获得的软实力。

在华盛顿没有谁会不认同这一点，但要解决问题并不简单。调整法规转而支持与华为接触在政治上不讨喜，即便这种接触只是发生在标准制定机构这种无害又沉闷的论坛中。与此同时，华为仍在全球各地建设5G网络，这些网络将承载未来的先进的互联网服务。而近一年来，美国自己动手，把它最好的企业锁在了界定这一未来的讨论之外。 ■



Carmakers in trouble

Pimp the ride

How to save a sputtering industry

EVEN BEFORE the recession, investors were deeply pessimistic about the car industry. Sitting on \$1.3trn-worth of legacy investments in factories that rely on a technology that ought to become obsolete—the internal-combustion engine—the likes of Ford, Renault and Volkswagen don't exactly look well positioned for the 21st century. Now, with car sales collapsing, a dinosaur business that employs 10m people directly faces a moment of truth. Long synonymous with hubris and the inept allocation of capital, it needs to look to the future.

Executives say they are better placed today than in 2008-09, when General Motors and others received bail-outs. Most firms have more cash and bigger margins. But this logic gets them only so far. Production in Europe and North America is now 50-70% lower than a year ago. Car firms have high fixed costs, so when they run below capacity they lose money fast. The top eight Western carmakers could burn over \$50bn of cash this quarter, reckons Jefferies, a bank. At that rate, they may run out of money by the end of the year.

There are other dangers. As recession bites, people may default on car loans, many of which are owed to carmakers' finance arms. The value of second-hand cars is dropping, harming these finance arms through their leasing operations. There may be a permanent fall in commuting, as more people work from home—road-passenger numbers in China are still 57% below their pre-covid level. This prospect helps explain why oil prices have collapsed. Investors are jumpy—on April 17th Ford raised \$8bn of debt at painful interest rates of 8.5-9.6%. The only firm that commands their confidence is Tesla, an electric-car specialist, whose shares are up by 64%

this year.

Given its carbon footprint, isn't there an argument for the creative destruction of the car industry? If only it were that simple. Millions of jobs are at risk and the big firms account for about 60% of the industry's investment, a rising share of which is, belatedly, going into green technologies. Adaptation would be far preferable to extinction. And yet there is a risk that government aid ossifies car firms before they have modernised. State "cash for clunkers" subsidies—which are on the menu in Germany—could encourage consumers to buy dirty, internal-combustion-engine cars. On March 31st America watered down emissions standards in order to help Detroit. Subsidies for idling workers help in the short run, but if they go on for long they risk preventing firms from shifting resources from old to new technologies.

The industry should take control of its own fate. Car firms need to be pioneers in operating factories under new health protocols, from redesigning the choreography of assembly lines to providing health tests for workers. Big Western firms are starting to re-open some plants. This won't be lucrative, but it will stem short-term losses.

Firms should also avoid slashing investment indiscriminately, as they did in 2007-09 when capital spending dropped by 29%. Most car firms have two parts, a vast legacy operation and a small, loss-making, fast-growing one making hybrid and fully electric cars. The danger is that they cut spending on the new bit, slowing the development of battery technologies and the launch of new electric models. Better to pare dividends, loss-making foreign adventures and legacy investments.

The final priority is consolidation. Too many mid-sized carmakers are clinging to their global aspirations, despite a number of mergers in recent years, such as Geely's purchase of Volvo and Fiat Chrysler's planned union

with PSA (Fiat's biggest shareholder owns shares in the parent company of *The Economist*). The world still has more than 1,000 factories making legacy cars. Renault and Nissan continue their halfway house of an alliance, which brings more complexity than synergy. Adapt, invest in the future and join forces. That is the way to a viable car industry—for the climate, workers and investors, too. ■



【首文】陷入困境的汽车制造商

改装上路

如何拯救一个熄火行业

在本次衰退发生之前，投资者就已经对汽车产业深感悲观。福特、雷诺和大众等大型汽车制造商守着工厂里价值高达1.3万亿美元的老旧投资迟迟没有行动，而这些投资倚赖的内燃机技术快要被淘汰了。看起来它们并没有完全为21世纪做好准备。如今随着汽车销量暴跌，这个雇用了一千万人的庞大行业要直面它的关键时刻。长久以来它已经成了傲慢和资本不当配置的代名词。现在，它需要放眼未来。

高管们表示，与2008年至2009年通用汽车等公司接受纾困时相比，他们现在的处境要好一些。大多数公司有着更多现金和更丰厚的利润。但也仅此而已了。欧洲和北美的产量比一年前下降了50%至70%。汽车制造商的固定成本很高，所以在非满负荷运行时就是在快速亏钱。投行杰富瑞（Jefferies）估计，西方最大的八家汽车制造商本季度可能要烧掉500多亿美元现金。照这个速度，到今年年底它们可能就会耗尽资金。

还有其他危险。受衰退的影响，人们可能会拖欠汽车贷款，其中许多是由汽车制造商的金融部门发放的。二手车的价值正在下降，这也损害了这些经营租赁业务的金融部门。随着更多人在家工作，通勤规模的缩小可能会是永久性的，比如中国的道路旅客数量就仍比疫情之前低57%。这种前景有助于解释油价为何暴跌。投资者焦虑不安，以至于福特在4月17日要以高到“肉痛”的利率——8.5%至9.6%——发行80亿美元的债券。唯一能赢得投资者信心的公司是专做电动汽车的特斯拉，它的股票今年上涨了64%。

考虑到它留下的碳足迹，难道没有理由对汽车产业展开创造性破坏？要是事情有那么简单就好了。数以百万计的工作岗位岌岌可危，而大企业占到这个行业投资的60%左右，其中越来越高的比例正投入到绿色技术上——尽管已经有些晚了。调适要比灭绝好得多。然而，政府的援助可能会让汽车制造商在完成现代化改造之前就陷入僵化。德国正在考虑的“旧车换现

金”计划可能会鼓励消费者购买污染严重的内燃机汽车。3月31日，为援助底特律，美国放宽了排放标准。补贴待岗工人在短期内会有帮助，但如果补贴持续太久，就有可能阻碍企业把资源从老旧的技术转移到新技术上。

汽车产业应该掌控自己的命运。从重新设计装配线布局到为工人提供健康测试，汽车制造商需要成为在新的健康规程下运营工厂的先行者。西方的大公司已经开始重新启动一些工厂。这不会带来丰厚的利润，但会减少短期亏损。

汽车制造商也应该避免不加选择地大幅削减投资，就像它们在2007年到2009年所做的那样，当时资本支出下降了29%。大多数汽车制造商由两部分组成：一个庞大的传统业务，以及一个规模小、亏损，但增长迅速的混合动力和纯电动车业务。危险在于它们选择削减在新业务上的开支，减缓研发电池技术和推出新电动车型。最好是削减股息、亏损的海外业务和传统业务投资。

最后一个重点是整合。尽管近年来发生了不少并购，例如吉利收购沃尔沃、菲亚特克莱斯勒计划与PSA结盟（菲亚特最大的股东持有《经济学人》母公司的股份），但仍有太多中型制造商执着于自己的全球抱负。世界上还有一千多家制造传统汽车的工厂。雷诺和日产维持着一个有限合作的联盟，这带来的复杂性超过了协同作用。适应变化，投资未来，联合力量——这是汽车产业的生存之路，从气候、工人和投资者的角度去看都是如此。■



Muhammad bin Salman

The prince

Though not yet king, Muhammad bin Salman has a firm grip on the kingdom

TO MARK THE end of its decades-old ban on cinemas, the government of Saudi Arabia held a fancy opening for the first commercial one in Riyadh. Ministers, influencers and at least one royal were invited to watch the Marvel superhero film “Black Panther”. In it a young prince called T’Challa finds himself suddenly in charge of Wakanda, an isolated kingdom rich in a precious natural resource. But he must fight off a challenge to the throne from a ruthless relative called Erik Killmonger. In the end T’Challa prevails and opens up Wakanda to the world.

Sound a little familiar? The man who ended the cinema ban, Muhammad bin Salman, the de facto ruler of Saudi Arabia, has a bit of T’Challa in him. The young crown prince, often known as MBS, is trying to open up his isolated, oil-rich kingdom. Tourists and foreign investors are now welcomed as part of a drive to diversify the economy. Conservative clerics have been muzzled and the vice police curbed, as the Saudis tone down their austere brand of Islam. Archaic restrictions, such as the ban on cinemas and another on women drivers, have been lifted. But, as Ben Hubbard intimates in his book “MBS”, Prince Muhammad arguably has a lot of Erik Killmonger in him, too.

The prince is the sixth son of the 25th son of the founding king of Saudi Arabia—so he was not exactly predestined to rule. Moreover, he was not an especially impressive young man; he never studied abroad, ran a company or served in the army. Abdullah, the previous king, saw him as “an upstart whose experience fell far short of his ambitions”, the author writes. The critique still feels apt. Yet Prince Muhammad was the apple of his father Salman’s eye—and a series of deaths in the family pushed Salman all the

way up the royal ladder.

When Salman became king in 2015 he put his son in charge of the economy and defence, but there were still other royals between Prince Muhammad and the throne. That didn't last long. King Salman, who is now fading, made him deputy crown prince that April. Two years later Prince Muhammad pushed aside his older cousin, Muhammad bin Nayef, to become crown prince. The royal court claimed the move was consensual. Reportedly, however, Muhammad bin Nayef was lured to a palace and denied medicine until he abdicated. He was under house arrest until early March—when, according to Mr Hubbard, who reports for the *New York Times*, he was taken into custody by security officers. (Senior Saudi officials had denied Muhammad bin Nayef was under house arrest; one described the claim as “not true at all”.)

For a while Saudi-watchers in the West were entranced by the bold and ambitious prince. But recently his rash and ruthless side has been getting more attention. Saudi Arabia's intervention in neighbouring Yemen, a brainchild of Prince Muhammad's, has created a humanitarian disaster. His decision to lock up hundreds of Saudi tycoons in a luxury hotel until they handed over chunks of their fortunes alienated outside investors. He in effect kidnapped the prime minister of Lebanon in 2017, then started a pointless feud with Canada. The world's richest man, Jeff Bezos, thinks the prince hacked his phone (though MBS denies it). World leaders are confounded by all this. “Are his dangerous acts the youthful faults of an inexperienced ruler? Or do they spring from deep in his character and serve as harbingers of things to come?” asks Mr Hubbard.

The book ends with the grisly tale of Jamal Khashoggi, a columnist who was killed and dismembered inside the kingdom's consulate in Istanbul two years ago. Prince Muhammad denies ordering the murder. Few observers believe him; after all, Saudi dissidents are routinely jailed and tortured. To

prevent such incidents from happening again the prince set up a committee to reform the intelligence service. Naturally, he put himself in charge of it. ■



穆罕默德·本·萨勒曼

王子掌权

尽管还不是国王，穆罕默德·本·萨勒曼牢牢掌控着沙特王国【《MBS：穆罕默德·本·萨勒曼的掌权之路》书评】

为庆贺长达几十年的电影院禁令终止，沙特阿拉伯政府为利雅得首家商业影院举行了盛大的开幕仪式。各路部长、有影响力的人物和至少一名皇室成员受邀观看了漫威超级英雄电影《黑豹》。在影片中，年轻的王子特查拉突然接掌了瓦坎达这个富含某种珍稀自然资源的与世隔绝的王国，但他必须击退凶残的亲戚艾瑞克·克尔芒戈对王位的挑战。最终，特查拉获胜，并向世界开放了瓦坎达。

听起来有点熟悉？解除电影院禁令的人、沙特事实上的统治者穆罕默德·本·萨勒曼身上有一点特查拉的影子。这位通常被人叫做MBS的年轻王储正试图打开他那与世隔绝、盛产石油的王国。作为实现经济多元化的举措之一，沙特现在欢迎游客和外国投资者的到来。随着沙特人设法缓和严厉的伊斯兰教教规，它捂住了保守的神职人员的嘴，限制了风化警队的权力。电影院禁令和妇女驾车禁令等陈旧的限制已经被取消。但正如本·哈伯德在《MBS》一书中暗示的，穆罕默德王子身上可以说也有很多艾瑞克·克尔芒戈的影子。

这位王子是沙特建国君主第25个儿子的第六个儿子——所以他并非注定要统治王国。此外，他不是特别能给人以深刻印象的年轻人。他从未在国外学习、经营公司或在军队服役过。哈伯德写道，前任国王阿卜杜拉认为他是“一个暴发户，他的经历远远撑不起他的野心”。这一评论听来仍很恰当。然而，穆罕默德王子是他父亲萨勒曼的掌上明珠，而家族中一连串死亡将萨勒曼推上了皇家阶梯的顶点。

如今日渐衰老的萨勒曼在2015年成为国王时，让这个儿子负责经济和国防，但在穆罕默德王子和王位之间还隔着其他皇室成员。这种局面没持续多久。当年4月萨勒曼将他任命为副王储。两年后，他挤掉了堂兄穆罕默

德·本·纳耶夫成为王储。皇家法院声称此举经过了双方同意。然而，据报道称，穆罕默德·本·纳耶夫是被诱骗至一座宫殿，且不准其服药，直到他退位。他被软禁直至3月初，据哈伯德（他为《纽约时报》撰写报道）称他被安全官员拘捕。（沙特高级官员否认穆罕默德·本·纳耶夫被软禁，其中一人称这种说法“完全不符合事实”。）

西方的沙特观察人士一度被这位大胆而野心勃勃的王子迷住。但近年他鲁莽而无情的一面越来越受到关注。沙特对邻国也门的干预——这是穆罕默德王子的主意——已经酿成了一场人道主义灾难。他把数百名沙特大亨关在一家豪华酒店，直到他们交出大部分财富，结果导致外部投资者离他而去。2017年，他在事实上绑架了黎巴嫩总理，然后又开始与加拿大毫无意义地争斗不休。世界首富杰夫·贝佐斯认为这位王子入侵了他的手机（但MBS否认了）。这一切令各国领导人困惑不已。“他的种种危险行为只是一个没有经验的统治者因年轻而犯下的错误吗？还是说它们源自他的性格深处，预示了将会发生的事？”哈伯德问道。

这本书以贾马尔·卡舒吉的恐怖遭遇结尾。他是一名专栏作家，两年前在沙特驻伊斯坦布尔领事馆被杀害和肢解。穆罕默德王子否认是自己下令谋杀他。几乎没有观察人士相信他，毕竟沙特的异见分子经常被监禁和折磨。为防止此类事件再次发生，这位王子成立了一个委员会来改革情报部门——负责人自然是他本人。 ■



Free exchange

The cost of living

Covid-19 could lead to the return of inflation—eventually

INFLATION IN THE rich world resembles a fairy-tale beast. Older members of society frighten younger ones with stories of the creature's foul deeds, but few serious people expect to see one and some doubt it ever existed. Although high inflation seemed a fixture of the economic landscape in the 1970s, changes to policy and the structure of the global economy since have ushered in four decades of ever meeker growth in prices. As covid-19 shuts businesses and leaves supermarket shelves bare, some economists fret that the pandemic could lead to inflation making an unwelcome return. Though the future is shrouded in more uncertainty than ever, inflation seems unlikely to rear its head—until, perhaps, the world's struggle with covid-19 nears its end.

Worries about soaring prices start with the observation that virus-fighting measures choke off production. Crudely put, inflation is the result of too much money chasing too few goods. At present the amount of goods and services available for purchase is tumbling. Many service industries are shut down. The virus is playing havoc with the supply of some products. On April 12th Smithfield Foods, a meat-processing firm, said it would close a plant producing nearly 5% of American pork, after more than 200 workers fell ill; it has since shut down others. Workers involved in the logistics operations for e-commerce platforms, such as Amazon and Instacart, have gone on strike to demand higher pay and safer working conditions. If supply interruptions translate into shortages in shops, then higher prices could follow.

Massive stimulus programmes are another potential source of inflation. Governments around the world are borrowing heavily to finance schemes

that support firms and workers. Central banks are flooding economies with newly created money. Over the past month the balance-sheet of the European Central Bank has grown by €550bn (\$600bn), or nearly 12%, and that of the Federal Reserve by nearly \$2trn, more than 40%. Printing money during the global financial crisis did not spark rapid inflation. Yet its coincidence with a collapse in supply might lead you to expect rocketing prices.

The prices of some goods and services might indeed rise sharply while economies are locked down. Those for some medical equipment in America, for instance, have reportedly risen as state governments compete for scarce supply. But the broad, sustained increases in price levels associated with accelerating inflation are unlikely to materialise in the short run, because lockdowns both interrupt supply and undercut workers' ability to earn and spend. Closing a restaurant limits food-service supply, but it also means that sacked waiters and kitchen staff have no income. And in some circumstances the drop in demand induced by a supply shock may be larger than the decline in supply—a source of deflationary, rather than inflationary, pressure.

This idea is explored in a new working paper by Veronica Guerrieri of the University of Chicago, Guido Lorenzoni of Northwestern University, Ludwig Straub of Harvard University and Iván Werning of the Massachusetts Institute of Technology. If some sectors of the economy shut down entirely, affected workers will curtail their spending dramatically. Spending by other workers could make up for the shortfall—only if the goods and services that can still be produced are substitutes for those that cannot. The abrupt drop in consumers' spending on plane tickets or hotel bookings is unlikely to be offset by more purchases of teleworking software instead, for instance. In the absence of good substitutes, say the authors, the economy experiences a “Keynesian supply shock”, where demand falls by more than supply. They provide another useful way to think about this

state of the world: that consumption will be much more valuable in the future, as goods and services that cannot be had today become available once more. So it makes sense to spend less now, and more later.

Available figures suggest that fewer goods are indeed being chased by even less spending. In March annual consumer-price inflation slowed in both America and the euro area, compared with rates in February. Much of that reflected tumbling energy costs; but core inflation—which strips out food and energy prices—also decelerated. Financial-market measures of inflation expectations suggest the drop is not a one-off. Expectations for average annual inflation in America over the next decade, as calculated by the Federal Reserve Bank of Cleveland, sank from 1.7% in January to 1.2% in April.

Those expectations could shift as economies reopen. Rehired workers could spend a high share of their incomes; demand from earners whose incomes were unaffected by shutdowns could overwhelm slowly recovering supply. Disinflationary pressures will remain, though. Across rich economies, services account for half or more of the consumption baskets used to calculate consumer-price inflation. For as long as fears of viral contagion linger, many businesses could struggle to attract new custom—and so be forced to offer steep discounts. Technologies adopted during lockdowns could allow companies to serve more customers without hiring many more workers, thus adding more to supply than to demand.

| *Hold on for dear life*

Inflationary effects are most likely to appear once the virus is truly beaten. The crisis could weaken structural forces weighing on demand. Take inequality, for instance, which concentrates income in the hands of the thrifty rich. More generous post-pandemic safety-nets, or progressive taxes enacted to pay down large government debts, could redirect income towards freer spenders, creating inflationary pressure. So could a change in

policymaking attitudes. The economic traumas of the early 21st century may push governments and central banks to prefer high economic growth and low unemployment to low and stable inflation, as happened after the second world war. Inflation is not certain to return after covid-19. But its re-emergence seems less fantastic a possibility. ■



自由交流

生活成本

最终，新冠肺炎可能会导致通货膨胀卷土重来【新冠报道】

富裕国家的通货膨胀就像童话故事里的野兽。年长的社会成员用这种生物的恶行来吓唬年轻成员，但没有几个理智的人预期自己真会撞见一只，一些人甚至怀疑它是否存在过。尽管高通胀似乎是上世纪70年代经济格局的一个固定组成部分，但自那以后的40年里，政策和全球经济结构的变化带来了日益温和的价格增长。随着新冠肺炎导致众多企业关闭，超市货架空空如也，一些经济学家担心这场大流行病可能导致不受欢迎的通货膨胀卷土重来。尽管未来笼罩着前所未有的不确定性，但看起来通胀不太可能抬头——可能直到世界与新冠肺炎的斗争接近尾声。

对价格飙升的担忧始于人们发现防疫措施遏制了生产。笼统地说，通货膨胀是过多货币追逐过少商品的结果。目前可供购买的商品和服务的数量骤降。服务业的众多部门停工。病毒正在破坏某些产品的供应。4月12日，肉类加工公司史密斯菲尔德食品公司（Smithfield Foods）表示，在200多名工人感染后，它将关闭一家生产了美国近5%的猪肉的工厂。这之后它又关闭了其他一些工厂。为亚马逊和Instacart等电子商务平台提供物流的工人罢工，要求涨工资和更安全的工作条件。如果供应中断导致商店里的商品短缺，那么价格可能就会上涨。

大规模经济刺激计划是另一个潜在的通胀源头。各国政府正在大举借债，为支持企业和劳动者的方案提供资金。各国央行正在向经济注入大量新发货币。过去一个月里，欧洲央行的资产负债表增加了5500亿欧元（6000亿美元），增幅接近12%，而美联储的资产负债表增加了近2万亿美元，增幅超过40%。在全球金融危机期间，印钞并没有引发快速通胀。但印钞与供应崩塌同时发生，可能就会让人预期价格将飙升。

当经济体陷入封城状态时，某些商品和服务的价格可能确实会大幅上涨。例如，据报道，由于供应稀缺和各州政府的争夺，美国一些医疗设备的价格

格已经上涨。但短期内，与通胀加速相关的广泛而持续的物价上涨不太可能成为现实，因为封城不仅会中断供应，也会削弱工人赚钱和消费的能力。关闭一家餐馆限制了食品服务供应，但也意味着被裁掉的服务员和厨房员工没有了收入。在某些情况下，供给冲击导致的需求下降可能大于供应下降——这是通缩压力而非通胀压力的源头。

一份新的研究报告探讨了这一点。研究者包括芝加哥大学的维罗妮卡·圭列里（Veronica Guerrieri）、西北大学的吉多·劳伦佐尼（Guido Lorenzoni）、哈佛大学的路德维希·斯特劳勃（Ludwig Straub）和麻省理工学院的伊凡·沃宁（Iván Werning）。如果某些经济部门完全关闭，受影响的劳动者将大幅削减支出。只有在仍然可以生产的商品和服务足以替代那些停产的商品和服务的情况下，其他劳动者的支出才可能弥补缺口。举例来说，消费者在机票或酒店预订上的支出陡然下降不太可能被更多购买远程办公软件所抵消。作者说，在没有好的替代品的情况下，经济体会经历“凯恩斯式的供给冲击”，即需求的降幅大于供给。他们提供了另一种有效方式来思考世界的这种现状：当今天无法获得的商品和服务在未来再次可获得时，消费将更有价值得多。因此，现在少花钱，以后多花钱是合理的。

现有的数据表明，确实是商品少而追逐商品的消费更少。3月美国和欧元区的年度消费价格通胀相比2月都有所放缓。这在很大程度上反映了能源成本的骤降；但剔除食品和能源价格后的核心通胀也已下降。金融市场对通胀预期的测量表明这种下降并非一次性的。根据克利夫兰联储的计算，对美国未来十年平均年通胀的预期已从1月的1.7%降至4月的1.2%。

随着经济重新启动，这些预期可能会改变。重新找到工作的劳动者可能会花掉自己很大一部分收入；有些人的收入未受企业关停的影响，他们的需求可能会压倒正在缓慢恢复的供应。不过，反通胀压力仍将存在。在富裕经济体中，服务业占了用于计算消费价格通胀的消费篮子的一半甚至更多。只要对病毒蔓延的恐惧未消，许多企业可能很难吸引到新客户，因此被迫推出大幅折扣。在封城期间采用的技术可以让企业在不雇用更多工人的情况下为更多客户提供服务，导致供应的增长高于需求。

| 坚持下去，为了更昂贵的生活

通胀效应最有可能出现在病毒真正被击败之时。这场危机可能会削弱压制需求的结构性力量，比如不平等，它令收入集中在俭省的富人手中。疫情过后更普惠的社会安全网，或为偿还政府的巨额债务而实施的累进税，可能会将收入重新导向花钱大手大脚的人，从而形成通胀压力。政策制定方面的态度转变可能也有同样的影响。21世纪初的经济创伤可能会促使各国政府和央行宁愿选择高经济增长和低失业率，也不愿选择像二战后那样的稳定的低通胀。新冠肺炎之后通胀未必会卷土重来，但它的再度出现似乎也不至于是奇思异想了。 ■



The data economy

Tear down this wall

A big member of big tech embraces open data

TWO DECADES ago Microsoft was a byword for a technological walled garden. One of its bosses called free open-source programs a “cancer”. That was then. On April 21st the world’s most valuable tech firm joined a fledgling movement to liberate the world’s data. The company plans to launch 20 data-sharing groups by 2022 and give away some of its digital information, including data it has gathered on covid-19.

Microsoft is not alone in its newfound fondness for sharing in the age of the coronavirus. “The world has faced pandemics before, but this time we have a new superpower: the ability to gather and share data for good,” Mark Zuckerberg, the boss of Facebook, a social-media giant, wrote in the *Washington Post* on April 20th. Despite the EU’s strict privacy rules, some Eurocrats now argue that data-sharing could speed up efforts to fight the virus.

The case for sharing data predates the pandemic. The OECD, a club mostly of rich countries, reckons that if data were more widely exchanged, many states could enjoy gains worth 1-2.5% of GDP. The estimate is based on heroic assumptions (such as putting a number on opportunities for startups). But economists agree that readier access to data is broadly beneficial, because data are “non-rivalrous”: unlike oil, say, they can be used and re-used without being depleted, to power various artificial-intelligence algorithms at once, for example.

Many governments have recognised the potential. Cities from Berlin to San Francisco have “open data” initiatives. Companies have been cagier, says Stefaan Verhulst, who heads the Governance Lab at New York University,

which studies such schemes. Firms fear losing intellectual property, imperilling users' privacy and hitting technical obstacles. Standard data formats (eg, JPEG images) can be shared easily, but much that a Facebook's software collects would be meaningless to a Microsoft, even after reformatting. Less than half of the 113 "data collaboratives" identified by the lab involve corporations. Those that do, including initiatives by BBVA, a Spanish bank, and GlaxoSmithKline, a British drugmaker, have been small or limited in scope.

Microsoft's campaign is the most consequential by far. Besides encouraging non-commercial sharing, the firm is developing software, licences and (with the Governance Lab and others) rules frameworks to let firms trade data or provide access without losing control. Optimists believe that the giant's move could be to data what IBM's embrace in the late 1990s of the Linux operating system was to open-source software. Linux went on to become a rival to Microsoft's own Windows and today underpins Google's Android mobile software and much of cloud-computing.

Brad Smith, Microsoft's president, notes that fewer than 100 firms collect more than half of all data generated online. More sharing would, in his view, counteract the concentration of economic—and political—power. Bridging the "data divide", as he calls it, won't be easy. Data are more complex than code. Most programmers speak the same language and open-source collectives mainly solve technical problems. People in charge of data often come from different industries without a common vocabulary and talk business.

Indeed, like IBM before it, Microsoft has reasons other than altruism to champion open data. It makes most of its money not by extracting value from hoarded data through targeted advertising, like Alphabet or Facebook, but by selling services and software to help others process digital information. The more data that are shared, the better for Microsoft. Mr

Smith argues that this makes his firm the perfect campaigner for open data. “If you want to know who to trust”, he says, “you should look at the company’s business model.”

That may be so. But this also points to a bigger hurdle. Even if technical and legal barriers to sharing could be removed, many data-rich firms will be reluctant to loosen their lucrative grip on user information. Mr Zuckerberg’s declarations notwithstanding, don’t expect Facebook to follow Microsoft’s lead any time soon. ■



数字经济

拆掉这堵墙

科技巨头圈子里的一个重量级成员拥护开放数据

二十年前，微软还是“带围墙的技术花园”的代名词。它的一任老板曾把免费的开源程序称为“毒瘤”。然而此一时彼一时。4月21日，这家全球市值最高的科技公司加入了一场开放世界数据的新兴运动。它计划在2022年前成立20个数据共享团体，无偿公开公司的部分数字信息，包括自己收集的新冠肺炎数据。

微软并不是新冠病毒时代唯一一家开始热衷于信息分享的公司。4月20日，社交媒体巨头Facebook的老板马克·扎克伯格在《华盛顿邮报》撰文写道：“过去世界也曾遭遇大流行病，但这一次我们拥有一项新的超级能力：收集并共享数据来造福人类。”尽管欧盟有严格的隐私保护条例，但一些欧盟官员现在提出，数据共享可以加快抗击新冠病毒的进程。

在这场大流行病之前，人们就已提出共享数据的理由。成员主要为富裕国家的经合组织估计，假设数据交流更为广泛，许多国家可能会得到相当于GDP的1%到2.5%的好处。虽然这一估计是基于大胆的假设（比如把创业公司的商机也算在内），但经济学家们一致认为，更方便地获取数据可以让人们广泛受益，因为数据是“非竞争性的”：数据不像石油，它可以被反复使用而不会枯竭，比如可以同时驱动各种不同的人工智能算法。

许多政府已经认识到了这种潜力。从柏林到旧金山的很多城市都有“公开数据”项目。研究这类方案的纽约大学治理实验室（Governance Lab）的负责人斯特凡·费尔哈斯特（Stefaan Verhulst）表示，相比之下，企业在这方面的态度一直更谨慎。它们担心丧失知识产权、危及用户隐私、遭遇技术障碍。标准数据格式（比如JPEG图像）很容易共享，但由Facebook的软件收集的很多数据即使修改了格式，对微软的软件来说仍然毫无意义。在该实验室确定的113个“数据合作项目”中，有企业参与的还不到一半，而且它们的规模也都很小或者涉及范围有限，比如西班牙对外银行（BBVA）

和英国制药公司葛兰素史克（GlaxoSmithKline）提出的方案。

微软提出的计划绝对是最重大的。除了鼓励非商业性数据共享，微软还在开发软件和许可，并与治理实验室等各方一起打造规则框架，让企业可以开展数据交易或提供数据的使用权而不失去控制。乐观主义者认为，微软此举对于数据的意义将堪比IBM在上世纪90年代末采用Linux操作系统对于开源软件的意义。当年，Linux随后发展为微软自行研发的Windows的竞争对手，到如今已是谷歌的安卓移动软件和大量云计算的基础。

微软总裁布拉德·史密斯（Brad Smith）指出，不到100家公司收集了一半以上的在线生成的数据。在他看来，加大数据共享能阻止经济力量和政治力量的集中。要消除他所说的“数据分割”并非易事。数据比代码更复杂。大多数程序员都有共同的语言，而开源团队主要解决技术问题。主管数据的人却往往来自各行各业，各有各的语言体系，而且谈的是生意。

事实上，和当年支持Linux的IBM一样，微软也并非出于无私才成为开放数据的拥趸。微软不像Alphabet或Facebook等公司那样通过定向广告从自己储存的数据中赚钱，它大部分收入来自出售服务和软件以帮助其他公司处理数字信息。共享的数据越多，对微软越有利。史密斯认为，这让微软成为开放数据的完美倡导者。“如果你想知道哪家公司值得信任，”他说，“就应该看看它的商业模式。”

或许真是这样。但这同时也指向了一个更大的问题。即使可以消除共享数据的技术和法律障碍，很多拥有大量数据的公司也不会心甘情愿放松对用户信息的掌控，因为这是它们丰厚利润的来源。尽管扎克伯格发布了声明，但不要指望Facebook会马上效法微软。■



Corporate fraud

Who's lost their trunks?

The crisis will expose a decade's worth of swindling and aggressive accounting

WHEN BERNIE MADOFF owned up to a \$65bn Ponzi scheme in December 2008, it was not out of guilt. He knew the game was up. Three months earlier Lehman Brothers had imploded. The market meltdown sent clients clamouring to withdraw from his funds, leaving them depleted with many investors still unpaid. American regulators had not spotted the fraud, despite a tip-off years earlier. It was not them that did for Mr Madoff, but recession.

Booms help fraudsters paper over cracks in their accounts, from fictitious investment returns to exaggerated sales. Slowdowns rip the covering off. As Baruch Lev, an accounting professor at New York University, puts it, "In good times everyone looks good, and the market punishes you harshly for not keeping up." Many big book-cooking scandals of the past 20 years emerged in downturns. A decade before the crisis of 2007-09 the dotcom crash exposed accounting sins at Enron and WorldCom perpetrated in the go-go late 1990s. Both firms went bust soon after. As Warren Buffett, a revered investor, once put it: "You only find out who is swimming naked when the tide goes out." This time, thanks to a pandemic, the water has whooshed away at record speed.

| *Hell and low water*

Much of the swimwear was already threadbare: a borrowing binge has strained many corporate balance-sheets. Some dirty secrets are beginning to come out. Take Luckin Coffee, which had expanded to take on Starbucks in China, attracting big-name investors like BlackRock and Singapore's sovereign-wealth fund. On April 2nd the Nasdaq-listed Chinese chain

announced an ongoing internal probe amid allegations that its chief operating officer and other employees may have fabricated over 2bn yuan (\$280m) in sales. On April 14th Citron Research, a short-seller, accused GSX, a Chinese online-tutoring firm listed in New York, of inflating last year's sales. In a statement GSX denied the allegations and said Citron's report was misleading and "full of subjective maliciousness".

These revelations have revived fears over the flaky corporate governance of Chinese firms listed on foreign exchanges, whose audits, conducted at home, China's government makes it hard for outsiders to inspect. A gaggle of fraud-hunters like Citron and Muddy Waters, which outed Luckin, claimed numerous scalps after the first wave of such listings a decade ago. This time they are looking beyond China.

Blue Orca Capital, an Asia-focused fund targeting corporate "zeros", expects opportunities to pop up in other emerging markets, Europe and America. "My entire career has been in a bull market," says its founder, Soren Aandahl. "This is exciting." Mr Aandahl is eyeing any firms with discrepancies between the amount of capital they need to raise and the cash their accounts say they are generating. Others are focusing on industries hit hardest by the pandemic, such as travel, entertainment and property.

Only a small minority of firms resort to outright fraud. Far more prettify profit-and-loss statements with accounting wheezes that fall in a grey area. This accounts for much of what John Kenneth Galbraith, an economist, called "the bezzle" and "psychic wealth": gains that appear real but prove illusory.

In the bull market startups became masters of conjuring up novel metrics that flatter performance. WeWork's "community-adjusted" earnings before interest, taxes, depreciation and amortisation (EBITDA) transformed a hefty

loss for 2018 under Generally Accepted Accounting Principles (GAAP) into a profit. Illegal? No. A red flag? Absolutely. Many investors turned a blind eye because they bought into what Mr Aandahl calls “the myth in the shareholder list”: all would be well if other high-profile backers were on board (as with Luckin).

Non-GAAP adjustments have spread like wildfire through corporate accounts, making it harder to discern what numbers reflect a firm’s true financial position. The average number of non-GAAP measures used in filings by companies in the S&P 500 index has increased from 2.5 to 7.5 in the past 20 years, according to PwC, a consultancy. In credit agreements analysed by Zion Research Group, the definition of EBITDA ranges from 75 words to over 2,200. GAAP is far from perfect, but some of the divergence from it has clearly been designed to pull wool over investors’ eyes. One study found that non-GAAP profits were, on average, 15% higher than GAAP profits.

Playing around with earnings and revenue-recognition metrics is this generation’s equivalent of dotcoms using bots and other tricks to boost “eyeballs” 20 years ago, says Jules Kroll of K2 Intelligence, the doyen of corporate sleuths. “When an area is hot to the point of overheated, there is a growing temptation to juice the numbers.” In an ominous sign, SoftBank, a Japanese technology conglomerate which bet big on WeWork and dozens of other startups, said last month that it expects an operating loss of ¥1.4trn (\$12.5bn) in its last fiscal year.

Besides exposing old schemes, the pandemic is likely to give rise to new ones. When economic survival is threatened, the line separating what is acceptable and unacceptable when booking revenues or making market disclosures can be blurred. Mr Kroll reckons that “amid such massive dislocation, some will inevitably cheat.”

Bruce Dorris, head of the Association of Certified Fraud Examiners, the world's largest anti-fraud outfit, says the effects of covid-19 look like "a perfect storm for fraud". It may engender everything from iffy accounting to stimulus-linked scams as thousands of firms—including bogus applicants—hustle for help. One fraud investigator points to private-equity-owned firms as potential targets. "There are lots of them, they are highly leveraged and they may not qualify for bail-outs because they have deep-pocketed sponsors," he says. That increases the temptation to resort to unseemly practices. The ebbing tide is likely to reveal plenty of corporate nudity. That will not stop some businesses from taking up naturism. ■



企业舞弊

谁的泳裤掉了？

这场危机将让十年来风行的企业造假和激进会计操作暴露无遗【新冠报道】

当伯尼·麦道夫（Bernie Madoff）在2008年12月承认自己制造了一起650亿美元的旁氏骗局时，他并不是出于愧疚。他知道游戏玩完了。三个月前，雷曼兄弟破产。市场崩盘导致客户吵嚷着要撤资，他的基金已经被掏空，即使还有许多投资者没得到偿付。美国监管机构几年前就接到过举报，却没有发现这宗骗局。让麦道夫完蛋的不是监管机构，而是经济衰退。

经济繁荣帮助欺诈者掩盖了诸如虚假投资回报、夸大销售额等各种账目问题。经济衰退扒掉了这层遮羞布。纽约大学的会计学教授巴鲁克·勒夫（Baruch Lev）说：“年景好的时候，所有人看上去都不错，你若跟不上形势，市场会狠狠罚你。”过去20年里，许多重大的假账丑闻都是在衰退期曝光。在2007至2009年金融危机爆发的十年前，互联网泡沫破裂让安然（Enron）和世通（WorldCom）在上世纪90年代末经济繁荣期的会计造假行为浮出水面。不久后两家公司双双破产。正如备受尊崇的投资家沃伦·巴菲特所说的：“只有退潮时才知道谁在裸泳。”这次，一场大流行病让潮水以创纪录的速度退去。

| 浮出水面

不少人的泳衣本已破烂不堪——借贷无度已经让很多公司的资产负债表不堪重负。一些肮脏的秘密勾当开始浮出水面。比如瑞幸咖啡，它在中国飞速扩张，欲与星巴克一争高下，吸引了贝莱德集团（BlackRock）和新加坡主权财富基金等著名投资者。4月2日，面对有关它的首席运营官和其他员工可能伪造了20多亿元（2.8亿美元）销售额的指控，这家在纳斯达克上市的中国连锁企业声称自己正在进行内部调查。4月14日，沽空机构香橼（Citron Research）指控在纽约上市的中国在线培训公司“跟谁学”夸大了去年的销售额。跟谁学在一份声明中否认了这些指控，并称香橼的报告

具有误导性，“充满了主观恶意”。

这些揭露事件让人们再度开始担忧在海外上市的中国企业的治理是否可靠。这些企业的审计在中国国内完成，中国政府让外界很难从旁查核。10年前第一波这样的上市潮之后，一些打假公司收获颇丰，比如香橼，还有揭露了瑞幸的浑水（Muddy Waters）。这一次，它们搜寻的目光投向了中国以外的地方。

杀人鲸资本（Blue Orca Capital）是一家专注于亚洲的基金，主要针对企业的“零息债券”。它预期机会将在其他新兴市场、欧洲和美国出现。“我的整个职业生涯都处于牛市，”创始人索伦·安达尔（Soren Aandahl）说，“眼下真令人兴奋。”现在，只要哪家公司需要募集的资金与它账目显示的收入之间有出入，那它就是安达尔的目标。其他打假公司则把重点放在受这场大流行病打击最为严重的行业，比如旅游、娱乐和房地产等。

明目张胆造假的公司只是少数。绝大多数公司是用一些属于灰色地带的会计把戏来美化自己的损益表。这种做法基本上就是经济学家约翰·肯尼斯·加尔布雷思（John Kenneth Galbraith）所说的“占款”（the bezzle）和“心理财富”：看似真实、实则虚幻的收益。

在牛市中，创业公司成了编造各种新奇指标来美化业绩的高手。如果按照公认会计准则（GAAP），WeWork在2018年严重亏损，而它却通过“社区调整后”EBITDA（扣除利息、税项、折旧及摊销前的盈利）把亏损变成了盈利。这违法吗？没有。是危险信号吗？绝对是。很多投资者对此视而不见，因为他们押注的是安达尔所说的“股东名单神话”，即如果其他知名投资者也在董事会里（就像瑞幸那样），那么一切都会安然无恙。

非GAAP调整已经如野火般在公司账目中蔓延，这让人们更加难以辨别哪些数字反映了公司真实的财务状况。咨询公司普华永道的数据显示，在过去20年里，标准普尔500指数公司在财报中使用的非GAAP指标的平均数已经从2.5增加到了7.5。在Zion Research Group分析的信贷协定中，EBITDA的释义从75个词到2200多个词不等。GAAP还远不够完美，但与之相左的

一些做法显然是用来蒙蔽投资者的。一项研究发现，非GAAP方法下的利润比GAAP平均高出15%。

企业侦探界的鼻祖K2 Intelligence的朱尔斯·克罗尔（Jules Kroll）表示，20年前互联网公司利用自动程序和其他花招来赚“眼球”，而现在这一代人则在收益和收入确认指标上动手脚。“当一个地区的经济增长过热时，给数据注水的诱惑力就会增大。”上个月，在WeWork和其他几十家创业公司押下重注的日本科技集团软银表示，预计上一财年的营运亏损将达到1.4万亿日元（125亿美元），这是个不祥之兆。

除了让老把戏大白于天下，这场大流行病很可能催生出新骗局。当面临生死存亡，在收入记账或向市场披露信息时可接受的做法和不可接受的做法之间的界限会变得模糊。克罗尔认为：“在如此大规模的混乱中，一些公司必然会造假。”

全球最大的反欺诈机构美国注册舞弊检查师协会（Association of Certified Fraud Examiners）的负责人布鲁斯·多里斯（Bruce Dorris）表示，新冠肺炎的影响看上去像“一场欺诈的完美风暴”。当成千上万的公司——其中不乏假冒的申请者——争相申请援助时，可能会引发从可疑账目到与经济刺激政策相关的造假等各种各样的问题。一位反造假调查人员指出，私募股权持有的公司是潜在的调查对象。“它们数量众多，杠杆率高，而且因为有财大气粗的投资者，可能不符合救济条件。”他表示。这更会诱使它们去走歪门邪道。潮水逐渐退去，很多裸泳的企业很可能会原形毕露。但这并不会阻止一些企业加入裸泳大军。 ■



Risk parity

Under the weather

How a popular investment strategy unravelled

“THE PANDEMIC was a strange beast that I didn’t have an edge wrestling with,” says Ray Dalio, founder of Bridgewater Associates, the world’s largest hedge fund, explaining his losses in the first quarter. For years Bridgewater’s famed risk-parity strategy produced high returns for low risk, and was widely adopted by others. But things soured when covid-19 hit. Mr Dalio reported losses of 7-21% across his funds in the first quarter, his biggest since late 2008.

Bridgewater created the first risk-parity portfolio in 1996, when it launched its All Weather fund. It was intended to be insulated from market-wide shocks. A typical way to do this is to balance holdings of relatively volatile stocks with government bonds—in times of market stress bonds usually rise in value, offsetting losses from stocks. But that means less exposure to equities, which tend to have higher returns. Bridgewater’s innovation was to keep a high allocation of stocks, but to borrow to buy safe long-dated bonds. If the long-dated interest rate is higher than the borrowing rate, as has generally been the case, this raises the total return on the portfolio, without adding extra risk.

The strategy’s success led others to follow. Assets allocated to the strategy probably exceeded \$1trn in March, according to David Zervos of Jefferies, an investment bank. Risk parity’s outperformance during the global financial crisis was its making. The average annual return in the S&P risk-parity index in 2006-10 was 8%; by contrast, the S&P 500 equity index made nothing.

At first risk parity fared well during the corona-crisis. Between January 1st

and March 13th the MSCI world share-price index fell by 20%. Safe assets were in high demand. In America the yield on the ten-year Treasury, which moves inversely to the price, dipped to a record low of 0.3% on March 9th. But then bond and share prices began to fall in tandem. Faced with an intense cash crunch, some investors sold their holdings of even liquid assets such as Treasuries. Risk-parity portfolios plunged in value.

With yields on Treasuries still low, proponents of risk parity are on the lookout for other ways to hedge risk. Mr Dalio reckons that government borrowing undertaken to support the economy during the pandemic will stoke inflation, making bonds less attractive to hold. Mr Zervos argues that investment-grade corporate bonds, which offer a return that is around two percentage points higher than government bonds, could be a substitute. The search for a new way to outperform begins. ■



风险平价

未能全天候

一个流行的投资策略如何崩塌了【新冠报道】

“大流行病是一头怪兽，我和它搏斗没有胜算。”桥水基金的创始人瑞·达利欧（Ray Dalio）这样解释今年第一季度的亏损。多年来，这家全球最大的对冲基金著名的风险平价策略以低风险赚得高回报，被其他人广泛采用。但当新冠肺炎爆发时，事情变了。达利欧公布其基金在第一季度亏损7%到21%不等，是自2008年底以来最大的跌幅。

桥水于1996年推出了全天候（All Weather）基金，创建了首个风险平价投资组合。其理念是避免受到整体市场的冲击。典型的操作方法是使用政府债券来平衡波动性较大的股票，因为在市场承压时债券的价值通常会上涨，从而抵消股票的损失。但这意味着投资组合中的股票敞口较低，而股票往往会获得更高的回报。桥水的创新是保持高股票配比，但要借钱购买安全的长期债券。如果长期利率高于借款利率（通常都是如此），则可以提高投资组合的总收益而不会增加额外的风险。

该策略的成功导致其他人纷纷效仿。投资银行杰富瑞（Jefferies）的戴维·泽沃斯（David Zervos）称，3月份按照这一策略配置的资产可能超过1万亿美元。风险平价在全球金融危机期间表现出众，成就了自身。在2006到2010年，标普风险平价指数的平均年回报率为8%，相比之下标普500指数一分钱都没挣到。

新冠危机期间，风险平价一开始表现良好。1月1日至3月13日，MSCI全球股价指数下跌了20%。对安全资产的需求很大。在美国，十年期美国国债的收益率（与价格成反比）在3月9日降至0.3%的历史低点。但随后债券和股票价格开始交替下跌。面对严重的现金短缺，一些投资者甚至出售了他们持有的流动资产，如美国国债。风险平价投资组合的价值暴跌。

目前美国国债的收益率仍然很低，风险平价的支持者正在寻找其他对冲风

险的方法。达利欧认为，在大流行病期间政府为支持经济而举债会引发通货膨胀，使持有债券的吸引力降低。泽沃斯认为，投资级公司债券的回报率比政府债券高约两个百分点，或可作为替代品。对新的优胜投资方式的探寻开始了。■



Hedge funds

Back in the game

Once the kings of capital markets, hedge funds have become a sideshow. Now many hedgies hope the slump will make them relevant again

HEDGE FUNDS have had a rotten decade. Star managers were once perceived to be infallible “masters of the universe” who made money for wealthy individuals and big institutional investors in both good times and bad. But steep losses during the global financial crisis of 2007-09 tarnished that reputation, and subsequent returns have failed to resurrect past success. The result has been a humbling comedown. Many of the hedge-fund industry’s biggest names—like Leon Cooperman, who ran Omega Advisors, and Eric Mindich, once the youngest-ever partner at Goldman Sachs—have thrown in the towel, returned investors’ capital and converted their hedge funds into family offices.

These woes have been exacerbated by seismic shifts in the allocation of capital. As hedge-fund profits wilted, institutional investors—such as pension funds and university endowments, which make up the bulk of hedge funds’ clientele—saw little reason to pay meaty fees for mediocre performance. Investors turned to cheap index funds instead, or sought out the juicier returns dangled by private-equity and property funds. Having managed more capital than their private-equity peers for much of the past decade, by 2019 the hedge-fund industry was a fifth smaller than private equity (see chart 1). Index funds, or “passive” investors, have eclipsed both. The Bank for International Settlements, a club of central banks, estimates that almost half of the roughly \$30trn invested in American equities is now passively managed.

Hedge-fund managers have long warned that these trends in investment allocation might pan out poorly for investors in a crisis. The financial-

market chaos wrought by the pandemic has tested that claim, and hedge funds have been vindicated, though only partially. They have not made big gains. And they have experienced outflows: figures released by Hedge Fund Research on April 22nd suggest that these amounted to 1% of assets under management in the first quarter. Still, they have, so far, lost less than the market. And there are early signs that the crisis could benefit the industry in the longer term, if it causes investors to appreciate the benefits of hedging their equity exposure, and to shift away from illiquid assets.

How you think hedge funds have performed during the market turmoil depends on how stern a test you apply. If you think their purpose is to make steady returns, regardless of how markets fare, then most have failed. On average, the value of their portfolios has fallen by 10.5% (see chart 2). But they have at least beaten the market: the S&P 500 fell by 20% in the first three months of the year. True, average annualised returns of the S&P 500 in the past five years, at 4.6%, still beat those of the average hedge fund, at 3%. But the goal for most institutional investors is not to achieve the juiciest returns; it is to generate good returns that are steady and low-risk. If hedge funds beat the market during times of stress, they become a source of portfolio diversification that is useful to endowments and pension schemes.

By and large, machines have done better than humans. Around a third of hedge-fund assets are managed in so-called “systematic” funds, which write investment rules based on historical-data analysis and use algorithms to execute trades. On average, these have done best: systematic investors have seen the value of their assets slip by only 2.1% this year. The Medallion fund, the flagship fund run by Renaissance Technologies and set up by Jim Simons in 1988, was up by 24% in March. By contrast, discretionary funds, which are run by human managers picking and choosing trades, are down by 12.7%.

Systematic-fund managers offer a few explanations for their better relative performance. Carter Lyons of Two Sigma, one such fund, claims that systematic investments have done well because they can diversify more. “A systematic fund may take several thousand positions, whereas a discretionary manager may only have 100.” That helps keep systematic portfolios’ losses down when markets are tumbling. Others claim that consistency has helped. “The great thing about systematic processes is that they stick to their knitting,” says Luke Ellis, the chief executive of Man Group, the third-biggest hedge-fund manager in the world. Some of its discretionary funds have done well, but its best performing ones have been systematic.

Some bets have come off better than others. Macro strategies, which place bets on economic developments, have fared best on average, down just 2%. But Bridgewater Associates, a big macro fund, has done poorly, brought down by its risk-parity strategy.

At the bottom of the heap are activist funds, which buy stakes in companies in the hope of changing their strategies or management. These were down 16.8% on average at the end of March. Activists may have suffered as a result of loading up on shares at lofty valuations earlier in the year. According to Lazard, an investment bank, activists deployed \$2.8bn of capital per week in February. With corporate deals off the table and shareholder meetings postponed, they might spy fewer opportunities to take on company bosses.

Varied though their performance has been, hedge funds still look appealing when compared with many private-equity funds. The pandemic seems likely to pose the most financial danger to highly leveraged businesses—precisely the type of firm that private-equity funds tend to invest in. Buy-out firms themselves do not disclose returns, but some of their investors—like banks—must. Last month one of America’s largest

lenders admitted to writing down its private-equity investments by 20% in the first quarter.

Another drawback of private equity may prove to be its illiquidity. Pension funds and university endowments have outgoings that are more or less fixed. Stable cash flows in normal times meant that they became more comfortable with illiquid assets. Few will be prepared for a situation in which the economy is shuttered and pension contributions and tuition payments dry up. Large institutional investors might face an unprecedented need for cash.

It is still too soon to know which funds will navigate the crisis best, let alone how the pandemic will reshape investment decisions in the longer term. “Returns in March will end up being just one piece of the puzzle,” says Mr Ellis. Many investors claim they are using the turmoil to make long-term bets that may not have lifted returns yet. But the early signs are that hedge funds might not come out too badly. The pendulum seems likely to swing back towards holding liquid assets, and hedge funds appear to be doing well enough that they might benefit from the reallocation.

If hedge funds were once a flashy way to generate extra returns for rich individuals, they have since become more pedestrian—reliable sources of diversification for big institutional investors. In turbulent times, perhaps that is enough. ■



对冲基金

东山再起

曾经是资本市场之王的对冲基金已经沦为配角。现在，许多对冲基金希望暴跌能让它们再显价值

对冲基金经历了糟糕的十年。明星经理曾经被认为是战无不胜的“宇宙之主”，无论年景好坏都能为富人和大型机构投资者赚钱。但是，在2007至2009年全球金融危机期间发生的巨额亏损败坏了这种声誉，之后的回报也未能使重现过去的成功。其结果是令人沮丧的没落。行业里的许多最知名人士，例如经营欧米茄顾问公司（Omega Advisors）的利昂·库珀曼（Leon Cooperman），还有曾是高盛有史以来最年轻合伙人的埃里克·明迪奇（Eric Mindich）都已经洗手不干，将资本返还给投资者，并将他们的对冲基金转变为家族办公室。

资本配置的剧烈变化加剧了这些困境。随着对冲基金利润的萎缩，对冲基金的主要客户群——养老基金和大学捐赠基金等机构投资者——几乎看不到理由为平庸的业绩支付高额费用。投资者转向廉价指数基金，或寻求私募股权和房地产基金承诺的更丰厚收益。在过去十年的大部分时间里，对冲基金行业管理的资金规模都超过了私募股权机构，但到2019年，其规模已比私募股权小了五分之一（见图1）。指数基金（或“被动”投资者）让两者都黯然失色。据央行俱乐部国际清算银行估计，目前投资于美国股票的大约30万亿美元中，有近一半是被动管理的。

对冲基金经理一直以来警告说，投资配置的这些趋势在危机期间可能对投资者不利。疫病大流行造成的金融市场混乱已经证实了这一说法，而对冲基金则证明了自己——尽管只是在一定程度上。它们也没有取得重大收益，而且还经历了资金外流：对冲基金研究公司（Hedge Fund Research）4月22日发布的数据表明，外流资金占第一季度管理资产的1%。然而到目前为止，它们的损失仍少于市场。而且，有早期迹象表明，如果这场危机令投资者意识到对冲股票敞口并远离非流动资产的好处，那么从长远来看可以使该行业受益。

如何评价市场动荡期间对冲基金的表现，取决于采用多严苛的测试。如果你认为它们的目标是不论市场整体情况如何都要取得稳定的回报，那么它们大多数都失败了。平均而言，其投资组合的价值下降了10.5%（见图2）。但它们至少打败了市场：标普500指数在今年前三个月下跌了20%。诚然，标普500指数在过去五年中的平均年化回报率是4.6%，仍然击败了对冲基金的平均3%。但是，大多数机构投资者的目标不是获得最大的收益，而是产生稳定而低风险的良好回报。如果对冲基金在压力时期击败了市场，它们就成为了投资组合多元化的一个来源，这对捐赠基金和养老金计划很有用。

总的来说，机器比人的表现好。对冲基金资产中约有三分之一由所谓的“系统化”基金管理，这些基金根据历史数据分析编写投资规则，并使用算法执行交易。平均而言，它们的表现最好：系统化投资者今年的资产价值仅下降了2.1%。大奖章基金（The Medallion Fund）是由文艺复兴科技公司（Renaissance Technologies）管理的旗舰基金，由吉姆·西蒙斯（Jim Simons）于1988年创立，到3月增长了24%。相比之下，由人类经理选择交易的全权委托基金下跌了12.7%。

系统性基金经理就其相对较好的表现给出了一些解释。双西格玛（Two Sigma）就是此类基金之一，该公司的卡特·里昂（Carter Lyons）称，系统性投资之所以表现不错，是因为它们可以更好地分散投资。“系统性基金可以持有几千个头寸，而全权委托经理可能只有一百个。”当市场动荡时，这有助于降低系统性投资组合的损失。其他人则称一致性有所帮助。“系统性流程的优势在于它们坚持规则。”全球第三大对冲基金经理曼集团（Man Group）首席执行官卢克·埃利斯（Luke Ellis）说。该公司的一些全权委托基金业绩不错，但表现最好的是系统性基金。

有些下注方式比其他的更好。平均来看，押注经济发展的宏观策略表现最好，仅下跌了2%。但大型宏观基金桥水基金（Bridgewater Associates）因受到其风险平价策略的拖累而表现不佳。

表现最差的是维权基金，它们购买公司的股份，以期改变其战略或管理。

这些基金到3月底平均下跌了16.8%。这可能是因为它们在今年早些时候以高昂的估值购入股票。据投资银行拉扎德（Lazard）称，维权基金在2月每周配置了28亿美元的资本。随着公司取消交易并推迟股东大会，它们能挑战公司老板的机会更少了。

尽管业绩参差不齐，但与许多私募股权基金相比，对冲基金仍然具有吸引力。疾病大流行似乎可能对高杠杆业务构成最大的财务风险——而这正是私募股权基金倾向于投资的公司类型。收购型公司本身并不披露回报，但它们的一些投资者（如银行）必须披露。上月，美国最大的贷款机构之一承认在第一季度将其私募股权投资减记了20%。

私募股权的另一个缺点可能是流动性不足。养老基金和大学捐赠基金的支出大体上是固定的。正常时期稳定的现金流使得它们更能够接受流动性较差的资产。没有几家基金会对经济停滞、养老金和学费枯竭的情况有所准备。大型机构投资者可能面临前所未有的现金需求。

要判断哪种基金能最好地度过危机还为时过早，更不用说大流行病在长期会如何重塑投资决策了。埃利斯说：“到头来，3月份的回报只是拼图中的一片罢了。”许多投资者称自己正利用此次动荡来做一些长期押注，到目前为止可能还没能提升回报。不过早期迹象表明，对冲基金的表现可能不会太糟糕。钟摆似乎很可能再度转向持有流动资产，对冲基金的表现似乎足够好，可能会从资金再分配中受益。

如果说对冲基金曾经是为富人创造额外回报的一种花哨的方式，它们如今已变得更加平平无奇——成了大型机构投资者多元化投资的可靠来源。在动荡年代，也许这就足够了。■



The Economist film

Are we losing our sex drive?

People in Nigeria, Mexico and India are the most sexually satisfied according to one study. But in some parts of the world people are actually losing their sex drive.



经济学人视频

人类在失去“性趣”吗？

研究发现，尼日利亚、墨西哥和印度人“性福”指数最高，但其他许多地方的人们正在失去性驱动力。



Global scourges

The famished

For all its eccentricities, Martín Caparrós's new book powerfully captures their plight

DUNCAN GREEN, an in-house thinker at Oxfam, a charity, and an academic at the London School of Economics, makes an intriguing observation. Often, he notes, a person's views about poverty and development are shaped by the first region of the developing world that he or she gets to know. Those who begin by studying Africa tend to have strong views on foreign aid (whether for or against) and are obsessed with the quality of government. Those who learned first about east Asia tend to focus on economic growth. And those whose first experience is in Latin America are preoccupied with justice and power.

Martín Caparrós is an Argentinian journalist and novelist whose book, "Hunger", has already appeared in French, German and Spanish. It has now been updated and translated into English. The book introduces English-speaking readers to a Latin American perspective on poverty. But "Hunger" is also highly idiosyncratic—a peculiar, often perplexing tour through some of the world's most desperate places, interspersed with muddled ranting. It is an off-putting, infuriating book that nonetheless gets one big thing right.

The best parts of the book are the sections in which Mr Caparrós interviews hungry people. He hangs out with a woman who scavenges a rubbish tip in Argentina, with an Indian widow who has been left to die in a holy city and with a peasant farmer in Niger who keeps glancing at his chunky digital watch. He asks stupid questions, as good journalists do, and gets answers that reveal much about how extremely poor people think.

Why, the author asks, is an Indian mother taking her malnourished daughter out of the hospital before she has recovered? Because, the mother

explains, her sister-in-law has fallen ill, and she must look after the household. What would a poor woman in South Sudan eat, if she could eat anything? Walwal, she replies—a kind of sorghum porridge. But suppose you could have meat or fish, Mr Caparrós presses. No: she would eat walwal.

“Hunger” is also a political book. Mr Caparrós believes that people go hungry chiefly because the powerful behave in unjust ways. He is against multinational agribusiness firms such as Cargill (though not against crop science), and implies that trade is a major cause of high food prices. He thinks little of humanitarian or development aid, and describes welfare as “a way of maintaining poverty” because it keeps the poor from rebelling. Much of this is nonsense, and it is not even clear that the author believes it. He has travelled too widely and interviewed too many people to hold fast to simple explanations.

Strangest of all are the chapters in which Mr Caparrós steps back to address the reader and his own conscience. More than once he poses the question: “How the hell do we manage to live knowing these things?” Sometimes he seems to be fighting an internal battle, in which his desire for justice pushes against his feelings of despair and horror about the lives of the poorest: “I’ve got enough problems without going around thinking about those poor bastards in Africa or Kolkata or those places I don’t even...” At such moments the book seems not just Latin American but distinctively Argentinian. Few countries are so thick with psychoanalysts.

The great thing about “Hunger” is its relentlessness. Most books about poverty (indeed, most articles in *The Economist* about poverty) introduce the reader to the poor, then pull back into dispassionate consideration of agricultural productivity, social safety-nets, credit constraints and the like. All that policy talk is fine, but it is not how extremely poor people think about their lives. Deep poverty and hunger often make no sense to those

who suffer those things, except perhaps as evidence of God's will. Misfortune simply hit them, when the rains failed, when a husband vanished or a child fell ill. Mr Caparrós holds you there, in the unsettling presence of the desperate, and forces you to listen to them. ■



全球苦难

饥民

马丁·卡帕罗斯的新书虽古怪，却有力地捕捉到饥民的困境【《饥饿：最古老的问题》书评】

英国慈善机构乐施会（Oxfam）的内部顾问、伦敦政治经济学院的学者邓肯·格林（Duncan Green）发现了一个有趣的现象。他指出，人们对贫困与发展的看法往往是由自己了解的第一个发展中地区所塑造的。那些一开始研究非洲的人对外国援助有强烈的看法（无论赞成或反对），而且执着于政府的素质。以研究东亚起步的人倾向聚焦经济增长。而先接触拉丁美洲的人则满脑子都是公正与权力的问题。

马丁·卡帕罗斯（Martín Caparrós）是阿根廷人、新闻工作者、小说家。他的著作《饥饿：最古老的问题》（Hunger: The Oldest Problem）此前已经出版了法语、德语和西班牙语版，目前做了修订并译成英文。这本书向英语读者展现了一种拉美视角的贫困观。但这本书也极为特立独行——它穿行于世界上一些生存条件最恶劣的地方，过程离奇古怪，常常令人困惑，还夹杂着混乱的怒骂。这是一本会让人不适甚至大为光火的书，不过它还是有一个重要的可取之处。

这本书最精彩的部分是卡帕罗斯对饥民的采访。他的访谈对象包括一个在阿根廷的垃圾场里拾荒的女人、一个被遗弃在一座圣城里等死的印度寡妇，还有一个尼日尔农民（他一直盯着卡帕罗斯那块厚重的数字手表）。像优秀记者都会干的那样，他问了一些蠢问题，得到的答案却有力地揭示出极度贫困的人们的想法。

卡帕罗斯问，为什么一个印度母亲不等自己营养不良的女儿康复，就带她离开了医院？那位母亲解释说，因为嫂子病了，她必须回去照料家人。他又问南苏丹的一个贫穷妇女，如果什么都能吃到，她想吃什么？她回答说walwal（一种高粱粥）。卡帕罗斯再问，但如果能吃到肉或鱼呢？不要，她说，就要吃walwal。

《饥饿》也是一本表达政见的书。卡帕罗斯认为，人们之所以挨饿，主要是因为权贵群体行事不公。他反对美国嘉吉（Cargill）这类跨国农业企业（却并不反对农作物科学），并暗示贸易是粮价高企的主因。他不屑人道主义或发展援助，认为福利只是“一种维持贫困的方式”，因为这样可以防止穷人造反。这大部分都是胡说八道，甚至也看不明白作者是否真的深信不疑。以他走访范围之广、采访人数之多，不大可能会认定如此简单的解释。

最奇怪的是卡帕罗斯退回到自身、向读者发问和扪心自问的那些章节。他不止一次提出这个问题：“我们他妈的怎么能明知这些事存在，还能活得下去？”有时他仿佛陷入了自我挣扎，他对公正的渴望与他对赤贫人群生活状况的绝望与恐惧相抵触：“我面对的问题已经够多了，都不用跑去考虑非洲或加尔各答或者其他我甚至都没.....的地方的可怜虫。”在这些时候，这本书似乎不仅仅是拉美视角了，而是独具一格的阿根廷视角。很少有哪个国家有这么多心理分析学家。

《饥饿》的一大优点是它的残酷。大多数有关贫困的书（当然还有本刊有关贫困的大多数文章）都会向读者介绍穷人的生活，然后又回到对农业生产率、社会保障网、信贷限制等问题的冷静思索。所有这些政策讨论都很好，但却并不是赤贫人群看待自己生活的方式。对遭受这些苦难的人来说，赤贫和饥饿除了有可能是上帝旨意的证明外，往往没有什么可以理解的意义。久旱无雨、丈夫突然消失、孩子生病——这些纯粹就是不幸降临。卡帕罗斯按住你，让你不安地直面那些绝望的人，强迫你去倾听他们的声音。■



Buttonwood

Stacked and whacked

Why a lot of startups will come to regret their unicorn status

IN JULY 2006 Yahoo, a faded internet giant, offered to buy Facebook, then a fledgling, for \$1bn. Billion-dollar offers for startups were then quite rare. “I thought we should at least consider it,” recalls Peter Thiel, an early Facebook backer, in his book, “Zero to One”. The initial reaction of Mark Zuckerberg, its founder, was firmly to say no. “This is just a formality,” he told his board. “We’re obviously not going to sell here.”

Entrepreneurs are supremely confident about their eventual success. They have to be. Startups usually fail; in the vernacular of Silicon Valley, they have a high “kill rate”. It takes unusual self-belief to even set up. Mr Zuckerberg’s was vindicated in spades. Until recently investors were tripping over themselves to throw money at would-be Zucks. Founders were willing to cede certain protections to their venture-capital (VC) backers to get a billion-dollar valuation. They will now regret it. They are, in effect, sitting under a mountain of debt-like claims on their companies.

Take the case of an imaginary startup. WeWhack is a tech platform that connects people who carry grudges to contract killers. (In a bull market for VC, the legal and moral concerns about the business model are dismissed as so much naysaying.) The founder, Mr Soprano, owns all of its common stock. An early-stage VC firm, called Seedy, gives him \$20m in exchange for a 20% stake. Mr Soprano can boast that his company is worth \$100m, the “post-money” valuation. This is the figure quoted in newspapers and trade magazines.

But in reality it is worth less. VC backers such as Seedy typically receive convertible preferred stock. This is a security that is specific to venture

capital, says Jean-Noel Barrot of HEC Paris, a business school. “Convertible” means the security converts into common stock at “exit” ie, when the company is either sold to a bigger company or is listed on the stock exchange. “Preferred” means the backer will be paid back before common stockholders: it has liquidation preference. If, in our hypothetical case, the exit value is between \$0 and \$20m, Seedy gets everything. If it is between \$20m and \$100m, the VC gets \$20m and Mr Soprano gets the rest. Only if the exit value is above \$100m will both parties be paid in proportion to their shareholding.

Were Seedy granted common stock, Mr Soprano could in principle immediately sell WeWhack for \$20m (the value of its cash holdings), pocket \$16m (his 80% share) and return the rest to Seedy. Preferred stock is a disciplining device. It encourages the founder to use the \$20m to create a firm that is worth a lot more.

Things become more complex as the business matures. Mr Soprano decides to sell a further 20% of WeWhack to fund its global expansion. There is lots of interest from VC firms. The highest bid comes from SoftMoney. It is willing to pay \$150m for senior preferred convertible stock, meaning it is first in the queue at the exit, ahead of Mr Soprano and Seedy. The post-money valuation is \$750m.

But Mr Soprano wants to be the founder of a unicorn, a startup valued at \$1bn or more. SoftMoney says it will pay \$200m, for a post-money valuation of \$1bn, if it gets greater protection should things go wrong. It is granted two times liquidation preference: an assurance that it will make back its \$200m twice over. WeWhack’s exit price must reach \$400m before anyone else makes a cent. But Mr Soprano is fine with that. He is confident that his business is worth billions.

A good early-stage investment partner will advise founders not to go for a

headline valuation if it comes with such terms, says Richard Wong, of Accel, a VC firm. They don't always listen. After many funding rounds, a venture-backed company might have half a dozen layers in its capital stack, each with its own protections and voting rights.

When funds are raised at lofty values, it can create misalignment later on between founders, early-stage VCs and late-stage investors, says Simon Levene of Mosaic, a London-based VC firm. A founder sitting under a mountain of preference stock is like the manager of an over-indebted firm. In a bear market, his stake is probably worthless. So why not blow the company's remaining cash on perks, take undue business risks ("gamble for redemption") or simply give up? He may use his voting rights to stymie an exit for other investors. It can get messy.

Everyone can be a dreamer in a buoyant market. The kill rate is low. But when trouble strikes, it reverts to the mean—and, as a VC bigwig puts it, "a lot of things get whacked." ■



梧桐

压垮

为什么很多创业公司到头来都会后悔做独角兽

二〇〇六年七月，日渐式微的互联网巨头雅虎提出以10亿美元收购当时羽翼未丰的Facebook。对创业公司来说，10亿美元的出价在当时非常罕见。“我认为我们至少应该考虑一下。”Facebook早期的投资人彼得·蒂尔（Peter Thiel）在他的著述《从0到1》（Zero to One）中回忆道。而创始人扎克伯格最初的反应却是断然拒绝。“这只是走个过场，”他在董事会上表示，“我们显然不会把公司卖掉。”

创业者坚信自己最终一定能成功。他们必须这样。创业公司常以倒闭告终——用硅谷的行话来说“杀灭率”很高。甚至一开始创办公司就需要有超凡的自信。事实证明扎克伯格那种自信是对的。直到最近，投资者还在争先恐后地要把钱投给“下一个小扎”。过去，创始人为了获得10亿美元的估值，愿意向风险投资者出让某些权益保护。他们现在会后悔当初这么做。因为这实际上让公司背负了大量类似债务的权益要求。

以一家虚构的创业公司为例。WeWhack是一个为寻仇者和职业杀手牵线搭桥的技术平台。（在风投的繁荣期，对这一商业模式的法律和道德顾虑被视为过于消极负面而不予理会。）创始人索普拉诺（Soprano）拥有公司全部普通股。一家名为Seedy的早期风投公司向他投资2000万美元以获得公司20%的股份。于是索普拉诺便可以夸耀自己的公司价值一亿美元，即“投资后”估值。这是报纸和行业杂志会引用的数字。

但实际上公司不值这么多钱。Seedy等风险投资者通常得到的是可转换优先股。这是专为风险投资提供的一种股份，巴黎高等商学院的让-诺埃尔·巴罗（Jean-Noel Barrot）表示。“可转换”是指在“退出”时（即公司要么被大公司收购，要么在股票交易所上市），股份可以转换成普通股。“优先”是指投资者有清算优先权，能先于普通股的股东获得偿付。在我们假设的例子中，如果退出价值在0到2000万美元之间，那么所有的钱都归

Seedy。如果退出价值在2000万到一亿美元之间，那么Seedy得2000万美元，其余归索普拉诺。只有当退出价值超过一亿美元时，双方才会按持股比例分配资金。

如果Seedy获得的是普通股，索普拉诺原则上可以立即以2000万美元（公司持有现金的价值）的价格将WeWhack出售，然后把1600万美元（其持有的80%的股份）收入囊中，把剩下的400万美元还给Seedy。优先股是一种约束手段。它鼓励创始人用这2000万美元去打造一家价值远远超出这个数额的公司。

随着公司趋于成熟，事情会变得更加复杂。索普拉诺决定再出售20%的WeWhack股份，为其全球扩张提供资金。多家风投公司都很感兴趣。其中SoftMoney出价最高。它愿意花1.5亿美元获得高级可转换优先股，这意味着退出时它位列第一，排在索普拉诺和Seedy的前面。现在公司的投资后估值为7.5亿美元。

但索普拉诺想成为独角兽（估值为10亿美元或以上的创业公司）的创始人。SoftMoney表示，它可以支付2亿美元以让公司获得10亿美元的投资后估值，条件是万一公司出现问题，它能得到更多的权益保护。它获得了两倍优先清算权，即保证能拿回两倍于自己2亿美元投资的钱。这样一来，如果WeWhack的退出价格达不到4亿美元，其他人就别想拿回一分钱。但索普拉诺觉得这可以接受。他相信自己的企业价值几十亿美元。

风投公司Accel的王献华指出，如果投资协议中有这样的条款，好的早期投资伙伴会建议创始人不要一味追求夺人眼球的估值。但他们并不总能听得进去。经过多轮融资后，公司的资本堆栈可能有六七层，每一层都有自己的权益保护和表决权。

伦敦风投公司Mosaic的西蒙·列文（Simon Levene）表示，在高估值融资之后，创始人、早期风投公司与后期投资者之间可能出现利益不一致。背负着大量优先股的创始人就像一家负债累累的公司的经理。在熊市中，他的股份可能一文不值。与其这样，为什么不把公司剩余的现金拿来发福

利，或者去冒过高的商业风险（“破釜沉舟赌一把”），又或者干脆放弃？创始人可能利用自己的表决权来阻挠其他投资者退出。事情可能变得一团糟。

在繁荣的市场中，每个人都可以是梦想家。杀灭率不高。但当麻烦来袭，它又回归均值——正如一位风投大鳄所说，“很多都被做掉了。”■



Bartleby

Teenage picks

Some unfortunate mismatches in young people's job preferences and prospects

THE WORLD of work is changing. Are people ready for the new job outlook? A survey of 15-year-olds across 41 countries by the OECD, a club of mostly rich countries, found that teenagers may have unrealistic expectations about the kind of work that will be available.

Four of the five most popular choices were traditional professional roles: doctors, teachers, business managers and lawyers. Teenagers clustered around the most popular jobs, with the top ten being chosen by 47% of boys and 53% of girls. Those shares were significantly higher than when the survey was conducted back in 2000.

The rationale for this selection was partly down to wishful thinking on the part of those surveyed (designers, actors and musical performers were three of the top 15 jobs). Youth must be allowed a bit of hope. When Bartleby was a teenager, his ambitions were to play cricket for England and become prime minister; neither ambition was achieved (a lucky escape for the country on both counts).

Furthermore, teenagers can hardly be expected to have an in-depth knowledge of the minutiae of labour-market trends. They will have encountered doctors and teachers in their daily lives. Other popular professions, such as lawyers and police officers, will be familiar from films and social media. But many people end up in jobs they would not have heard of in their school years. You settle for what is available.

The OECD points out that some of the fastest-growing occupations are rarely mentioned by young people. But surely the surprise is not that “user

support technician” is ranked only 158th out of 543 professions and “computer user support specialist” appears in 229th place. Rather, it is astonishing that young people know that such jobs exist at all.

At least teenagers who want to tackle climate change, as many profess to, are in luck. America’s Bureau of Labour Statistics (BLS) predicts that the two fastest-growing occupations over the next few years will be solar-photovoltaic installers and wind-turbine technicians.

Some parts of the OECD survey are disturbing. Even though top performers in maths or science are evenly matched among males and females, a gender gap persists in terms of aspiration. More boys than girls expect to work in science or engineering—the average gap across the OECD is more than ten percentage points. The problem continues in higher education; with the exception of biological and biomedical sciences, degrees in STEM subjects (science, technology, engineering and maths) are male-dominated. In America women earn just 35.5% of undergraduate STEM degrees and 33.7% of PhDs.

Things are even worse in technology. In Britain only one in five computer-science university students is a woman—a big problem at a time when the World Economic Forum predicts that technology will create more than a quarter of all jobs in newly emerging professions. But women are underrepresented in some important fields of technology; they have only 12% of jobs in cloud computing, for example. Something about the tech industry puts off female applicants.

Women play a much bigger role in the health- and social-care sectors, which are also poised for expansion. The BLS forecasts that eight of the 12 fastest-growing jobs in America over the next few years will be in those areas, with roles ranging from occupational-therapy assistants to genetic counsellors. The snag is that some of these jobs are not very well paid.

Home-health and personal-care aides (with the third- and fourth-fastest growth rates, respectively) had median annual salaries in 2018 of just over \$24,000.

Some jobs in health care are extremely lucrative, of course. But another gender imbalance emerges here: women make up only one-third of American health-care executives. In contrast, they tend to dominate the poorly paid social-care workforce. In Britain 83% of social-care workers are female. That suggests men shun the field, perhaps because they do not perceive caring to be a masculine trait.

The biggest problem in the labour market, then, may not be that teenagers are focusing on a few well-known jobs. It could be a mismatch: not enough talented women move into technology and not enough men take jobs in social care. Any economist will recognise this as an inefficient use of resources. Wherever the root of the problem lies—be it the education system, government policy or corporate recruiting practices—it needs to be identified and fixed. ■



巴托比

青少年的选择

年轻人的工作偏好和工作前景之间遗憾地存在一些不匹配

工作的天地正在改变。人们是否已准备好迎接新的工作前景？成员主要为富裕国家的经合组织（OECD）调查41个国家的15岁青少年发现，青少年可能对未来可供自己选择的工作种类抱有不切实际的预期。

五个最受欢迎的选择中有四个是传统的职业角色：医生、教师、企业管理者和律师。青少年的选择集中在那些最热门的工作上，47%的男孩和53%的女孩选择了排名前十的职业。这两个比例明显高于2000年做调查时得出的数字。

这种选择结果的部分原因是受调查者的一厢情愿（设计师、演员和音乐表演者位列最热门的15个职业）。总归得让年轻人怀揣一些希望嘛。本专栏作者十几岁时立志为英格兰板球队效力，并成为首相，结果壮志未酬（从哪一方面来看英国都是幸免于难）。

再者，很难指望青少年能深入了解劳动力市场趋势的细微之处。他们在日常生活中会接触到医生和老师，通过电影和社交媒体熟悉其他受欢迎的职业，如律师和警察。但许多人最终都从事了他们上学时听都没听过的工作。能有碗饭吃就不错了。

经合组织指出，一些岗位增长最快的职业很少被年轻人提及。但令人惊讶的肯定不是“用户支持技术人员”在543个职业中仅排名第158位，“计算机用户支持专员”排在第229位，而是年轻人居然知道这些工种的存在。

至少那些想要解决气候变化问题的青少年（很多人都这么宣称）运气不错。美国劳工统计局预测，未来几年增长最快的两个职业将是太阳能光伏安装人员和风机技术人员。

这项调查的某些发现令人不安。尽管在数学或科学上表现最优的男女生人

数不相上下，但不同性别在志向上仍存在差异。想要从事科学或工程类工作的男孩比女孩多——经合组织各成员国的平均差距超过了10个百分点。这个问题在高等教育中持续：除生物和生物医学外，STEM学科（科学、技术、工程和数学）的学位获得者多为男性。在美国，仅有35.5%的STEM本科学位和33.7%的STEM博士学位由女性获得。

技术领域的情況还要更糟。在英国，计算机专业大学生中仅五分之一是女性。这在当下是个大问题——据世界经济论坛预测，技术领域将创造超过四分之一的新兴职业岗位。但女性在一些重要的技术领域人数占比很低，比如她们目前仅占云计算职位的12%。技术行业的某些特点令女性申请者意兴阑珊。

女性在医疗和社会照护部门发挥的作用要大得多，这些部门也呈扩张之势。美国劳工统计局预测，未来几年美国12个岗位增长最快的工种有八个来自这些领域，其中包括作业疗法（OT）助理和遗传咨询师等。问题是其中某些岗位没什么“钱途”。家庭保健助理和个护助理（岗位增速分列第三和第四）在2018年的年薪中位数略高于2.4万美元。

当然，医疗领域的某些工作薪资极为丰厚。但在这里再次出现了性别失衡：女性仅占美国医疗行业高管的三分之一。相比之下，她们往往是低薪的社会照护工作的主力。英国83%的社会照护工作者是女性。这显示出男性回避这个领域，也许是因为他们觉得照顾别人这件事不能彰显男子气概。

如此看来，劳动力市场上最大的问题可能并非青少年盯着少数众所周知的工作，而可能是一种不匹配：没有足够的杰出女性进入技术领域，也没有足够的男性从事社会照护工作。任何一位经济学家都会认识到这是对资源的低效利用。无论问题的根源在哪里——是教育系统、政府政策还是企业招聘操作——都需要把它找出来解决。 ■



Diversity in America Inc

The benefits of being bold

A provocative study examines Asians in American corner offices

“A CAREER BOOK about Asians? Aren’t they doing fine...?” So begins “Breaking the Bamboo Ceiling”, a tome by Jane Hyun published in 2005. Because Asian-Americans had higher incomes and education levels and committed fewer crimes than their average compatriot, they were seen as a model minority. Despite this, they rarely rose to the top of companies. A mix of individual, cultural and organisational barriers—the “bamboo ceiling” of the book’s title—seemed to halt their rise.

Fifteen years later Asians are still under-represented. Some 11% of associates at American law firms are Asian, but only 3% of partners are. In technology Asians make up over 30% of the workers but less than 15% of bosses. In 2017 Asians made up roughly 6% of the country’s population but only 3% (16) of the bosses of S&P 500 firms.

Some prominent Asians run big companies. Arvind Krishna is IBM’s new boss. Satya Nadella runs Microsoft and Sundar Pichai leads Alphabet. But few other Asians have joined their ranks—and, revealingly, these stars all have Indian roots. There are fewer South Asians in America than East Asians, but they still made up 13 of those 16 Asian S&P 500 CEOs.

Why are there so few Asians among America’s business elite? And if a bamboo ceiling is to blame, why do South Asians break through more easily? These questions are the focus of a study by Jackson Lu of MIT Sloan School of Management and colleagues, who surveyed hundreds of senior executives and business-school students. They found that while discrimination exists, it is not destiny. South Asians endure greater racism than East Asians but still outperform even whites (if success is weighed

against share of population). Their research also rules out lack of ambition: a greater share of Asians than whites strive for high-status jobs.

That leaves culture. The researchers conclude that South Asians tend to be more assertive than East Asians in how they communicate at work, which fits Western notions of how a leader should behave. The same propensity for confident discourse featured in “The Argumentative Indian”, a book by Amartya Sen, a Nobel-prizewinning economist. The researchers attribute East Asians’ reticence to Confucian values of modesty and respect for hierarchy. Sometimes boldness and bombast are needed to break bamboo. ■



美国商界的多元化

胆小不得将军做

一项研究观察美国高管中的亚裔，引人深思

“一本关于亚裔的职场指南？他们不是发展得挺好吗……？”玄珍（Jane Hyun）在2005年出版的著作《打破竹子天花板》（Breaking the Bamboo Ceiling）的开篇写道。与一般美国人相比，亚裔美国人的收入和教育水平较高，犯罪率较低，因此被视为模范少数族裔。尽管如此，他们却很少能晋升到公司高层。个人、文化和企业组织方面的各种障碍混合在一起——也就是书名中的“竹子天花板”——似乎阻断了他们的职业发展之路。

十五年后，亚裔在高层中的比例仍然偏低。美国律师事务所的律师中约11%是亚裔，但合伙人中只有3%。在科技行业，亚裔占员工总数的30%以上，但在老板中的比例还不到15%。2017年，亚裔约占美国人口的6%，但在标普500指数公司的老板中仅占3%（16人）。

也有一些杰出的亚裔掌管着大企业。阿尔温德·克里希那（Arvind Krishna）是IBM的新老板。萨蒂亚·纳德拉（Satya Nadella）掌舵微软，桑达尔·皮查伊（Sundar Pichai）领导Alphabet。但在这个级别上鲜有其他亚裔。而且引人深思的是，这几位明星老板都有印度血统。在美国，南亚裔的人数少于东亚裔，但在16名标普500公司亚裔CEO中，他们还是占了13名。

为什么美国的商界精英中亚裔这么少？如果问题是竹子天花板，那为什么南亚裔更容易突破？麻省理工学院斯隆管理学院的陆冠南（Jackson Lu）及其同事将这些问题作为研究重点，调查了数百名高管和商学院学生。他们发现，尽管歧视确实存在，但命运并非已经注定。南亚裔比东亚裔承受的种族歧视更严重，却仍然表现不俗，甚至超过了白人（如果用人口占比来加权计算成功度的话）。他们的研究还排除了缺乏抱负这一可能因素：亚裔中争取更高职位的人数比例要高于白人。

那么就剩文化因素了。研究人员得出的结论是，南亚裔在工作沟通中往往比东亚裔更加坚定自信，这与西方对领导人特质的期待相吻合。诺贝尔奖得主、经济学家阿玛蒂亚·森（Amartya Sen）所著的《好辩的印度人》（The Argumentative Indian）中也展现了他们言谈自信的特点。研究人员认为东亚裔的含蓄寡言是因为讲求谦逊和尊卑有序的儒家价值观。有的时候，要富有胆魄、口若悬河，方能一路向上，势如破竹。■



Bartleby

When rank leads to rancour

How not to give employee feedback

IN DAVID MAMET'S film, "Glengarry Glen Ross", a group of American property salesmen are forced into a contest to maximise sales. The top two will get prizes; the bottom two will be fired. The play comes across as a critique of the corrupting effect of "dog-eat-dog" capitalism and putting performance above all else. But is competition between employees an effective way of improving overall outcomes for business?

Jan Woike, from the Max Planck Institute in Berlin, and Sebastian Hafenbrädl, of the IESE business school in Barcelona, try to answer the question in an article* for the *Journal of Behavioural Decision Making*. They tested whether performance ranking helped or hindered group effort.

Their approach was to use a "public goods" game in which participants are given tokens which they can invest. They had the choice of investing in an individual project or investing collectively. Two different versions of the game were played. In both games returns were higher if everyone collaborated. But in one version, investing in the individual project improved the relative ranking of the participant, even though the returns to both the individual and the group were lower.

Participants in the game included some students and some experienced managers. The researchers observed no significant difference in the way the two groups played the game. What mattered was the form of feedback. In one version of the game, individuals were told how well they scored and how well they were performing relative to the rest of the group. In another, they were informed about how well the group as a whole was performing, relative to the maximum possible return.

Predictably, the second feedback mechanism led to more co-operation. Less obviously, information on individual performance relative to fellow group members led players to favour moving up the pecking order over not just their group's collective returns, but also over their material wellbeing. They were willing to forgo guaranteed financial gains; achieving "status" was more important.

As the authors note, this result has implications for most organisations. "Ranking feedback, which is often used in organisational settings, prompts people to perceive even situations with co-operative outcome structures as competitive," they write. People may not be innately co-operative or competitive; they may simply respond to cues set by the organisation they work for.

Destructive competition would be a particular problem for those companies which use so-called "agile" management approaches, in which staff from different departments are organised into teams and asked to work together. Instead of being agile, such teams may wrestle themselves to a standstill.

The research also raises more questions about a management approach, dubbed "rank and yank", under which all employees are rated yearly and those who fall into the lowest category are liable to lose their jobs. Ranking systems of this kind, associated with Jack Welch's tenure as boss of GE, an engineering giant, from 1981 to 2001, have been the subject to increased academic scrutiny. Study after study suggests that they hurt overall performance, not least by lowering productivity.

Businesses need to compete with their rivals but within the firm, co-operation is normally much more useful than competitive rivalry; a house divided against itself, cannot stand, as Abraham Lincoln said. Competitive ranking seems not just to reduce co-operation and foster selfishness but

also to discourage risk-taking. Such findings have prompted many bosses to yank “rank and yank”. Microsoft abandoned it in 2013.

The Economist is a genuinely co-operative place (although Bartleby is locked in a Darwinian struggle with Schumpeter for the right to a full-page column). If it wasn't, journalists would be reluctant to pass on contacts or story tips to their colleagues, and section editors would constantly rubbish the suggestions of their peers [as it is, we only do it occasionally, ed.].

In “Glengarry Glen Ross” two of the salesmen conspire to rob the office, steal some of the best sales leads and sell them to a rival business. If you set up a dog-eat-dog system, you risk having the hounds turn around and bite their owner.

* “Rivals without a cause? Relative performance feedback creates destructive competition despite aligned incentives” ■



巴托比

排名仇怨

如何避免给员工反馈

在戴维·马梅特（David Mamet）的电影《大亨游戏》（Glengarry Glen Ross）中，一批美国房地产销售员被迫参加一场竞赛，以最大程度地提高销售额。前两名有奖，后两名将被解雇。这部戏给人的感觉是在批判资本主义“狗咬狗”的堕落后果和唯绩效论。但是，员工之间的竞争到底能不能有效改善企业的整体绩效呢？

柏林的马克斯·普朗克研究所（Max Planck Institute）的杨·沃基（Jan Woike）和巴塞罗那IESE商学院的塞巴斯蒂安·哈芬布拉德（Sebastian Hafenbrädl）在《行为决策期刊》（Journal of Behavioural Decision Making）上发表的一篇文章*中试图回答这个问题。他们检验了绩效排名对团队工作是有利还是有碍。

他们开展了一项“公共品”博弈实验。实验参与者获得可用于投资的代币。他们可以选择个人投资或合作投资。实验有前后两个版本。不论哪个版本，只要每个人都选择合作投资，就都能获得更高的回报。但在其中一个版本中，选择个人投资可以提高参与者自己在所有人中的排名，不过个人和整个团队的回报都会比合作投资低。

参与者包括学生和经验丰富的企业管理人员。研究人员没有发现两类人在博弈方式上有显著差别。造成差异的是反馈的形式。在一个版本中，参与者会得知自己的得分和在群体中的排名。在另一个版本中，他们会得知相比可能的最大回报，整个团队目前的总体表现如何。

正如所料，第二种反馈机制促成了更多合作。不太明显的一点是，当参与者获知自己相较于其他小组成员表现如何时，不但会把提高自己的排名优先于团队整体回报，甚至还会优先于自己的物质利益。他们愿意放弃有保证的财务收益——获得“地位”更为重要。

正如作者指出的那样，这一结果对大多数组织机构都有启示。“组织设计中经常使用排名反馈，这会让人们把即便是鼓励合作成果的组织结构也视为是竞争性的。”他们这样写道。人们也许并非天生就是合作型或竞争型，他们可能只是在所在组织的引导下做出了相应的反应。

对于那些使用所谓“敏捷”管理方式的公司来说，破坏性竞争尤其会是个问题。在这种管理方式中，来自不同部门的员工组成团队，受命一起工作。破坏性竞争会让“敏捷”的追求落空，令团队因内斗而陷入僵局。

这项研究也对“末位淘汰”这种管理方法提出了更多质疑。按照这种方法，所有员工都要接受年度考核，那些考核结果垫底的员工有可能饭碗不保。这种排名制度是杰克·韦尔奇（Jack Welch）在1981年至2001年期间执掌工程巨头通用电气时提出的，已经成为越来越多学术研究的课题。一项又一项研究表明，这种方式有损企业整体绩效，尤其是因为它会降低生产率。

企业需要与竞争对手角力，但在企业内部，通力合作通常都比竞争对抗有用得多。正如林肯总统所言，家不和，则不立。竞争性排名似乎不仅会减少合作，滋长自私，还会抑制冒险精神。这样的研究发现促使许多老板淘汰了“末位淘汰”。微软在2013年停用了这种方法。

本刊是一个真正的合作型机构（尽管巴托比与熊彼特专栏为争夺整版专栏的权利深陷达尔文式的斗争），否则记者们就不会愿意与同事分享联系人方式或新闻线索，而栏目编辑就会不断贬低彼此的建议（其实我们偶尔这么干，主编大人，只是偶尔）。

在《大亨游戏》中，两名推销员密谋从办公室窃取一些最有价值的销售线索，出售给一家竞争对手。如果建立了“狗咬狗”的系统，狗就有可能反咬主人一口。

*《无故竞争？排名式绩效反馈导致破坏性竞争，令共同利益失效》 ■



Anatomy of an investing bubble

Exit unicorns, pursued by bears

The pandemic rams home what markets already felt: technology unicorns are headed for a fall. The consequences will not all be bad

FOR A SENSE of how covid-19 is affecting the world's technology "unicorns", as privately held firms worth \$1bn or more have come to be known, consider two of them. Lime, a scooter-rental firm valued at \$2.4bn, has halted its services in Europe and America, where most citizens have been told to stay off the streets. DoorDash, a \$13bn food-delivery company, has suddenly found itself useful to a self-isolating society as a whole, not just couch potatoes; deliveries have surged.

On the surface, DoorDash stands to benefit from the pandemic, and Lime to suffer. In fact, the coronavirus may prove more indiscriminate than that. It strikes at a time when many of the world's 450-odd unicorns were looking roopy. Their perpetually loss-making business models—only a small proportion are in the black—were increasingly being questioned. So were their exuberant valuations, which added up to perhaps \$1.3trn globally. A reckoning was afoot; some unicorns would "go under", Dara Khosrowshahi, boss of Uber, a ride-hailing giant which relinquished its unicorn status by going public last year, told *The Economist* on March 2nd.

Among investors, "fear of missing out" has been giving way to "fear of looking stupid", says Alfred Lin, a partner at Sequoia Capital, a venerable Silicon Valley venture-capital (VC) firm. Plenty have given up trying to do new deals; instead they are trying to save old ones. One firm is telling its companies to expect 30% less revenue in the next two quarters and to cut costs accordingly. On March 5th Sequoia put out a memo entitled "Coronavirus: The Black Swan of 2020" warning that the outbreak will depress startups' growth and calling on its portfolio firms (one of which is

DoorDash) to rein in costs, conserve cash and brace for capital scarcity.

Most telling, the gospel of growth at all cost has gone out of the window. After years of initial public offerings (IPOs) being done without much focus on profits, “path to profitability” is the new watchword, says Ryan Dzierniejko of Skadden, Arps, Slate, Meagher & Flom, a law firm. “The law of economic gravity has returned as it does every decade or so,” says Michael Moritz, another Sequoia partner. For some unicorns, dispensing with eight flavours of sparkling water and five selections of Thai curry may be a good start, he adds.

The unicorn reality check was under way before America declared a national state of emergency over covid-19 on March 13th. Venture capitalists reckoned that a third of American unicorns would thrive, a third would disappoint and a third would be taken over or die. As investors the world over scurry to safe assets amid a market meltdown, Mr Khosrowshahi’s prediction may come true faster than he thought. Some discern an echo of the dotcom bubble, which burst 20 years ago. Others are more sanguine. Whoever is right, startup pastures that emerge in the aftermath will look very different to today’s.

Unicorns have come a long way since Aileen Lee, founder of Cowboy Ventures, a VC firm, coined the term in 2013, to convey wonder and rarity. Nowadays every startup wants to be one, for bragging rights and to hire the cleverest coders. “For millennials and Gen Zs being a unicorn became a filter,” says Jeff Maggioncalda, CEO of Coursera, a unicorn that offers online learning courses and university degree programmes. A small Austin-based scooter startup called itself, simply, Unicorn; the attempt to leverage nominative determinism failed when the firm went bust in December after spending all its cash on Google and Facebook ads.

For the past decade huge sums from sovereign-wealth funds, mutual funds

and hedge funds poured, directly or via VC firms, into startups that were unicorns or, their backers believed, might be one soon. Total annual VC investment in America leapt from \$32bn in 2009 to \$121bn in 2018. Some \$82bn has flowed into American startups since 2010. About as much has gone to those in the rest of the world. Fat cheques allowed cash-burning firms to put off facing the scrutiny of public markets, with their pesky insistence on earnings.

The euphoria began to ebb last year. First, in May, Uber's blockbuster IPO priced at a 30% discount to what the company's investment bankers had promised. Today its market capitalisation is \$43bn, more than a third below what it was on its first day of trading. Unicorn IPOs of Lyft, Uber's main rival, and of Slack, a corporate-messaging service, disappointed. Then, in October, WeWork, a supposedly "techie" office-rental group, scrapped its IPO after it became clear that investors had no appetite for shares in a firm that lost as much money as it generated in revenues. Its valuation was cut from \$47bn to less than \$8bn.

Other debacles followed. Brandless, an online retailer that sold unbranded products for a fixed \$3, folded in February. Zume, a firm selling robot-made pizzas, shut its main business in January. Both, as well as WeWork, were backed by the \$100bn Vision Fund, the opaque VC vehicle of SoftBank, a Japanese tech conglomerate, and its boss, Son Masayoshi. OneWeb, a British satellite-internet startup formerly valued at \$3.3bn and also backed by Mr Son, has filed for bankruptcy.

After the WeWork fiasco smart VC money turned more cautious, particularly with regard to Vision Fund firms: they went from garnering praise to seeming problematic. Now investors, customers and suppliers "think you must be a crappy company" if you were backed by the fund, says the boss of one, who keeps assuring them "we are not the next WeWork". A Vision Fund spokesperson says: "We're sorry to hear it. That has not been

our experience with our other founders.”

In fact the malaise extends well beyond Mr Son’s empire. In the last quarter of 2019 American venture-backed firms raised 16% less capital than in the previous quarter and big funding rounds—over \$100m—fell by a third. Last year China, home to four of the world’s ten most richly valued unicorns, entered a “capital winter”, as investors turned against firms handing out huge subsidies to consumers in a reckless pursuit of customers. Some Chinese unicorns went bust, including Tuandaiwang, a peer-to-peer lender once valued at \$1.4bn.

The coronavirus shock comes at a time when most tech unicorns were already exhibiting underlying health problems. Some, most notoriously WeWork, never really deserved the label in the first place. Their businesses had at best a tenuous claim to techiness—and so to the “flywheel” effect behind the likes of Amazon or Facebook, in which a large user base makes them more attractive to more users, and so on. Other companies are bona fide technology firms but, like Uber or Lyft, find that digital flywheels gum up. And too many unicorns rest on shaky and opaque financial structures that may exaggerate their lofty valuations.

Start with “fake tech”. These include capital-intensive firms such as WeWork (where accommodating more customers means leasing more office space) and direct-to-consumer retailers such as Casper, which sells snazzy bedding. “We consider ourselves a tech company first,” declared its co-founder, Neil Parikh, in 2016. Stockmarket investors considered it a mattress retailer. In February it listed at \$575m, less than half its \$1.1bn private valuation.

| *Pie in the sky*

Zume, recounts a VC investor close to it, “only used to talk about the robots, never about the pizza”. When its lorries rounded corners, melted

mozzarella ran everywhere. “When we ordered a margherita,” the investor remembers, “it tasted bad.”

Some proper tech unicorns nevertheless discovered that in the physical world, where many at least partially reside, flywheels encounter friction. In theory their markets are almost limitless, with nearly half of humanity carrying a smartphone. Their business models, like Uber’s, enjoy certain network effects: demand from more riders in a given city lures more drivers to the platform; more drivers in turn attract more riders by making rides easier and cheaper to hail. And they can lower upfront costs by outsourcing things like accounting and data storage to the cloud.

The trouble is that, in practice, variable costs—subsidies paid to drivers to generate business, say—rise with every new customer. People “thought software changes everything”, says Aaron Levie, co-founder of Box, a listed enterprise cloud firm. But in many cases the digital platform is only a small part of the cost structure: “The physical assets stay expensive.”

No network effects means lower barriers to entry for rivals. The flywheel breaks down because riders have no reason to favour an Uber over a Lyft. Most will go for whichever is cheaper—which leads both firms to fight for customers with cut-price rides subsidised by their VC backers’ cash. In the words of Marco Zappacosta, co-founder of Thumbtack, a local-services marketplace, “Some companies ended up selling \$1 for 80 cents.”

Randy Komisar of Kleiner Perkins, a big VC firm, offers an alternative rule of thumb. For a unicorn to count as genuinely “tech”—and therefore profitably scalable—its actual product must be technology, he says; “it can’t just be using technology.” Businesses selling physical goods or services often don’t make the cut. Those providing cloud-based services, especially to corporations—like Snowflake (which helps firms warehouse data in the cloud) or PagerDuty (which assists companies’ digital operations)—do. It

helps that, like Slack and Zoom, a video-conferencing firm that also went public last year, they are coronavirus-proof. Indeed, lockdowns are boosting their business by pushing firms to move more functions online.

That is not to say that the consumer internet is dead. Airbnb, a home-sharing website, has seen bookings fall by 40% in big European cities as the pandemic halted trips. It may delay its IPO, which was expected to be this year's biggest. But despite racking up losses of late, it is well-managed, cash-rich and, thanks to an unmatched global reach that puts up a high barrier to entry, likely to make money again once people get back to travelling.

Neil Shen of Sequoia Capital China says that investors still believe in the ability of some Chinese firms, especially \$10bn-plus "super-unicorns", to dominate their giant home market. Meituan-Dianping, a food-delivery firm, and Pinduoduo, an e-commerce site, were criticised for losing money ahead of their IPOs in 2018. Both ex-unicorns have since taken off. On March 30th Meituan even reported a quarterly profit (though it warned of a coronavirus hit in the coming months). One promising candidate to follow in their footsteps is ByteDance, the parent company of TikTok, a hit video-sharing app—and, with a valuation of \$75bn, the world's biggest unicorn (in which the Vision Fund also has a stake).

The complex and opaque financial practices behind the calculation of unicorns' valuations are the third pre-existing condition that afflicts most of them—including those which pass Mr Komisar's test, boast solid business models and hold enough cash to tide them over a rough few months or more. These conditions lead firms to overstate their value in two main ways.

The first has to do with ownership structure. A private firm's headline valuation is the product of the number of shares and the price per share at

the last funding round. But shares issued in later rounds often have downside protections such as seniority over other investors and IPO return guarantees. These lower the value of common equity issued in previous rounds. In 2018 Ilya Strebulaev of the Stanford Graduate School of Business examined the legal terms of 135 unicorns' various share classes and found that firms were overstating their valuations by 48% on average.

The second issue is one of governance. Recent years have seen frequent use of "inside rounds", in which existing backers stump up more money. These can be a vote of confidence from people who know a business well. But they are also a way for VC firms to mark up their portfolios, generating higher internal rates of return that are more attractive to institutional investors (and form the basis on which many partners get paid). According to Mike Cagney, co-founder of three fintech unicorns, SoFi, Provenance and Figure, an unwritten VC rule advises against a firm which led one investment round in a startup leading the next. That inside rounds have become more common in recent years creates a credibility issue for Silicon Valley, he says.

As a result of such finagling, of the roughly 200 American unicorns probably only half merit the moniker, reckons one veteran founder. Although the frequency of "down rounds", in which valuations fall rather than rise, does not yet appear to have increased, activity in the opaque secondary market for unicorn shares suggests that a repricing is under way.

Sellers in such marketplaces (chiefly company insiders and VC firms seeking an early exit) appear to outnumber buyers in transactions involving such darlings as Grab, a \$14bn Singaporean ride-hailing group, and Didi Chuxing, a Chinese rival. Phil Haslett of EquityZen, one such marketplace in New York, revealed in March that shares in many big private startups were changing hands at roughly 25% below their most recent funding round, in part as rank-and-file employees lined up to cash in. The trend has

intensified as virus-linked uncertainty pummels risky assets.

These ructions point to one certainty: a shake-out looms. Firms that have most to lose from virus-related measures are shedding workers. Even before covid-19, Lime laid off 14% of its staff and exited a dozen cities. On March 27th Bird, a rival, announced that it was sacking a third of its workers to conserve cash. In all, unicorns have trimmed their payrolls by several thousand people. That is probably not the end of retrenchment. Workers who remain are seeing the value of their shares dwindle and prospects of an IPO windfall recede. Even viable listings are on ice until the markets' pandemic fever breaks.

In the meantime, the unicorn world is astir with talk of consolidation. SoftBank has reportedly long wanted DoorDash and Uber Eats to merge. A tie-up now looks appetising. The Japanese firm may once again try to combine Grab and Gojek, a rival in Indonesia, where a price war is leading both to lose perhaps \$200m a month. In America Uber may try to woo Lyft, whose share price has fallen faster than its own.

Selling to strategic buyers offers another way out. In February Intuit, a financial-software giant, bought Credit Karma, a personal-finance portal, for \$7bn. Many potential acquirers are, however, hoarding cash until the pandemic passes.

| *The uglies are coming*

If all else fails, “sell it to one of the big uglies”, says one VC chief. The “uglies” in question—Apple, Microsoft, Alphabet, Amazon and Facebook—are collectively sitting on more than \$570bn of gross cash. In normal times regulators would balk at a takeover by one of the tech giants. But these are not normal times. As a painful recession looms, preserving jobs—including not just those of well-paid coders but of the much larger army of gig-economy workers—may override antitrust concerns.

Even if some unicorns are spared—through mergers, acquisitions or just good fortune—the coronavirus is certain to ravage the herd. It will probably put the term itself, which has come to denote excess and broken promises, out to pasture. A new word may be needed, says Mr Khosrowshahi, to describe what is left. ■



解剖一种投资泡沫

大熊追来时，抛下独角兽

大流行病凸显出市场本已感受到的变化：科技独角兽正走向衰落。但焉知非福【新冠报道】

要了解新冠肺炎对全球科技“独角兽”（估值10亿美元或以上的私营公司）的影响，可以看看其中两家的情况。估值24亿美元的电动滑板车租赁公司Lime已暂停在欧洲和美国的业务，那里的人大多被建议不要外出。估值130亿美元的外卖公司DoorDash突然发现整个自我隔离的社会都需要它，而不仅仅是死宅们。送餐量激增。

从表面上看，这场大流行病会让DoorDash受益，Lime受损。而实际上，新冠病毒可能不会这么厚此薄彼。疫情来袭之时，全球450多家独角兽有许多都状态不佳。它们长期亏损的商业模式（只有一小部分盈利）受到越来越多质疑。同样受质疑的还有它们全球总计1.3万亿美元的超高估值。一场清算正在到来，一些独角兽将“倒下”，网约车巨头优步的老板达拉·科罗斯萨西（Dara Khosrowshahi）3月2日对本刊表示。优步于去年上市，放弃了独角兽的身份。

硅谷老牌风投公司红杉资本的合伙人林君睿说，在投资者中，“错失恐惧”已被“出丑恐惧”取代。很多已经放弃了做新投资的打算，而是努力挽救已有的投资。一家风投公司告诉它所投资的公司，要预见到在接下来的两个季度里收入将减少30%，并相应削减成本。3月5日，红杉资本发布了一份题为《冠状病毒：2020年的黑天鹅》（Coronavirus: The Black Swan of 2020）的备忘录，警告疫情将抑制创业公司的成长，并呼吁它投资的公司（DoorDash就是其中一家）控制成本，留存现金，为资金稀缺做好准备。

最能说明问题的是，把不惜一切代价寻求扩张当圣经的时代已经过去。律师事务所Skadden、Arps、Slate、Meagher & Flom的瑞安·德兹涅科（Ryan Dzierniejko）说，多年来IPO一直对利润关注不足，如今“盈利之

路”成了新的口号。红杉资本的另一位合伙人迈克尔·莫里茨（Michael Moritz）说：“经济周期规律是十年左右一个轮回，新的轮回已经开始。”他补充说，有些独角兽公司里供应八种气泡苏打水和五种泰国咖喱，省掉这些可能是一个不错的开始。

美国在3月13日宣布为应对新冠肺炎而进入国家紧急状态，在此之前独角兽公司就已经开始被迫面对现实了。风险投资家认为，美国的独角兽有三分之一将蓬勃发展，三分之一将令人失望，三分之一将被收购或倒闭。在市场崩溃之中，全球投资者急于转向安全资产避险，科斯罗萨西的预测可能会比他所想的更快发生。一些人认为这是20年前互联网泡沫破灭的重现，其他人更乐观些。不论谁对谁错，余波过后，创业公司的放牧场看起来将与今天的大不相同。

风投公司Cowboy Ventures的创始人艾琳·李（Aileen Lee）在2013年提出了独角兽这个称法，表示惊叹和珍稀之意。此后独角兽已经走过了很长一段路。如今，每家创业公司都希望成为独角兽，以获得吹嘘的资本并吸引顶尖的程序员。“对千禧一代和Z世代而言，独角兽已经成了一个筛选条件。”Coursera的CEO杰夫·马金卡尔达（Jeff Maggioncalda）说。

Coursera是一家提供在线学习和大学学位课程的独角兽。一家总部位于德州奥斯汀的小型电动滑板车创业公司干脆就给自己取名独角兽。这家希望靠名字决定命运的公司把所有现金都拿来在谷歌和Facebook上打广告之后，于去年12月破产。

过去十年中，来自主权财富基金、共同基金和对冲基金的巨额资金直接或通过风投公司涌入独角兽或其支持者认为可能很快会成为独角兽的创业公司。美国的年风投总额从2009年的320亿美元跃升至2018年的1210亿美元。2010年以来，约有8220亿美元流入了美国的创业公司。世界其他地方的创业公司总共也得到了差不多金额的投资。有了巨额支票，这些烧钱的公司就可以推迟面对公开市场紧盯盈利的恼人审视。

独角兽热在去年开始降温。5月，先是优步备受关注的IPO发行价比其投资银行的承诺低了30%。现在优步的市值为430亿美元，比上市首日跌去了

三分之一还多。优步的主要竞争对手Lyft和企业通讯服务Slack这两家独角兽的IPO同样令人失望。接着在10月，号称“高科技”的办公室租赁公司WeWork取消了IPO，因为在那时已经很明显，投资者对这家亏掉了全部收入的公司的股票没有兴趣。它的估值从470亿美元跌至不到80亿美元。

其他惨败案例相继而来。在线零售商Brandless在2月倒闭，该公司以3美元的固定价格出售无品牌产品。Zume销售由机器人烤制的披萨，它在1月关闭了主要业务。这两家公司和WeWork过去都得到日本科技企业集团软银的老板孙正义以及旗下不透明的风投部门、规模1000亿美元的愿景基金（Vision Fund）的支持。英国卫星互联网创业公司OneWeb曾估值33亿美元，此前也拿到了孙正义的投资，现已申请破产。

WeWork惨败之后，精明的风投基金变得更加谨慎，尤其是对愿景基金投资的公司：它们曾广获赞誉，现在却成了人们眼里的问题企业。其中一家公司的老板说，现在，如果你的公司获得过愿景基金的支持，那投资者、客户和供应商就会“认为你一定是一家很烂的公司”，他不停地向他们保证“我们不是下一个WeWork”。愿景基金的发言人说：“我们很遗憾听到这种说法。我们投资的其他公司的创始人没有遇到这种情况。”

实际上，问题远不止于孙正义的帝国。在2019年最后一个季度，受美国风险资本支持的公司募集的资金比上一季度减少了16%，超过一亿美元的大型融资轮减少了三分之一。全球估值前十的独角兽公司有四家在中国。去年，投资者对为了扩大用户基数而不顾一切向消费者提供巨额补贴的公司变了脸，中国进入“资本寒冬”。一些中国独角兽破产，包括曾经估值14亿美元的P2P借贷平台团贷网。

新冠病毒来袭时，大多数科技独角兽已经显露出潜在的健康问题。有些公司从一开始就不配独角兽的称号，最声名狼藉的就是WeWork。它们的业务充其量也就是勉强和技术挂钩，跟亚马逊或Facebook等公司背后的“飞轮”效应也没有太大关系（飞轮效应是指一家公司庞大的用户基数会让它吸引到更多用户，并且越来越多）。其他一些独角兽是货真价实的科技公司，但像优步或Lyft一样，它们发现数字飞轮失灵了。此外，有太多独角

兽依赖不可靠且不透明的融资结构，这可能夸大了它们的高估值。

先说说“冒牌科技公司”。其中包括WeWork（吸引更多客户就意味着租赁更多办公空间）这样的资本密集型公司，以及直接面向消费者的零售商，例如销售时髦床上用品的Casper。Casper的联合创始人尼尔·帕里克（Neil Parikh）在2016年宣称：“我们首先把自己看作一家科技公司。”股市投资者认为它就是一家床垫零售商。今年2月，它上市时市值为5.75亿美元，还不及其私募融资时11亿美元估值的一半。

| 天上的馅饼

一位熟悉Zume的风险投资人说，Zume“以前只谈机器人，从没提过披萨”。送餐车拐弯时，融掉的奶酪洒得到处都是。“我们订过一次玛格丽特披萨，”这位投资者回忆说，“很难吃。”

但一些真正的科技独角兽发现，在物理世界中（很多公司至少部分存在于物理世界）飞轮会遇到摩擦。从理论上讲，鉴于现在地球上接近一半的人口拥有智能手机，它们的市场几乎是无限的。它们的业务模式具有一定的网络效应，比如优步：在一个城市中乘客需求越多，就会吸引更多司机使用该平台；司机越多，叫车又会更容易也更便宜，因而又会吸引到更多乘客。而且这些公司可以通过把会计和数据存储之类的工作外包到云端来降低前期成本。

问题在于，实际上，每增加一位新客户，可变成本（如为催生业务量而支付给司机的补贴）都会增加。已上市的企业云存储公司Box的联合创始人亚伦·列维（Aaron Levie）说，人们“过去以为是软件改变了一切”。但在许多情况下，数字平台只占成本结构的一小部分，“实物资产的成本一直很高”。

没有网络效应意味着竞争对手进入市场的门槛降低了。飞轮失灵是因为乘客没有理由厚优步而薄Lyft。大多数人是哪家便宜选哪家，这就导致两家公司用风投的资金补贴车费来争取客户。用本地服务交易平台Thumbtack的联合创始人马考·扎伯考斯塔（Marco Zappacosta）的话说，就是“有些

公司最后是把1块钱的东西8毛钱卖出。”

大型风投公司Kleiner Perkins的兰迪·科米萨（Randy Komisar）提出了另一种经验法则。他说，独角兽要真正算得上“科技公司”，并因此可以实现盈利性成长，它的实际产品必须是技术。“不能只是利用技术。”销售实体商品或服务的企业通常都算不上是科技公司。提供基于云的服务的公司可以算，尤其是那些为企业提供云服务的公司，例如Snowflake（帮助企业将数据存储于云端）或PagerDuty（辅助公司的数字化运营）。如果公司能不受新冠疫情的影响就更好了，比如Slack以及同样在去年上市的视频会议公司Zoom。实际上，在因疫情而封城期间，很多公司不得不将更多职能转移到线上，这推动了它们的发展。

这并不是说消费互联网已死。疫病大流行期间，人们暂时取消了出行，住房共享网站爱彼迎在欧洲大城市的预订量下降了40%。它可能会推迟上市——这原本预期是今年规模最大的IPO。但是，尽管爱彼迎最近损失增大，但它管理完善，现金充裕，而且它无与伦比的全球网络竖起了很高的市场准入门槛。一旦人们恢复出行，它很可能又可以开始赚钱。

美国红杉资本中国公司的沈南鹏说，投资者仍然相信一些中国公司——尤其是估值超过百亿美元的“超级独角兽”——能够主导其庞大的本土市场。外卖公司美团点评和电商网站拼多多在2018年IPO之前曾因亏损而受批评。自那时起，这两家前独角兽公司均已有了长足发展。美团在3月30日甚至公布去年第四季度实现盈利（尽管它警告称未来数月的业绩可能因疫情受损）。一家很可能追随它们脚步的独角兽公司是火爆的短视频分享平台TikTok的母公司字节跳动，其估值达到750亿美元，是世界上最大的独角兽（愿景基金也有持股）。

独角兽估值计算背后复杂而又不透明的财务操作是第三个困扰大多数独角兽的先天问题，包括那些符合科米萨提出的标准、自诩有稳健的商业模式、并拥有足够现金在未来几个月甚至更长时间里渡过难关的公司。这些操作导致独角兽们以两种主要方式夸大了估值。

第一种方式与所有权结构有关。私营公司的整体估值是股票数量与上一轮融资时每股价格的乘积。但是，在随后的融资轮中发行的股票通常会有下行保护方案，例如股票等级高于早期投资者以及享有IPO回报担保。这些措施降低了前几轮发行的普通股的价值。斯坦福大学商学院的伊利亚·斯德布拉耶夫（Ilya Strebulaev）在2018年研究了135家独角兽不同股票级别的法律条款，发现这些公司的估值平均夸大了48%。

第二种方式与治理有关。近年来“内部融资轮”被频繁使用，让既有投资者拿出更多的钱。了解公司的投资者以这种形式追加投资可以视作对公司投了一张信任票。但是，这也是风投公司抬高投资组合价值，借此产生更高内部收益率从而更加吸引机构投资者的一种方式（同时也是许多风投公司合伙人薪酬的依据）。根据SoFi、Provenance和Figure这三家金融科技独角兽的联合创始人迈克·卡格尼（Mike Cagney）的说法，风投界有一条不成文的规矩，即在一家创业公司领投了一轮投资的公司不应继续领投下一轮。他说，内部融资轮近年变得更普遍，给硅谷带来了可信度问题。

一位资深创始人认为，由于存在这样的花招，在大约200家美国独角兽中，可能只有一半名副其实。尽管估值不升反降的“减值融资轮”的频率似乎尚未增加，但在不透明的二级市场上，针对独角兽股票的活动表明这些股票正在被重新估值。

在此类市场中，当涉及诸如估值140亿美元的新加坡网约车公司Grab和其中国竞争对手滴滴出行等资本宠儿的交易时，卖家（主要是公司内部人士和寻求早日退出的风投公司）似乎比买家多。纽约其中一个这类交易平台EquityZen的菲尔·哈斯莱特（Phil Haslett）3月透露，许多大型私营创业公司的股票在转手时股价比上一轮融资低约25%，部分原因是普通员工在排队兑现。随着病毒带来的不确定性冲击风险资产，这一趋势愈演愈烈。

这些纷乱指向一个确定的前景——一场大洗牌逼近。受抗疫措施影响最大的公司正在裁员。甚至在疫情爆发之前，Lime就解雇了14%的员工并退出了十几个城市。3月27日，其竞争对手Bird宣布将裁员三分之一以保存现金。独角兽公司已总计裁员数千人，而且可能还没有结束。留下来的员工

眼看着股票价值缩水，通过IPO一夜致富的希望越来越渺茫。疫情不退，则股市波动不止，即使是可行的上市计划也要暂时搁置。

与此同时，合并的话题在独角兽世界激起一片骚动。据说软银一直希望DoorDash和优食（Uber Eats）合并。现在这看起来很诱人。软银可能会再次尝试将Grab和它在印度尼西亚的竞争对手Gojek合并，两家公司在印尼的价格战导致双方每月各损失约2亿美元。在美国，优步可能会试图向比自己股价跌得更快的Lyft提出合并。

向战略买家出售企业是另一条出路。2月，金融软件巨头Intuit以70亿美元的价格收购了个人金融门户网站Credit Karma。不过，许多有收购意向的公司目前都在囤积现金直至疫情结束。

| 丑八怪来啦

一位风投公司主管说，如果其他路都走不通，“就从那些大‘丑八怪’里找一个，把公司卖给它”。这里说的“丑八怪”是指苹果、微软、Alphabet、亚马逊和Facebook，它们总共坐拥约5700多亿美元的现金。通常情况下，监管机构不大会批准这其中任何一家科技巨头的收购。但现在是非常时期。令人痛苦的衰退迫在眉睫，保证就业（不仅包括高薪的程序员，还包括人数多得多的零工经济大军）可能比担心垄断更重要。

即使一些独角兽能幸存下来，无论是通过合并、收购还是单单靠运气，新冠病毒必将重创独角兽群。它可能把这个称谓本身也放逐草场——“独角兽”已成了夸张挥霍和违背承诺的代名词。可能需要一个新名字，科斯罗萨西说，来称呼活下来的那一群。■



Technology in India

Silicon subcontinent

After a decade of phenomenal growth, one of the world's biggest startup scenes is showing signs of trouble

WHEN ITINERANT venture capitalists land at Delhi airport, many head straight to Aerocity, a new development of glass, steel and Starbucks next door that would not look out of place in Silicon Valley, Singapore or Shanghai. Cyber City, another tech enclave 20 minutes away by Uber (traffic permitting), swarms with young programmers in T-shirts and jeans not unlike the Stanford students plotting the next disruptive app at Philz Coffee in Palo Alto. Many are one and the same.

What Delhi's tech parks lack in the splendour of India's historic business hub, in south Mumbai, they make up for in unpotholed roads, uninterrupted mobile connections and stable broadband. Between 2017 and 2019 the capital spawned 2,562 startups, according to Tracxn Technologies, a data provider. Other clusters, notably in Bengaluru, Mumbai, Hyderabad, Pune and Chennai, added a further 4,500 or so between them. India now has 80,000 startups (see chart 1). They raised \$10bn in 2019, up from \$3.1bn in 2012 (see chart 2). That puts India's venture capital (VC) activity behind America (\$114bn) and China (\$34bn) but ahead of larger economies such as Germany or France.

PitchBook, a research firm, counts 18 unlisted "unicorns", valued at more than \$1bn apiece, grazing in India. They are worth a combined \$72bn. Bright engineers and managers now aspire to work for them—or their VC backers—rather than settle for safe careers at a multinational, a bank or a state-run firm. Another 150-odd "soonicons" may reach the \$1bn mark shortly. They promise free cappuccinos, excitement—and, for a lucky few, riches. They may reconfigure parts of the national economy. Mohandas Pai,

a VC-wallah and former finance chief of Infosys, a local tech giant, predicts that within a decade India's startups will help triple its GDP.

Mr Pai is not alone in his bullishness. India's business press revels in tales of startup wonder. Foreign VC firms have piled in. They hope to ape the success of Flipkart, an e-commerce platform in which Walmart bought a majority stake for \$16bn in 2018. Yet despite startup India's indisputable promise, pitfalls await the unwary.

The Indian VC scene has come a long way. In 2005, when Rajan Anandan, a partner at Sequoia Capital, a Silicon Valley VC titan, returned to India after a spell in America, all-important early-stage VC was close to non-existent. Foreign firms began to fill the gap. Californian stalwarts, including Accel, Matrix, Lightspeed, Bessemer and Norwest, have since set up mostly autonomous Indian offices. So have Singaporean sovereign-wealth funds, Temasek and GIC; Chinese tech giants, Tencent and Alibaba; and, inevitably given its startup covetousness, SoftBank of Japan. They have been joined by powerful local firms such as Blume Capital. Giant Indian conglomerates such as Tata, Reliance and Mahindra have launched VC arms. VC types say they get more than 5,000 pitches a year.

Most of the money has gone into familiar platforms: ride-hailing (Ola), food delivery (Swiggy, Zomato), online grocers (bigbasket), car rental (Zoomcar), online education (Byju's). The first new unicorn of 2020, HighRadius, offers software-as-a-service (SaaS), another tested business model which provides companies with things like accounting or customer support via the computing cloud.

This penchant for the familiar is understandable. And the platforms work in India—just about—without the need to fix its rickety physical and digital infrastructure. But their growth is limited in a country rich in people but poor in disposable income. And, like counterparts in the West, few of them

make any money (see chart 3). The reasons—and justifications—are the same, too: heavy investments are necessary to acquire new customers and achieve scale.

| *Bharat biltzscaling*

The success of this strategy is hard to gauge. Information on realised returns—the cash VCs get from their investments as opposed to unrealised capital gains from swelling valuations—remains scant. What little there is suggests a near absence of cash returns. People who have reviewed pitch books used to raise money say as much. True, only a few funds have been around the decade or so required for investments to ripen. But it may have something to do with weak operating performance. Oyo Rooms, a seven-year-old firm which sells tech-infused budget-hotel franchises and has expanded furiously across 800 cities in India and abroad, has had to sack workers and faces questions about its viability.

Individual companies' valuations—including Oyo's, long put at \$7.5bn-10bn—are thus increasingly viewed with suspicion. Many are "marked to myth" rather than to market, as local wags put it. That in turn helps explain why clean exits, through a public listing or a private sale, are rare. Walmart's Flipkart deal accounted for 80% of the ten biggest exits in 2018, according to Bain, a consultancy. Last year's top ten raked in just \$4bn. Half were sales of secondary stakes by one VC firm to another. Only one, of a 24-year-old e-merchant called Indiamart, was a public offering.

Investor-unfriendly bureaucracy presents more hurdles to divestment. A term sheet related to incorporating in India, from the Indian branch of an American VC firm, can run to 12 pages, remembers an executive at a hot startup; one from its American office related to incorporating in America took up a single page. Some of those who invested in Flipkart are enmeshed in a fight with the government to recover a withholding tax imposed on their returns.

To list on India's main exchanges firms must demonstrate a few years of profits. Laws impede those whose management is based in India from floating overseas (the approach of many successful Israeli startups) without first going public at home. Complex and mutable levies on shares handed to investors and staff in effect give the government first dibs on a firm's cash.

Despite its pro-business rhetoric, the nationalist government of Narendra Modi has made life harder for startups in other ways. Like all of India Inc they contend with complex and constantly changing rules. Some are draconian and indiscriminate. In December the government blocked digital-payments providers from collecting fees from merchants who use their services, hurting the business model of Paytm, India's biggest unicorn. It also launched a public payments system that competes with private providers. Flipkart has found itself facing restrictions on warehousing and discounting, slapped with a complex transaction tax, and under investigation by the competition authorities for long-standing sales arrangements.

The cost, complexity and chaos of India's VC world is prompting many startups to try to incorporate elsewhere while they remain small. An analysis by Tracxn shows that of 73 SaaS firms that have received at least \$20m each in funding, 50 have headquarters outside India. Many flee to Singapore, where expatriate managers can catch a six-hour flight to Delhi or Mumbai, which plenty do on a weekly basis. America is luring them with its vast market, better protection of intellectual property, lower taxes and a deep network of analysts, VC firms, lawyers and bankers. If India is to unleash its huge startup potential, it must first ask itself why some of its entrepreneurs and venture capitalists are so eager to leave. ■



印度科技

硅次大陆

经历了十年非凡的增长之后，全球最大的创业市场之一出现问题迹象

当满世界飞的风险投资人抵达德里机场后，许多人直奔航空城（Aerocity）。这个新区的建筑使用了大量的玻璃和钢结构，星巴克随处可见，就算放在硅谷、新加坡或上海也不会显得突兀。搭乘优步去另一个高科技新城数码城（Cyber City）仅需20分钟（交通顺畅的话），那里到处是穿着T恤和牛仔裤的年轻程序员，与在帕洛阿尔托（Palo Alto）的菲尔兹咖啡馆（Philz Coffee）策划下一个颠覆性应用的斯坦福学子无异。他们中许多人就是斯坦福毕业的。

与印度位于孟买南部历史悠久的商业中心相比，德里的高科技园区没那么光鲜显赫，但这里有平坦的道路、无处不在的移动连接和稳定的宽带。数据供应商Tracxn Technologies统计，2017年至2019年期间，在首都共成立了2562家创业公司。在其他创业集群地（特别是班加罗尔、孟买、海得拉巴、浦那和金奈）一共新成立了4500家左右。印度现有八万家创业公司（见图表1）。它们在2019年共融资100亿美元，2012年为31亿美元（见图表2）。这让印度的风投规模仅次于美国（1140亿美元）和中国（340亿美元），但领先于德国或法国等较大的经济体。

研究公司PitchBook的统计数据显示，印度共有18家未上市的“独角兽”（估值超过10亿美元的企业），总估值达720亿美元。如今优秀的工程师和管理人员都渴望为它们或它们背后的风险投资商工作，而不愿满足于在跨国公司、银行或国有企业中谋求一条安稳的职业道路。还有150多个“独角兽苗子”可能很快会达到估值10亿美元的标准。它们承诺免费的卡布奇诺、激动人心的工作内容，以及让少数幸运儿成为巨富。它们可能会重构一部分国民经济。曾在印度本土科技巨头印孚瑟斯（Infosys）任首席财务官的风险投资家莫汉达斯·帕伊（Mohandas Pai）预测，未来十年内，印度的创业公司将推动印度GDP增长到现在的三倍。

对未来信心满满的不止帕伊一人。印度的商业新闻媒体乐于报道创业公司的传奇故事。外国风险投资公司蜂拥而至，希望能复制电子商务平台Flipkart的成功。2018年，沃尔玛以160亿美元的价格收购了Flipkart的多数股权。不过，尽管“创业印度”的美好未来无可争辩，不够谨慎的人也可能会遭遇陷阱。

印度的风投市场已经取得了长足的发展。2005年，硅谷风投巨头红杉资本（Sequoia Capital）的合伙人拉詹·阿南丹（Rajan Anandan）在美国生活了一段时间后返回印度，那时至关重要的早期风投在印度几乎还不存在。外国公司开始填补空白。此后，Accel、Matrix、Lightspeed、Bessemer和Norwest等长期专注于加州的公司都开设了基本上独立运作的印度办事处。新加坡主权财富基金淡马锡和政府投资公司（GIC）、中国科技巨头腾讯和阿里巴巴也一样，当然还有盯着各种创业公司的日本软银。Blume Capital等强大的本地公司也加入了这一行列。塔塔（Tata）、信实（Reliance）和马辛德拉（Mahindra）等大型印度企业集团已设立风投部门。风投机构表示它们每年能收到5000多个项目推介。

大部分资金都投入了众所周知的平台：网约车（Ola）、外卖（Swiggy、Zomato）、日杂电商（bigbasket）、租车（Zoomcar）、在线教育（Byju's）等。2020年的第一个新独角兽企业HighRadius提供软件即服务（SaaS），这是另一种经过验证的商业模式，可通过计算云为企业提供会计或客户支持等服务。

偏爱熟悉的投资对象是可以理解的。这些平台无需修补印度薄弱的实体和数字基础设施就基本可以运作。但是，在一个人口多但可支配收入少的国家里，它们的成长空间有限。而且，和西方国家同类型公司一样，它们基本都没赚钱（见图表3）。原因（以及自我辩护的理由）也都相同：获得新客户和扩大规模需要大量投资。

| 印度式闪电扩张

这种策略是否成功很难衡量。相对于估值膨胀带来的未实现资本收益，有关风投商从其投资中获得的已实现现金回报的信息仍然很少。从已有的极

少量信息来看，几乎还没有现金回报。研究过融资项目推介书的人也持相同的看法。诚然，获得投资回报需要十年左右，而已经在此投资这么久的基金很少。但现金回报少也可能与经营不佳有关。成立七年的Oyo Rooms主打高科技经济型酒店特许经营，疯狂扩张到印度和国外的800多个城市，它已经不得不裁员，并面临外界对自己生存能力的质疑。

个别公司的估值受到的质疑因而越来越多，包括长期以来估值在75亿至100亿美元的Oyo。正如当地人调侃说，许多公司是“按神话估值”而不是按市价。这也有助于解释为什么很少有风投资本通过公开上市或私下出售完全退出。咨询公司贝恩称，沃尔玛收购Flipkart的交易金额占2018年十大风投退出交易的80%。去年前十大退出交易的总金额仅为40亿美元。有一半交易是一家风投公司向另一家转让股权。成立24年的电商Indiamart是唯一一家通过公开上市退出的。

不利于投资者的官僚主义给资本退出带来了更多障碍。一家炙手可热的创业公司的高管回忆说，美国风投公司在印度设立分公司时，成立条款长达12页，而在美国成立公司时条款只有一页。一些Flipkart的投资者正在为追回对其投资收益的预扣税与政府争执不下。

要在印度主要交易所上市，公司必须能证明已经实现了几年的盈利。由于印度法律限制，总部设在印度的公司在国内上市之前难以在海外上市（许多成功的以色列创业公司都选择了在海外上市）。政府对转给投资者和员工的股票的征税复杂又易变，实际上让政府先行从公司的现金收入中分钱。

尽管莫迪领导的民族主义政府在口头上表示支持商业发展，但它还从其他更多方面让创业公司的日子不好过。像所有印度公司一样，它们也要应对复杂且不断变化的法规。有些法规严苛而恣意。去年12月，印度政府禁止数字支付服务供应商向使用其服务的商户收取费用，这损害了印度最大的独角兽Paytm的商业模式。政府还启动了与私有供应商竞争的公共支付系统。Flipkart已面临仓储和打折上的限制，此外还受到复杂的交易税的打击，而且正在接受反垄断机构对其长期销售模式的调查。

印度风投市场的高成本、复杂度和混乱现状正促使许多创业公司在规模尚小时就尝试在其他国家设立公司。Tracxn的分析显示，在73家至少获得2000万美元投资的软件即服务公司中，有50家总部都设在印度以外。许多公司选择远走新加坡，外派到那里的主管们可以乘六小时飞机回到德里或孟买，很多人每周往返。美国以其广阔的市场、更完善的知识产权保护、更低的税率和更深厚的分析师、风投、律师与银行家网络深深吸引着印度创业公司。如果印度要释放其巨大的创业潜力，它必须首先自问，为何它的一些企业家和风险资本家如此渴望离开。 ■



Schumpeter

The CEO who loved me

Spies often use businesses as cover for their work, but it can end in tears

ESPIONAGE AND business have long been entangled. In “Live and Let Die”, Ian Fleming’s second novel, James Bond masquerades as a businessman working for Universal Export, a flimsy front company for MI6 that occupies a “big, grey building near Regent’s Park”. In “On Her Majesty’s Secret Service”, published almost a decade later, the game is up. “As cover, solid cover, Universal was ‘brûlé’ with the pros”, rues Bond. “It had been in use too long. All the secret services in the world had penetrated it by now. Obviously Blofeld knew all about it.”

Ernst Blofeld, head of Spectre, a global criminal syndicate—a man in need of secret communications—would doubtless also have been wise to Crypto AG, a Swiss company that rose to dominate the global market for cipher machines after the second world war. By the 1990s it was apparent that the firm was in bed with the National Security Agency (NSA), America’s eavesdroppers. The truth, it turns out, was even more remarkable. From 1970 to the 2000s, at least, Crypto AG was wholly owned by the CIA and, until 1993, the BND, Germany’s spy agency, according to the *Washington Post*. “It was the intelligence coup of the century,” crowed a CIA report. “Foreign governments were paying good money...for the privilege of having their most secret communications read.”

The history of intelligence is littered with such front companies, used to collect intelligence or carry out covert skulduggery. “Active Measures: The Secret History of Disinformation and Political Warfare”, a forthcoming book by Thomas Rid, describes how the CIA seed-funded and controlled a printing house in Berlin in the 1950s to spread propaganda in the Soviet bloc. It published political pamphlets and news magazines, forged and real,

as well as a lonely-hearts newsletter, a women's magazine, and even publications devoted to astrology and jazz. It was one of many publishing houses and publications around the world that were covertly subsidised by the CIA and KGB to spread influence.

Some fake firms have been devilishly crafty. In the 1970s, at the height of the Troubles, the British Army established a brothel and launderette in Belfast. Not only could soldiers use laundry vans to move around discreetly, but IRA suspects' clothes could be tested for explosive residue (both operations were eventually exposed and shot up). MI6 similarly operated a bogus travel agency that would lure republicans to Spain with free holidays, where they could be recruited as double agents. In the 1980s Mossad, Israel's spy agency, ran a Sudanese beach resort that was used to smuggle out thousands of Jews from neighbouring Ethiopia.

As well as creating sham companies, spies have also cultivated a cosy relationship with the real corporate world. MI6 and the CIA were both reputed to have close dealings with oil companies and the press. Kim Philby, a Soviet double-agent in MI6, served briefly as this newspaper's correspondent in the Middle East shortly before his defection. More recently, American telecoms firms have been paid hundreds of millions of dollars a year to co-operate with the government, often going beyond legal obligations to do so; the NSA has lauded AT&T for its "extreme willingness to help". American spies are also reported to have paid RSA, a security company, \$10m to use a flawed technique that made it easier to break a widely used form of encryption (the company denies this).

Such clandestine suborning is even simpler for dictators. The KGB would occasionally divert flights by Aeroflot, the Soviet national airline, to collect intelligence from the air. Today, America fears that Huawei, a Chinese telecoms giant that wants to build Western 5G networks, could help China's espionage efforts.

In some respects, the private sector is more important to spooks than ever. Tech companies hold more personal data than state-owned telecoms firms ever did. And as the use of biometric border controls makes it trickier for spies to travel under an alias—fingerprints are harder to fake than passports—the CIA and others have relied increasingly on recruiting and placing employees in legitimate companies so they can travel under their real names with commercial cover.

What is in it for the suits? Money, for a start. Before it was bought outright, Crypto AG was handed large sums of cash both to buy its loyalty and to ensure that its back-doored cipher machines would have an edge over competitors. Companies might also get access to secrets. MI6 would funnel useful titbits to national champions like BP and British Airways, according to a former intelligence officer. Today the CIA provides pliant corporate partners with “special, tailor-made briefings”, according to a recent report by Jenna McLaughlin and Zach Dorfman for Yahoo News.

| *Live and let die*

Yet cloak-and-dagger arrangements can go badly wrong. Companies that collaborate with spooks can put—often unwitting—employees abroad at risk. In 1992 Hans Buehler, a salesman for Crypto AG, was detained in Iran for nine months and freed only after a \$1m ransom payment (he claimed he knew nothing of the firm’s back doors). Then there are the reputational costs. An aggrieved Mr Buehler went to the press, and the firm’s secret trickled into the open, prompting German spies to walk out of the deal (with a tidy five-fold return on the original investment). Crypto AG was wound up in 2018; its once-illustrious brand name is now destroyed.

A worse fate befell Ferranti, a British engineering firm that purchased International Signal and Control (ISC), an American arms contractor that turned out to be a CIA front for rampant gun-running. Ferranti went bankrupt in short order. When James Guerin, ISC’s CEO, was convicted of

fraud and illicit arms dealing, Bobby Ray Inman, a former deputy director of the CIA, wrote to the judge with a character reference: “Mr Guerin displayed patriotism toward our country...even though it could have risked unfavourable publicity for his company.” Alas, gratitude from the spooks is scant consolation for aggrieved shareholders. ■



熊彼特

双面CEO

间谍机构经常用企业做掩护，但可能会惨淡收场

间谍活动与商务向来纠缠不清。在伊恩·费莱明（Ian Fleming）的第二部小说《你死我活》（Live and Let Die）中，詹姆斯·邦德伪装成环球进出口公司（Universal Export）的商人。这是一家经不起查证的幌子公司，背后是“摄政公园附近一座灰色大楼”里的军情六处。在近十年后出版的《女王密使》（On Her Majesty's Secret Service）中，真相败露。“作为掩护，环球公司很好用，但它的价值已被榨干了，”邦德懊悔地说道，“它被用得很久了。现在，世界上所有的特务机关都打了进去。布洛菲尔德显然什么都知道。”

作为全球性犯罪集团幽灵党（Spectre）的头目，恩斯特·布洛菲尔德（Ernst Blofeld）需要开展秘密通信，那么他肯定也会对Crypto AG这家瑞士公司的底细了如指掌。这家公司在二战后崛起并主导了全球加密设备市场。上世纪90年代，Crypto AG与美国情报窃听机构国家安全局（NSA）勾结的事实已经昭然若揭。但后来爆出的真相更加惊人。据《华盛顿邮报》报道，从1970年起至少本世纪初，Crypto AG一直完全由美国中情局（CIA）和德国间谍机构联邦情报局（BND）所有（后者1993年退出后完全交由CIA）。“这是本世纪情报工作非常难得的成就，”CIA的报告中洋洋自得地写道，“外国政府花重金……把自己最机密的通信开放给他人。”

像这样的幌子公司在情报史上比比皆是，它们被用来收集情报或开展隐秘勾当。托马斯·里德（Thomas Rid）在即将出版的新书《积极手段：假消息与政治战之秘史》（Active Measures: The Secret History of Disinformation and Political Warfare）中描述了上世纪50年代，CIA如何通过出资创办并控制柏林的一家出版社，在苏联的盟国中展开宣传。这家出版社不仅出版内容真假混杂的政治宣传册和新闻杂志，还出征婚简报、女性杂志，甚至占星术和爵士乐专刊。CIA和克格勃为扩大各自的影响力，都曾在世界各地秘密资助众多出版社和出版物，这只是其中一家。

一些幌子公司极具欺骗性。上世纪70年代，就在北爱尔兰问题最严重的时期，英国陆军在贝尔法斯特（Belfast）开了一家妓院和一间自助洗衣店。不仅能让士兵们避人耳目，搭乘洗衣店的货车四处走动，还可以对爱尔兰共和军嫌疑犯的衣服做爆炸残留物检测（两家店最终都败露并流产）。此外，军情六处还经营着一家假冒的旅行社，以免费度假为诱饵吸引共和军成员前往西班牙，并在那里将其中一些人招募为双面间谍。上世纪80年代，以色列间谍机构摩萨德（Mossad）以在苏丹经营的海滨度假村为掩护，将成千上万从邻国埃塞俄比亚来的犹太人偷运了出去。

除了自办幌子公司，间谍机构还会与真实的企业建立亲密关系。军情六处和CIA都曾被指与石油公司和媒体交往甚密。供职于军情六处的前苏联双面间谍金姆·菲尔比（Kim Philby）在叛逃前不久曾经短期担任过本刊驻中东记者。再往近点儿看，美国政府每年向本土电信公司支付数亿美元以求合作，而这些合作常常超出了公司的法定义务范畴。NSA就称赞AT&T公司“极其乐于协助”。也有报道说美国间谍机构向安全公司RSA支付了1000万美元，让它使用一种有缺陷的技术，从而让间谍机构能更容易地破解一种广泛使用的加密技术（该公司对此予以否认）。

这样的暗中收买对独裁国家来说就更好办了。克格勃偶尔会让前苏联国家航空公司俄罗斯航空的飞机改道，以从空中搜集情报。如今，美国担心想在西方建设5G网络的中国电信巨头华为可能会帮助中国刺探情报。

从某些方面看，私营企业对间谍机构变得前所未有的重要。科技公司比国有电信公司过去拥有的个人数据更多。而随着生物识别技术在边境管制中的应用，间谍们用化名出行的难度也加大了（因为指纹比护照更难造假），CIA和其他间谍机构越来越依赖在合法公司里招募或安插人手，这样他们就能打着商务活动的幌子，使用真名真姓出行。

这会给企业带来什么好处呢？首先是钱。在被全盘收购之前，Crypto AG就曾得到一大笔钱。这笔钱既是为收买它，也是为确保它安装了后门的密码设备比竞争对手更有优势。此外，公司也可能获得机密信息。一位前情报官员表示，军情六处会向BP和英国航空等国家领军企业传送有用的信

息。詹娜·麦克劳林（Jenna McLaughlin）和扎克·多尔夫曼（Zach Dorfman）在近期的雅虎新闻上撰文指出，现今，CIA为听话的合作企业提供“特别定制的简报”。

| 你死我活

然而，合伙从事秘密活动也可能出严重差错。与间谍机构合作的公司可能将往往不知情的海外员工置于险境。1992年，Crypto AG的销售员汉斯·比埃勒（Hans Buehler）在伊朗被拘留了九个月，直到支付了100万美元的赎金才获释（他声称自己对公司产品被安装后门一无所知）。此外还有名誉损失。愤愤不平的比埃勒找到媒体，公司的秘密由此浮出水面，德国间谍机构于是退出了合作（获得了五倍于原始投资的可观回报）。Crypto AG在2018年停业，它曾经辉煌的品牌现已荡然无存。

而英国工程公司Ferranti的结局就更惨了。这家公司收购了美国军火承包商国际信号与控制公司（ISC），结果发现后者竟是CIA用来大肆走私军火的幌子公司。很快Ferranti就破产了。ISC的CEO詹姆斯·盖琳（James Guerin）被判欺诈罪和非法军火交易罪，为此CIA前副局长鲍比·雷·英曼（Bobby Ray Inman）在给法官的品行证明信中写道：“盖琳展现了对我们国家的爱国精神……尽管他的公司可能因此遭受负面报道。”唉，对受害的股东来说，间谍机构的感激之情实在起不到什么慰藉作用。■



Big wet data

An ocean of things

Compared with the land, the seas are poorly monitored. That is about to change

THERE IS TWICE as much water on Earth as land. Oceanographers are nevertheless fond of saying that science knows less about the high seas than it does about the moon. If John Waterston gets his way, though, that could soon change.

Mr Waterston is the head of the “Ocean of Things” project at the Defence Advanced Research Projects Agency (DARPA), an American military think-tank that has helped develop everything from the internet to stealthy fighter planes. The project’s name is a play on the “Internet of Things”, the awkward phrase which describes the trend for stuffing sensors and an internet connection into all manner of ordinary objects, from cars and toothbrushes to factory robots and doorbells. The Ocean of Things aims to likewise wire up the high seas with swarms of floating, connected sensors.

Such devices are not in themselves new. There are around 6,000 floating sensors deployed around the world’s oceans, run by navies and research institutes. What is unprecedented is the scale of Mr Waterston’s ambition. Over the next few years he hopes to deploy 50,000 sensors across 1m square kilometres of sea, an area considerably larger than Texas. The eventual goal—much more distant—is to enable the continuous monitoring and analysis of a significant fraction of the world’s oceans.

| *Peering into Neptune’s kingdom*

The project’s main aim, mindful of the “D” in DARPA’s name, is tracking ships. But rather than building something that can do just one job, Mr Waterston wants the Ocean of Things to supply a wealth of other information, from water temperature to wave heights, weather conditions,

nearby wildlife and more. All this would then be made freely available to scientific and commercial users.

Existing “floating instrument packages”, known as floats or drifters, are often custom-built, and usually contain the highest-quality instruments available. They therefore tend to be expensive, and are bought only in small numbers. A typical existing float, designed for scientific research, is the Argo. It costs around \$20,000, and can measure water temperature and salinity.

The Ocean of Things takes the opposite approach. The aim is to cram as many cheap, off-the-shelf components as possible into a single low-cost package. Current float prototypes cost around \$750, and Mr Waterston hopes that economies of scale could drive the cost down further. That would allow tens of thousands to be deployed without breaking the bank. Large numbers are crucial for coverage. They also help compensate for inaccuracies in individual instruments. “Can a \$5 sensor do the same things as a \$1,000 temperature gauge?” Mr Waterston asks rhetorically. “The answer is ‘yes’ if you have a lot of them, because you can cross-correlate. Maths solves the problem for you.”

The project’s researchers are evaluating three designs from different manufacturers, ranging in size from about six to 18 litres. One, proposed by Xerox’s Palo Alto Research Centre, is made of glass, like a traditional Japanese fishing float. A second, from a firm called Areté Associates, has an aluminium shell, and uses wood for buoyancy. Both models feature solar panels. The third, made by a company called Numurus, is made of lacquered cardboard, and relies entirely on its batteries. All three are designed to last for a year or so and are made to be as environmentally friendly as possible, with minimal use of plastics. That is important because, at the end of their mission, the floats are designed to scuttle themselves.

Some of the instruments on offer are common to any smartphone—GPS sensors, accelerometers to detect motion, a compass, a microphone, temperature sensors and a camera. Others are more directly tailored for the job, such as an underwater microphone, a gizmo to measure the water's conductivity (and therefore its salinity), and detectors to pick up radar and radio signals, including transmissions from marine anti-collision beacons. Some data from these instruments will be crunched on board, but most will be sent back to land in bursts, for onshore analysis. For now, that connectivity is provided by the Iridium network of geosynchronous satellites. But the modems necessary to talk to those satellites, says Mr Waterston, are the most expensive and power-hungry devices on the floats. He hopes that new, lower-flying satellite networks, currently being built by firms such as SpaceX and OneWeb, will provide cheaper alternatives.

Having lots of different sensors will help the floats build the best possible picture of what is going on around them. For example, if the microphone picks up a sound at the same time as the accelerometer shows movement, it could mean that a bird has landed on the float. Several birds landing on several floats could show how a flock is moving. Their presence, in turn, might be an indicator of shoals of fish or other biological activity.

Similarly, a ship sailing through a float field will leave all sorts of traces. It might be detected by its radio beacon, or its radar. It might sail close enough for a float to take a picture, or hear it on the hydrophone, or be disturbed by its wake. Correlating data from several floats will reveal the ship's speed and direction. By building a database of such encounters, the project's scientists hope to learn quickly how to tell different sorts of craft apart. Fishing vessels might be using fish-finding sonar or noisy trawl nets. A giant supertanker will sound different from a naval frigate.

The range of sensors on a float will also produce a mass of data of interest to oceanographers, meteorologists and biologists. The cameras and

microphones on a field of floats could, for example, detect and track whales and dolphins. At the moment, whenever a marine mammal is spotted in the shipping lanes off Los Angeles harbour, one of the busiest in America, traffic is slowed down. Better tracking would allow traffic to be rerouted, benefiting both critters and commerce. Float fields could watch for illegal fishing, smuggling and icebergs. They could monitor and track oil spills and algal blooms.

That, at least, is the long-term goal. So far, DARPA has bought around 4,500 floats, and has tested them only in small numbers. The next stage, starting this spring, will see fields of 1,000 at a time deployed in the Gulf of Mexico and in the waters off California. The plan is to deploy one float for every three square kilometres of ocean. The hope is that, as the technology matures, useful data could be gleaned from densities as low as one float per 20 square kilometres. With 361m square kilometres of ocean on the planet, a true Ocean of Things, monitoring everything on and under the water, would require about 18m floats. That will not happen for a while yet. But Mr Waterston's plans are a start. ■



水中大数据 浩如烟海

相比陆地，人类对海洋的监测十分匮乏。这即将改变

地球上海洋的面积是陆地的两倍。然而海洋学家总爱吐槽说，科学对海洋的了解还不如对月球多。不过这可能很快就会改变，如果约翰·沃特斯顿（John Waterston）能够如愿以偿的话。

沃特斯顿是美国军事智库国防部高级研究计划局（DARPA）的“海基物联网”（Ocean of Things）项目的负责人。DARPA参与研发的事物从互联网到隐形战斗机无所不有。该项目的名称套用了“物联网”（Internet of Things）一词，这个有点别扭的词描述了一种趋势，即通过各种传感器将汽车、牙刷、工业机器人、门铃等形形色色的普通物品用互联网连接起来。同样，海基物联网的目标是用大量漂浮的、互联的传感器把海洋连接起来。

这样的装置本身并不新鲜。在世界各地的海洋中已经漂浮着大约6000个由各国海军和研究机构布设的传感器。但沃特斯顿的雄心之大前所未有。在接下来的几年里，他希望能在一百万平方公里（比得克萨斯州大很多）的海域内布设五万个传感器。而该项目的最终目标——尽管目前还遥不可及——就是能对全球相当一部分海域展开持续的监测和分析。

| 探视海神的国度

DARPA的这个项目主要是为了跟踪船舶——毕竟它的名字中有个“D”（国防）。但沃特斯顿希望打造出的海基物联网不止于此，还能提供水温、浪高、天气状况、附近的野生生物等大量其他信息。所有这些信息届时都将无偿提供给科研和商业用户。

现有的“浮式仪器包”，也就是所谓的浮标或漂浮物，大多是定制的，配备的通常也都是当前质量最好的仪器。因此它们往往价格不菲，采购量也比较小。目前最常见的就是用于科研的Argo浮标。它的造价大约2万美元，

可以测量水温和盐度。

海基物联网则反其道而行之。它尽可能多地使用便宜和现成的组件，打造低成本的仪器包。目前的浮标原型成本大概在750美元，沃特斯頓希望规模化生产还会进一步降低成本。这样即使布设几万个浮标，花费也不至于太大。能大量部署浮标对扩大监测范围至关重要，也有助于弥补个别仪器产生的误差。“一个5美元的传感器和一个1000美元的温度计效果能一样吗？”沃特斯頓设问，“如果有很多个传感器，那答案就是‘一样’。因为它们之间可以交叉关联。数学能让这个问题迎刃而解。”

项目研究人员正在评估来自不同厂商的三种设计方案，大小从6升到18升不等。由施乐公司（Xerox）的帕洛奥多研究中心（Palo Alto Research Centre）提出的第一种设计用玻璃制作，像一个老式的日本鱼漂。来自Areté Associates公司的第二种设计，用铝制作外壳，使用木头产生浮力。这两者都采用太阳能板。第三种来自Numurus公司，由涂漆的硬纸板制成，完全依靠自带的电池。三种设计的使用寿命都在一年左右，而且都尽量少用塑料，尽可能地环保。这一点很重要，因为根据设计，这些浮标在完成任务后会自沉海底。

目前可使用的一些仪器在任何一部智能手机里都能见到，如GPS传感器、用于探测运动的加速度计、罗盘、麦克风、温度传感器和相机等。其他一些仪器则是为该项目定制的，如水下麦克风、用来测量水体导电性（进而可以测得盐度）的小装置，以及用来接收雷达和无线电信号（包括从海上防撞航标传输的信号）的探测仪。来自这些仪器的数据有一些会在船上被处理，大部分会被分批传回陆地供分析。目前，这种传输连接由地球同步卫星组成的铱星网络提供。但沃特斯頓表示，与这些卫星通信所需的调制解调器是浮标上最昂贵也最耗电的装置。他希望，目前SpaceX和OneWeb等公司正在建造的新型低空卫星网络能成为更加经济的替代方案。

拥有众多不同类型的传感器有助于浮标最大限度地了解周边情况。例如，如果在加速度计显示运动的同时，麦克风也接收到了声音，那可能是有只鸟停在了浮标上。停在多个浮标上的多只鸟可能显示一群鸟的运动轨迹。

反过来，鸟的存在可能表示附近有鱼群或其他生物活动。

同样，驶经浮标布设区域的船只也会留下各种痕迹。或许可以通过船上的无线电信标或雷达探测到船只。如果船行驶得足够近，浮标可以对它拍照，通过水听器能听到船只的声响，或者浮标会受到船只尾流的干扰。将多个浮标提供的数据关联在一起，就能显示船只的速度和方向。通过建立这种船只与浮标相遇的数据库，该项目的科学家希望能很快学会辨识不同种类的船舶。渔船可能使用寻鱼声纳或嘈杂的拖网。巨型油轮发出的声响又与海军护卫舰不同。

浮标上配备的各类传感器还会产生令海洋学家、气象学家和生物学家感兴趣的大量数据。例如，一定区域内浮标上的摄像机和麦克风可以探测并跟踪鲸和海豚。目前，在美国最繁忙的港口之一洛杉矶附近的航道上，只要发现海洋哺乳动物，船只就会放慢速度。更强大的追踪能让船只改变航线，这对生物和商业都有好处。浮标布设区域可用于监控非法捕鱼、走私和冰山活动，也可以监测和跟踪石油泄漏和藻华现象。

这至少是长期目标。迄今DARPA购买了约4500个浮标，而且只完成了小规模测试。下一阶段，也就是从今年春天开始，它将在墨西哥湾和加州附近海域一次性布设1000个浮标。它计划的布设密度是每三平方公里一个浮标。DARPA希望，随着技术的成熟，在把布设密度降低到每20平方公里一个浮标的情况下，仍能收集到有用的数据。地球上海洋面积多达3.61亿平方公里，一个名副其实的、能监测海面和水下万事万物的海基物联网将需要约1800万个浮标。这在短期内还无法实现。但沃特斯顿的计划拉开了序幕。 ■



Schumpeter

The rise and rise of Accenture

How a consultancy has ballooned into a white-collar leviathan

MANAGEMENT CONSULTANTS thrive on a simple business model. First, scare companies by laying bare where they are failing. Then soothe them with counsel on how to improve. The scaring part has grown easier as technology upends one industry after another. Rare is the chief executive these days unconcerned about cyber-security, artificial intelligence (AI) or their online offering. The soothing, though, may have become harder. Who is a boss to trust when consultancies themselves are only slowly getting to grips with the meaning of technological upheaval?

To a growing number of CEOs the answer is Accenture. The firm, whose name is a portmanteau of “accent on the future”, certainly has pedigree when it comes to tech. It is descended from Arthur Andersen, an accounting-and-advisory giant which helped persuade General Electric to install a UNIVAC 1, corporate America’s first computer, in 1954. In 2000 Andersen Consulting finally severed its strained ties to its parent (whose remaining accountancy business was felled two years later by the Enron fraud scandal). It changed its name and, in 2001, listed on the stockmarket at a value of \$14bn.

Since then its growth has been tentacular. Today around 200 clients are thought to pay Accenture at least \$100m each annually to keep their tech humming. Its 500,000 or so employees perform menial functions (running clients’ overseas call centres or making their sales software connect properly to accounting) and more glamorous ones (uploading businesses to the cloud, designing their apps, building AI chatbots, even imagining their next ad campaign). Last year the firm’s revenues reached \$43bn. Total shareholder returns, including dividends, come to 118% over the past five

years, compared with 56% for the S&P 500 index. In February its market capitalisation hit \$137bn.

Two things help explain Accenture's rise. One was beyond its control: technology's role within companies has moved from the back office to the core of what many of them do—hence those corner-office jitters. The second factor was a tech-heavy soothing strategy. Pierre Nanterme, a Frenchman who led Accenture from 2011 until shortly before his death in January 2019, doubled down on all things analytics, mobile, cloud and cyber-security. Each year the firm spends roughly \$1bn on around two dozen acquisitions to get on top of the buzziest tech trends. What Accenture calls “The New” now accounts for around two-thirds of its sales, up from one-third five years ago.

“The New” complements Accenture's older capabilities in a way that is hard for rivals to match. Unlike outsourcing competitors such as India's Infosys or Tata Consultancy Services, it has management-consulting chops from the Andersen days. At the same time, in contrast to august strategy firms like McKinsey or accountant-advisers like Deloitte, EY or PwC, its army of relatively cheap white-collar labour, roughly half of it in India and the Philippines, can be enlisted to perform labour-intensive tasks such as taking down dodgy videos on social media (which Accenture does for Facebook and Google). A global footprint helps insulate it against downturns in any particular region. Despite rivals' claims of the superiority of the limited-partnership model, which still dominates the industry, Accenture's stockmarket listing does not appear to have hurt its growth.

The result is an unusual ability to offer clients a comprehensive service. Refocusing your business around a new app? Accenture will be on hand to write the code—but can also supply designers to make it look pretty. Need an ad blitz to sell it to consumers? Accenture's marketing arm grossed \$10bn in revenue last year, placing it among the five biggest ad groups in

the world—it has become a creative agency not dissimilar from WPP or Publicis Groupe. Want to expand into new markets? Just ring one of its more than 200 offices in 51 countries.

The question for Julie Sweet, an American who took charge in September, is whether Accenture can keep ballooning. She faces three challenges. First, the sheer scale of the firm already feels daunting. No listed corporation bar Amazon and Chinese hardware-makers added more employees in the 2010s. It is tricky to build a culture—and foster a sense of purpose that clever clogs now demand of their employers—that appeals to both buttoned-down database managers in Bangalore and tattooed creative directors in Spitalfields. Accenture has morphed into a white-collar conglomerate at a time when investors favour focused businesses. Its margins are less juicy than those of the Indian outsourcers.

The second challenge is an economic downturn, like the one that looks increasingly possible as covid-19 goes pandemic. Recessions hurt consultants as cash-strapped clients focus on survival rather than expansion. Accenture weathered the financial crisis of 2007-09 but its revenues sank. Its share price has now fallen as it did back then, this time by a quarter since its February peak, faster than the covid-infected markets as a whole.

Ms Sweet's final predicament is perhaps the most consequential. If her firm keeps doing such a bang-up job in convincing clients that technology is central to their success, more of them might opt to build and run a bigger slice of it in-house rather than splurging on outside advice. Accenture seems at times to suggest that companies should let its consultants handle not just their brand and tech innards, but also their power to innovate.

| *Tech tonic*

Still, the Nanterme-era digital strategy has life in it yet. Many companies

are behind in the technology race. Before most so much as ask themselves how zippy 5G networks, the “Internet of Things” or machine learning will transform their businesses, Accenture already has some answers. If someone, some day, finds a function for blockchain, expect Accenture to be there to advise bosses on its use—and to soothe frayed nerves. ■



熊彼特

埃森哲的不断崛起

一家咨询公司如何长成了一头白领巨兽

管理顾问把一个简单的商业模式用得得心应手。首先明白地指出企业的不足，吓住它们。然后再提出改进的建议，安抚它们。随着技术颠覆了一个又一个行业，要吓住它们变得更容易了。如今很少有CEO不关心网络安全、人工智能，或自家提供的线上服务。不过安抚企业的难度可能加大了。咨询公司自己也才慢慢理解技术引发的剧变意味着什么，老板们该信谁呢？

对越来越多的CEO来说，答案就是埃森哲。这家公司的名字“Accenture”是“accent on the future”（着眼未来）的合成词。就技术而言，它当然自有渊源。它是会计和咨询巨头安达信（Arthur Andersen）的后裔。1954年，安达信帮助说服通用电气安装了美国企业界第一台计算机UNIVAC 1。2000年，安盛咨询（Andersen Consulting）最终断绝了与母公司的紧张关系（安达信剩余的会计业务两年后被安然欺诈丑闻拖垮）。它更名并于2001年上市，市值140亿美元。

自那以后，它开始了触角广泛的增长。据估计如今约有200个客户每年各向埃森哲支付至少一亿美元，以保持自己的技术顺畅运转。50万名左右的埃森哲员工既履行低端枯燥的职能（运营客户的海外客服中心，或让它们的销售软件与会计系统保持正常连接），也承担着比这更光鲜的工作（将业务上传到云端，为客户设计应用，打造人工智能聊天机器人，甚至为它们构思下一个广告活动）。去年该公司的收入达430亿美元。过去五年，包括股息在内的股东总回报率为118%，而标普500指数的数字是56%。2月，其市值达1370亿美元。

埃森哲的崛起或许有两个原因。第一个非它能控制：技术在企业内部的角色已经从后勤部门转移至许多企业的业务核心——因而在高管办公室内引发了惊慌。第二个因素是高科技含量的安抚策略。法国人皮埃尔·南特梅

（Pierre Nanterme）从2011年开始领导埃森哲，直到2019年1月他去世前不久。他在与分析、移动、云及网络安全有关的所有事物上大笔注。埃森哲每年花费约10亿美元展开约20多笔收购，以掌握最热门的技术趋势。埃森哲称之为“新”（The New）的业务现在约占公司销售总额的三分之二，五年前是三分之一。

“新”业务补充了埃森哲旧有的能力，令竞争对手难以企及。与印度的印孚瑟斯（Infosys）或塔塔咨询服务公司（Tata Consultancy Services）等外包竞争对手不同，埃森哲具备源自安盛时期的提供管理咨询的能力。与此同时，它还与麦肯锡等威严的战略公司或德勤、安永或普华永道等会计顾问公司形成鲜明对比，拥有相对廉价的白领大军（大约有一半在印度和菲律宾），可以招募他们执行劳动密集型的任务，比如从社交媒体上撤下可疑的视频（埃森哲为Facebook和谷歌提供这一服务）。业务覆盖全球这一点有助于抵御任何特定地区的低迷。尽管竞争对手宣称有限合伙制模式具优越性，而且这一模式也在业内占据主导，但埃森哲看上去并未因上市而损害增长。

这一切造就了埃森哲可为客户提供全面服务的不同寻常的能力。想围绕一款新应用重新定位你的业务？埃森哲随时都可以为你编写代码——但也可以为你提供设计师，让应用看起来漂亮些。需要发动一场广告闪电战把这款应用推介给消费者？埃森哲的营销部门去年的总收入达100亿美元，跻身全球五大广告集团之列。它已成为一个与WPP集团或阳狮集团

（Publicis Groupe）无甚差别的创意机构。想打入新市场？给它遍布51个国家的200多个办事处中的某一个打个电话吧。

美国人朱莉·斯威特（Julie Sweet）于去年9月走马上任，摆在她面前的问题是埃森哲是否还能继续壮大。她面临三个挑战。首先，该公司的庞大规模已经令人生畏。在上个十年，除了亚马逊和中国的硬件制造商外，没有哪家上市公司比它增聘了更多员工。很难打造出一种能让班加罗尔保守的数据库经理和斯皮塔菲尔德（Spitalfields）有纹身的创意总监都觉得有吸引力的文化，以及那些自命不凡之人如今要求雇主具备的使命感。在投资者青睐专注型企业的时候，埃森哲却变成了一家白领企业集团。它的利润

不如那些印度外包商丰厚。

第二个挑战是经济衰退。随着新冠肺炎在全球流行，一场衰退看上去越发有可能发生。经济衰退会打击咨询公司，因为资金紧张的客户会集中精力求生存，而不是扩张。埃森哲挺过了2007至2009年的金融危机，但收入下降了。这一次它的股价和当时一样出现了下跌，较2月份的峰值跌去了四分之一，幅度超过了受新冠影响的市场的总体水平。

斯威特的最后一个困境也许最为重大。如果她的公司在说服客户认同技术对它们的成功至关重要这一点上继续无往不利，那么更多客户可能就会选择在内部构建和运营更大比重的技术，而不是花大价钱寻求外部建议。埃森哲似乎有时会建议企业不单把品牌和技术内部事务托付给它的顾问们，也把创新力问题交给他们。

| 科技补品

不过，南特梅时代的数字战略仍有其生命力。许多公司在技术竞赛中都落于人后。在大多数企业都还没有自问飞快的5G网络、物联网或机器学习将如何改变它们的业务时，埃森哲就已经有了一些答案。如果有一天有人发现了区块链的一个功用，埃森哲说不定就会现身，就区块链的使用向老板们提供建议，并舒缓他们紧张的情绪。■



Schumpeter

Moutai madness

The secrets behind the world's biggest booze business

PICTURE A STATE-RUN distillery in the mountains of Guizhou, China's poorest province. The smell of fermented sorghum fills the air. Barefoot men shovel the grain into pits. Hundreds of women work the bottling line. Visitors are given a snifter. At first it intrigues: the dominant notes are of fermented beans and soy sauce. But then it becomes a Hobbesian battle for survival. One throat-singeing toast leads to 15. In come the "Demolition Girls", forcing guests to drink bowls of the stuff, until they collapse under the table. Hosting the proceedings is Yuan Renguo, the distiller's chairman, with "narrow eyes, a receding hairline, and the unsmiling countenance of a trained assassin".

These scenes, recounted in "Drunk in China", a new book by Derek Sandhaus, a self-confessed aficionado of Chinese liquor, take place at the headquarters of Kweichow Moutai, the most renowned producer of China's national drink, *baijiu*. Some might see it as an object lesson in the perils of doing business in China; foreigners are told to avoid the worst pitfalls of *baijiu* binges by tipping unwanted toasts discreetly into their rice bowls. Far better, though, to focus on the firm itself.

Moutai has been the global booze sensation of the decade. A bottle of its Flying Fairy which sold in the 1980s for the equivalent of a dollar now retails for \$400. Moutai's listed shares have soared by almost 600% in the past five years, outpacing the likes of Amazon. At \$200bn, its market value is only \$50bn shy of that of Coca-Cola, the world's biggest beverage company. It cranks out EBITDA margins of 68%, twice that of global rivals such as Diageo.

It does this while disregarding every Western marketing mantra. It is not global, has meagre digital sales and does not appeal to millennials. Its scores pitifully on environmental, social and governance measures. In the Boy Scout world of Western business it would leave a bad taste, in more ways than one.

Moutai owes its intoxicating success to three factors—not all of them easy to emulate. First, it profits from Chinese nationalism. Moutai is known as the “national liquor”. It was used to raise spirits and disinfect wounds in Mao’s Long March. It was Premier Zhou Enlai’s favourite tippie, shared with Richard Nixon in 1972. Its centuries-old craftsmanship—it is distilled eight times and stored for years in earthenware jars—is a source of national pride. It also claims to be hangover-proof, which would make it an invention to rival gunpowder. (Having tested the assertion with a few \$30 shots, your columnist cannot in good conscience corroborate it.)

Second, it chose to serve China’s super-rich rather than its middle class. Markets are littered with the corpses of firms that could not compete in the cut-throat battle for Chinese middle-class wallets. And the country’s premium market is massive—at 73m-strong, bigger than the population of France, notes Euan McLeish of Bernstein, an investment firm, and still less crowded with prestige brands than advanced economies. Moutai is to these well-heeled drinkers what vintage champagne is to the rest of the world. French cognacs, Scottish single malts and fine wines rightly smell lucre in China’s high Gini coefficient. So do luxury car brands, global fashion houses and top-end hotels.

Third, Moutai looks beyond affluent millennials and digital natives. The elderly and the middle-aged, it found, can be just as lucrative. Its biggest market now is (male) drinkers in their mid-30s. Many have no siblings, thanks to four decades of China’s one-child policy—which also means their elderly parents can splash out on weddings and banquets. Moutai is often a

guest of honour.

Moutai has succeeded thanks to nationalism, elitism and ageism, in other words—not in spite of this unholy trinity. But it faces risks. One is a scandalous reputation. Until President Xi Jinping cracked down on bribery, it was the Communist Party’s drink—and gift—of choice. About two-thirds of the precious firewater ended up lubricating the banquets of government and military officials—and their bank accounts when they sold the pricey gifts back to shops. The price of a bottle of Moutai became known as China’s “barometer of corruption”. When the shenanigans stopped, it temporarily hit the firm’s share price.

More recently, another anti-corruption push has shaken the firm. Mr Yuan, who stopped being chairman in 2018, was arrested last year on suspicion of bribery. According to JPMorgan Chase, a bank, six other top executives were arrested in 2019, some 400 distributors were dismissed for corruption, and Moutai’s e-commerce subsidiary was closed for the same reason.

Next, the government is its largest shareholder—and a meddlesome one. It appears to want prices to remain stable. Exorbitantly priced booze is at odds with its professed socialist ideals. Yet minority investors—including many foreign funds—lament that Moutai’s wholesale price is a third of what it sells for in shops. Raising it could boost the company’s profits further. Many shareholders would also like Moutai to increase direct sales to capture more of the retail value. Instead, in what some see as a travesty of corporate governance, its majority owner has plans to set up its own sales channel. As Mr McLeish delicately puts it, Moutai does not behave like a “value-maximising shareholder company”.

| *China’s sin dram*

In the long run, its biggest risk may be millennials. As they grow older, health concerns, work-life balance and the desire for more wholesome

pursuits than binge-drinking may curb the “*Ganbei!*” toasting culture on which so much of the demand for Moutai rests. For the time being, though, the party goes on. As Mr Sandhaus writes, citing a saying that has gained currency on Chinese social media: in China it is still better to do one bad thing with your boss than a hundred good things for your boss. That is not a sentiment on which Western marketers would build a business. But in China it has helped create the world’s biggest alcohol brand. ■



熊彼特

茅台狂醉

全球最大的酒业公司背后的秘密

想象一下，在中国最贫穷的省份贵州的山区里有一家国营酿酒厂。空气中弥漫着高粱发酵的气味。打着赤脚的男人把高粱铲进窖坑。几百名女工在装瓶线上工作。接待的人给每位来访者斟上了一小杯酒。一开始的品酒很有意思：主要香味是发酵的豆子味和酱香。但之后就变成了酒桌生存战。一杯辣嗓子的酒变成了15杯。“劝酒姑娘”上场，一碗接一碗地劝酒，直到客人喝趴，倒在桌子底下。主持这场酒局的是酒厂的董事长袁仁国，他“细眼，发际线靠后，不苟言笑的样子好像一名训练有素的刺客”。

上述场景是德里克·桑德豪斯（Derek Sandhaus）在其新书《醉酒中国》（Drunk in China）中的记述，发生在中国最著名的白酒生产商贵州茅台的总部。桑德豪斯自称是白酒这种中国“国饮”的狂热爱好者。有些人可能把白酒视作在中国经商的风险的一个实例。外国人被告知说，要躲过白酒狂欢的最糟糕陷阱，就要趁人不注意把酒倒进饭碗里。不过，一个好得多的办法是关注这家企业本身。

茅台在过去十年里轰动全球。一瓶飞天茅台在上世纪80年代的售价是一美元，现在是400美元。茅台的股价在过去五年飙升了近600%，表现超过亚马逊之类的巨头。它的市值为2000亿美元，只比全球最大的饮料公司可口可乐低500亿美元。它的税息折旧及摊销前利润达到68%，是帝亚吉欧（Diageo）等全球竞争对手的两倍。

茅台取得了如此佳绩，却并不遵循任何西方的营销准则。它不是全球品牌，数字渠道的销量微不足道，对千禧一代没有吸引力。它在环境、社会和治理方面表现不佳。在西方企业的“童子军”世界中，它会从多方面留下不好的口感。

茅台令人沉醉的成功归功于三个因素——不是哪一条都容易模仿。首先，

它得益于中国的民族主义。茅台被誉为“国酒”。在毛泽东领导的长征途中，它被用来振奋精神和消毒伤口。它是周恩来总理最喜欢的酒，他曾在1972年与尼克松总统共饮茅台。它要经过八次蒸馏，并在陶罐中储存数年，这样的酿造工艺历经几千年的历史，是民族自豪感的源泉。它还声称喝了不上头，果真如此的话就可以与火药的发明相媲美了。（在亲测了几杯30美元一小杯的茅台之后，凭良心说这一点本专栏作者无法作证。）

其次，茅台选择服务于中国的超级富豪而非中产阶级。市场上很多企业在拼抢中产阶级钱包的激烈竞争中尸横遍野。投资公司盛博的埃安·麦克莱什（Euan McLeish）指出，中国规模庞大的高端市场有7300多万消费者，比法国的人口还多，但高端品牌的密度仍低于发达经济体。对于这些富有的饮酒者而言，茅台的地位就如同年份香槟在世界其他地区的地位。法国干邑、苏格兰单一麦芽威士忌和上等葡萄酒都准确地从中国的高基尼系数里嗅到了金钱的香气。豪华汽车品牌、全球名牌时装和高端酒店也是如此。

第三，茅台把目光投向了富裕的千禧一代和数字一代以外的人。它发现中老年群体同样有利可图。现在，它最大的市场群体是35岁上下的（男性）饮酒者。由于中国实行了40年的独生子女政策，这一群体中许多人没有兄弟姐妹，这也意味着他们年迈的父母可以花大钱给他们办婚礼和酒宴，而茅台往往是酒中上选。

换言之，茅台的成功正是得益于民族主义、精英主义和年龄主义这不光荣的三位一体。但它也面临风险。其一是声誉不佳。在国家主席习近平开展反腐运动之前，茅台一直都是共产党宴饮和送礼的首选。大约三分之二的茅台都消耗在政府和军队官员的杯觥交错之间，以及这些人把这种昂贵的礼品转卖给商店后充实了自己的银行帐户。茅台的价格因此被称为中国的“腐败晴雨表”。这些腐败行为喊停后，曾经暂时打击了茅台的股价。

更近些时候，新一轮反腐运动震动了这家公司。袁仁国于2018年停止担任董事长职务，去年因涉嫌受贿被捕。据摩根大通称，2019年茅台还有另外六名高管被捕，约400家经销商因腐败被取消资格，茅台的电子商务子公

司也因为同样的原因关停。

第二个风险是政府是茅台最大的股东，而且是个爱管事的股东。政府似乎希望茅台价格保持稳定。酒价过高与其宣称的社会主义思想相悖。但包括许多外国基金在内的少数股东怨叹茅台酒的批发价仅是商店零售价的三分之一。提高批发价可以进一步提高这家公司的利润。许多股东还希望茅台增加直销以获得更多零售价值。但它的大股东则计划建立自己的销售渠道，一些人认为这是对公司治理的歪曲。正如麦克莱什微妙地讲到，茅台的行事风格不像是一家“追求股东价值最大化的公司”。

| 中国的杯中罪

长远来看，茅台的最大风险可能来自千禧一代。随着年纪的增长，他们更关注健康，追求工作与生活的平衡，渴望比酒局更有益身心的消遣，这可能会抑制“干杯！”这种酒桌文化，而很大程度上正是这种文化推动了对茅台的需求。不过，就目前而言，宴席还在继续。桑德豪斯在书中引述了中国社交媒体上广为流传的一句话：在中国，给领导做一百件好事，不如和领导做一件坏事。在西方，市场营销人员可不会以这种观念为基础打造企业。但在中国，这却促成了世界上最大的酒类品牌。■



Financial technology

Virtually money

China aims to launch the world's first official digital currency

CENTRAL BANKS have had a busy pandemic. Along with injecting vast amounts of money into the financial system, they have cleaned vast amounts of it—literally. From America to South Korea, central banks have quarantined and disinfected potentially contaminated banknotes. This hassle should make them all the more interested in a digital-currency pilot now under way in China. If successful, it could change how central banks manage both liquidity and physical cash.

Dozens of central banks have started looking at whether to issue digital currencies. But only a few have run trials and none has gone as far as China, which appears set to become the first country to put a central-bank digital currency (CBDC) into limited use. China's four largest commercial banks began internal tests this month. The city of Suzhou will give some to government employees next month to cover transportation costs, according to state media. Citic Securities, a brokerage, forecast on April 16th that China would formally launch the digital yuan later this year.

China began exploring the concept in 2014 because of the technological upheaval in its financial system. A decade ago it was cash-dominated; last year mobile transactions reached 347trn yuan (\$49trn), accounting for four of every five payments. An official digital currency could help address a risk from this transition. Were mobile-payment systems to fail or a crisis to erupt, people might want cash. But there is less and less of it in circulation. Enter the CBDC: people could move into "official" digital money in central-bank-authorized mobile wallets. They would also be able to transfer cash even when offline—for instance, via Bluetooth. A screenshot of one mobile wallet in testing recently spread online. It looked sufficiently reassuring,

showing an image of a one-yuan note stamped with a central-bank serial number.

But the bigger prize for China is the new powers that would come with a CBDC. China's version will be a centralised currency, rather like the anti-bitcoin. Officials will be able to track all digital cash in circulation, making it much harder to launder money or evade taxes. The central bank could also use coding to control how the money is used. For example, if it issues CBDC to a commercial bank for lending on to small businesses, it could ensure that the money is activated only once transferred to a small firm. And China might find it easier to make nominal interest rates negative: cash would no longer be an alternative to bank deposits because negative interest rates could apply to digital cash itself.

These powers are still some way off. Given the risks inherent to such a transformation, China will phase in the CBDC very gradually. Citic Securities estimates that it will take several years for the digital yuan to replace just about 10% of all physical cash in China. For now central banks must continue to worry about money-laundering—both illegal and antiviral. ■



金融科技

虚拟货币

中国计划发行全球首个官方数字货币【新冠报道】

各国央行经历了一场忙碌的大流行病。除了向金融系统注入大量资金，它们还大量洗钱——是真的洗。从美国到韩国，各国央行对可能受污染的钞票做了隔离检疫和消毒。这种麻烦应该会让它们对中国正在进行的一个数字货币试点项目愈发感兴趣。如果试验成功，它可能会改变央行管理流动性和实体货币的方式。

数十家央行已着手研究是否发行数字货币，但只有少数开展了试验，而且没有哪家走得像中国央行那样远。中国看起来将成为首个发行央行数字货币（以下简称CBDC）供有限使用的国家。中国四大商业银行本月启动了内部测试。据官方媒体报道，苏州市下月将用这种数字货币向政府公务员发放交通补贴。券商中信证券4月16日预测，中国将于今年晚些时候正式推出数字人民币。

由于金融体系内发生的技术颠覆，中国从2014年开始探索这一概念。十年前，中国的金融体系仍由现金主导；去年，移动交易达到347万亿元，占交易总笔数的五分之四。官方数字货币可能有助于解决这种转变带来的一类风险。万一移动支付系统出现故障或一场危机爆发，人们也许会想转用现金。但流通中的现金已越来越少。这时CBDC便可派上用场：人们可转用央行授权的移动钱包中的“官方”数字货币。他们甚至还可以在离线状态下完成转账，比如通过蓝牙。最近网上流传着一张测试中的手机钱包的屏幕截图，上面显示一张印有央行序列号的一元钞票图像，看起来很让人放心。

但对中国而言，更大的好处是CBDC带来的新权力。与比特币相反，中国的CBDC将是一种中央化货币。官员们将能追踪所有流通中的数字现金，大大提高洗钱或逃税的难度。央行还可以运用编码控制货币的使用方式。举例来说，如果要把CBDC发行给一家商业银行供它放贷给小企业，央行

可以确保只有当这笔资金转移到小企业的账户后才能激活。中国可能还会发现实施负名义利率变得更容易了：即便是使用现金而不在银行存款也逃不过，因为负利率同样可以施加到数字现金上。

要获得这些权力尚有一段距离。考虑到这一变革本身固有的风险，中国将一小步一小步地引入CBDC。中信证券估计，要花几年的时间，数字人民币才能置换掉中国实体现金总量的仅仅约10%。目前而言，各国央行仍必须为洗钱操心，不管是非法的洗钱还是为杀灭病毒的洗钱。■



The internet and covid-19

Get used to it

Changes in digital habits may outlast the lockdowns that caused them

AS MANY CITIES approach a full month in lockdown, white-collar workers are settling into routines that previously would have seemed bizarre. A new poll by scholars at MIT found that 34% of American employees have switched from commuting to remote work. As offices have emptied, the virtual world has changed nearly as much as the physical one. And recent shifts in where, when and how the internet is used may be surprisingly durable.

The surge in remote working is apparent in the locations of data use tracked by Cloudflare, a network-infrastructure firm. In New York internet usage in Manhattan's commercial core is down by around 30%. Conversely, usage in parts of gentrifying Greenpoint and Long Island City is up by over 60%. London displays a similar pattern, with steep drops in the city centre offset by heavier use in peripheral areas.

The timing of digital interactions shows how telecommuting has blurred the start and end of working hours. In Paris, London and New York the share of messages sent via Slack, a communication tool, during peak hours of 10am to noon and 2pm to 4pm has fallen. It has risen from 6pm to 9pm, as well as around 9am in London and Paris and at lunchtime in New York and Paris. One cost of not having to show up to work is that you also never get to unplug.

Some of the biggest changes are in how people spend time online. Surprisingly, traffic to gambling and pornography sites is flat. Visits to business and learning sites have risen the most, followed by games, e-commerce and streaming. The only category that has seen a decline is one

incompatible with social distancing: online dating.

These trends could reverse once lockdowns are lifted. However, firms may not wish to turn back the clock. Researchers at Stanford found in 2015 that among workers at a Chinese call-centre, those randomly assigned to telecommute were 13% more productive than colleagues who stayed in the office. Companies that have now integrated remote workers can save on office space, and better retain staff during child-rearing years. In March Gartner, a research firm, asked 317 executives how many of their employees who have switched to remote work will not go back to the office; the average reply was 10%. Online dating will return one day. But office workers of the future may still have to fend off 9pm messages from telecommuting colleagues. ■



互联网与新冠肺炎

习惯就好

封城导致的数字习惯的改变可能会比这一措施本身更持久【新冠报道】

许多城市维持封锁状态接近一整个月，白领们开始习惯在以往看起来会很奇怪的日常活动。麻省理工学院学者的一项新调查发现，34%的美国雇员已由通勤转向了远程办公。办公室人去楼空之时，虚拟世界发生的变化几乎和物理世界的一样大。而在何时、何地、如何使用互联网上新进发生的变化也许会出人意料地持续很久。

网络基础设施公司Cloudflare对数据使用地点的追踪显示远程办公明显激增。在纽约，曼哈顿核心商业区的互联网使用率下降了约30%。而绿点区和长岛市的部分高档社区情况相反，使用率上升了60%以上。伦敦也呈现出类似的模式，市中心的互联网使用率骤降，但被周边地区升高的使用率抵消。

数字互动发生的时间显示远程办公模糊了工作时间的开始和结束。在巴黎、伦敦和纽约，通过通讯工具Slack在上午10点至中午、下午2点至4点这两个高峰时段发送信息的比重有所下降，下午6点到晚上9点这一时段的比重上升。在伦敦和巴黎的上午9点左右、纽约和巴黎的午餐时间发送的Slack消息比重也上升了。不用去上班的代价之一就是时刻都在线。

一些最大的变化来自人们在网上从事的活动。赌博和色情网站的流量基本没有变化，令人惊讶。商业和学习类网站的访问量增幅最大，其次是游戏、电子商务和流媒体。唯一出现下降的是一个无法与社交隔离措施兼容的类别：在线约会。

一旦封城措施解除，这些趋势可能会逆转。然而企业可能并不希望再变回去。斯坦福大学的研究人员在2015年发现，在中国的一家客服中心，被随机安排远程办公的员工比留在办公室的同事工作效率高出13%。那些现如今融合了远程办公的企业可以节省办公空间，而且在员工抚育幼儿期间更

能留得住人。研究公司高德纳（Gartner）3月询问了317名高管：他们公司已经转为远程工作的员工中有多少人不会再回到办公室？他们给出的平均数字是10%。人们总有一天会回归在线约会。但办公室职员未来可能还是得设法躲开远程办公的同事在晚上9点发来的消息。 ■



ByteDance

Unabashed

China's first global software company is going from strength to strength. America doesn't like it one bit

AS COVID-19 has forced the world's teenagers out of school and into their rooms, they have turned to a familiar digital companion, TikTok. The short-video app was downloaded 115m times in March. Its nearly 1bn regular users enjoy silly clips of dog antics alongside pandemic advice from the World Health Organisation. Collectively, TikTok videos tagged with #coronavirus have been watched 53bn times.

TikTok's popularity over the past two years has shone the spotlight on ByteDance, its Beijing-based developer. Founded by a Chinese computer scientist, Zhang Yiming, in 2011, it is now the world's biggest unlisted technology "unicorn", recently valued at between \$90bn and \$100bn. It is also the only technology firm bar Apple with more than 100m users in both China and the West where TikTok has taken on the likes of YouTube and Instagram.

And ByteDance isn't done. The 60,000 people in its buzzy offices—"We are like flies," says one former employee—crank out one app after another. In the past year it has launched a worldwide corporate-software service (Lark), a music-streaming app in India and Indonesia (Resso) and, in China, a messaging rival to WeChat. As other firms sack workers amid covid-19, ByteDance is hiring 10,000 globally. It plans to employ 30,000 on top of that this year.

ByteDance is not the first Chinese firm with foreign ambitions. Commodity giants such as CNOOC, an oil firm, have been buying foreign reserves, and rivals, since the 1990s. In the past decade industrial giants have pursued

Western competitors from carmaking (as with Geely's purchase of Volvo) to chemicals (ChemChina's of Syngenta). More haphazardly, conglomerates like Fosun and Anbang splurged on trophy assets (including Club Med and the Waldorf Astoria hotel, respectively).

Unlike most of its peripatetic predecessors, though, ByteDance has built its empire by making products that appeal beyond China. It is China's first global software giant. It has also courted foreign investors. Filings in Hong Kong show that it has used an arrangement called the "Sina structure", which allows it to accept money from abroad, since its founding (many Chinese tech firms turn to this structure only when eyeing a stockmarket listing in America). Around 80% of ByteDance's investors are non-Chinese. So are four of its five board members. The other is Mr Zhang.

All this helps ensure ByteDance is not, in contrast to many Chinese tech upstarts, in hock to Alibaba, Baidu and Tencent—which is handy, for ByteDance competes with China's tech titans for ad revenue. It makes most of its money selling ads in its two main Chinese apps: Douyin, a Chinese TikTok, and Toutiao, a multimedia-and-news app akin to Facebook's newsfeed (its WeChat rival, Duoshan, disappointed).

How much money it makes, exactly, is unclear: as a private company ByteDance does not publish its accounts. But leaks and statements from investors put last year's revenue at between 104bn yuan and 140bn yuan (\$15bn-20bn), more than Uber, Snapchat and Twitter combined. Its ad revenues in China surpassed Tencent's and Baidu's and now trail only those of Alibaba. It reportedly turned a profit in June 2019, a feat in the world of loss-making unicorns.

If the firm generates \$25bn in sales this year, as it is expected to despite covid-19, it will have done so three years faster than Facebook. It is the only big Chinese firm whose share of the domestic advertising market is

growing fast, from 9% to 17% in 2019, according to Bernstein, a research firm. A recently launched advertising network, Pangle, which lets advertisers reach consumers across any of its non-Chinese apps, may at last help it monetise TikTok.

No wonder American rivals are trying to clip its wings. Facebook's TikTok clone, Lasso, has flopped. YouTube is said to be developing another (called Shorts). But the biggest threat has emerged in the form of America's government, wary of China's rise in any sphere.

Politicians in Washington fear that data on American users is being handed to Beijing; that Chinese algorithm designers are infecting impressionable Western youngsters with communist propaganda; and that ByteDance content is censored in line with party whims. In March two Republican senators introduced a bill that would ban TikTok from all government devices. The Committee on Foreign Investment in the United States (CFIUS) is reviewing ByteDance's acquisition in 2018 of Musical.ly, another app, which had 60m users in America and Europe.

In statements, TikTok has said that it stores all American "user data in the United States" and that its American operations are "not influenced by any foreign government, including the Chinese government". The firm is trying to mollify critics and has hired prominent security and legal experts in America to help it. Last month it opened a "transparency centre" in Los Angeles, where it promises to share information about its content-moderation, privacy and security controls, and said it would stop using moderators in China to handle content from users outside the country.

That, most lawyers and technologists reckon, may help get CFIUS off its back. Listing ByteDance in Hong Kong, which is under consideration, may also foster trust. So would anointing a non-Chinese successor—though, at 37, Mr Zhang may not be ready to retire. As a last resort, he is said to be

willing to contemplate spinning TikTok off. That would cement the digital divide between China and the West—until another hit ByteDance app tries to bridge it. ■



字节跳动

大胆前行

中国首家全球性软件公司不断壮大。美国一点也不高兴

新冠肺炎迫使全球各地的青少年停课在家，他们便去找熟悉的数字伙伴TikTok。3月，这款短视频应用下载量达1.15亿次。它有近10亿普通用户，他们观看的内容五花八门，从狗狗搞笑视频到世界卫生组织对大流行病提出的建议，无所不有。“#Coronavirus”标签下的TikTok视频观看量达530亿次。

TikTok在过去两年中广受欢迎，令它的开发者字节跳动成为关注焦点。这家总部位于北京的公司由中国计算机科学家张一鸣于2011年创立，如今已成为全球最大的未上市科技“独角兽”，最近的估值在900亿至1000亿美元之间。它也是除苹果外唯一一家在中国和西方的用户都超过一亿的科技公司，在西方TikTok已经在挑战YouTube和Instagram等应用。

而字节跳动并没有止步于此。在它各地繁忙热闹的办公室里，六万名员工合力推出一个又一个应用，“我们忙得跟苍蝇似的。”一位前员工说。过去一年中，字节跳动发布了一款全球企业办公软件Lark；在印度和印度尼西亚推出了一个音乐播放应用Resso；在中国推出了与微信竞争的消息服务。新冠疫情期间，其他公司都在裁人，而字节跳动正在全球招聘一万名员工，并计划今年在此基础上再招聘三万人。

字节跳动并不是第一家有志于在海外扩张的中国公司。自上世纪90年代以来，诸如中海油之类的大宗商品巨头就一直在收购外国资源储备和竞争对手。在过去十年中，中国的工业巨头积极追逐西方竞争对手，涉及汽车制造（如吉利收购沃尔沃）到化学品（如中国化工收购先正达）等各种领域。较没章法的是像复星和安邦这样的企业集团大手笔购入炫耀性资产——比如这两家公司分别收购了地中海俱乐部（Club Med）和华尔道夫酒店。

但是，与大多数出征海外的先行者不同的是，字节跳动通过打造出吸引力

不限中国的产品建立起自己的帝国。它是中国第一个全球软件巨头。它也争取外国投资者。香港的备案文件显示，字节跳动自成立以来就采用了所谓的“新浪架构”，让它可以接受国外资金（许多中国科技公司只有在计划于美国上市时才会采用这种架构）。字节跳动的投资者约80%来自海外。五位董事会成员中有四位是非中国籍，另一个是张一鸣本人。

所有这些都助于确保字节跳动不像中国的许多科技新贵那样，受资助它们的阿里巴巴、百度和腾讯的牵制。这方便它和这些科技巨头争夺广告收入。它的大部分收入源自旗下两款主要中文应用上出售广告位。这两款应用是TikTok的中文版“抖音”，以及与Facebook的“动态消息”（Newsfeed）类似的多媒体和新闻应用今日头条（字节跳动意欲与微信竞争的多闪表现不济）。

还不清楚它到底赚了多少钱：作为一家私营公司，字节跳动不公开账目。但根据内幕消息和投资者的声明，去年的收入估计在1040亿元至1400亿元之间，超过优步、Snapchat和推特的总和。它在中国的广告收入超过了腾讯和百度，目前仅次于阿里巴巴。据报道它在2019年6月开始盈利，这在普遍亏损的独角兽世界里实为壮举。

尽管有新冠疫情的影响，预期字节跳动今年的销售额仍将达到250亿美元。果真如此，它将比Facebook提前三年达到这样的收入水平。根据研究公司盛博的数据，这是唯一一家在国内广告市场中的份额正迅速增长的大型中国公司——2019年从9%增长到了17%。近期推出的广告网络Pangle可让广告客户通过字节跳动的任何非中文应用吸引消费者，最终可能会帮助它通过TikTok赚钱。

难怪美国的竞争对手正设法限制它的发展。Facebook克隆TikTok的产品Lasso已经失败。据说YouTube正在开发另一个类似的产品（名叫Shorts）。但最大的威胁来自美国政府，它对中国在任何领域的崛起都保持警惕。

华盛顿的政客担心美国用户的数据被传给中国政府，还担心中国的算法设

计者正用共产党的宣传毒化易受影响的西方年轻人，以及字节跳动提供的内容是根据共产党的想法审查过的。3月，两位共和党参议员提出了一项法案，禁止所有政府设备使用TikTok。美国外国投资委员会（以下简称CFIUS）正在审查字节跳动在2018年对Musical.ly的收购，这个应用当时在美国和欧洲拥有6000万用户。

TikTok在声明中表示所有美国“用户的数据都存储在美国境内”，其在美国的业务“不受任何外国政府的影响，包括中国政府在内”。字节跳动正试图平息对它的批评，并聘请了美国著名的安全和法律专家来帮助自己。上个月，它在洛杉矶开设了一个“透明中心”，承诺在此共享它在内容审核、隐私和安全控制方面的信息，并表示将不再使用在中国的内容审核员来审核中国以外用户发布的内容。

大多数律师和技术专家认为这可能有助于摆脱CFIUS的盯梢。字节跳动正考虑在香港上市，这也可能促进信任。任命非中国籍的继任者也能有这样的作用——尽管现年37岁的张一鸣可能还没准备退休。不得已的话，据说他愿意考虑剥离TikTok。这将加剧中国与西方之间的数字割裂，直到出现另一个热门的字节跳动应用来试图弥合鸿沟。 ■



Climate change

Winter is not coming

Northern-hemisphere temperatures stayed flat from November to March

THE MOST commonly cited risks of climate change are natural disasters: fiercer wildfires and hurricanes, bigger floods and longer droughts. But one of the most striking recent effects of global warming has been unusually mild weather in many parts of the world.

The northern-hemisphere winter that ended on March 20th was the second-warmest since records began, and the warmest ever on land. The anomaly was biggest in Europe and Asia, where average temperatures from December to February were 3.2°C (5.8°F) and 3.1°C above the average from 1951-80, and 0.8°C and 0.7°C above those continents' previous record highs. After a normal autumn, temperatures stayed close to their November levels for months. In Boston, where daily lows in January tend to hover around -6°C, the average minimum this January was 0°C; for Tokyo the figures were 0°C and 5°C. By local standards, the balmiest winter of all was in Russia. Moscow's average daily low in January was -2°C, far from the customary -13°C.

The winter-that-wasn't of 2019-20 is not yet a new normal. The main factor determining the severity of northern winters is the "Arctic oscillation": the relative pressure of Arctic and sub-tropical air. When pressure is higher in the Arctic, cold air from the North Pole pushes south, bringing harsh, dry winters to many places. When pressure is higher towards the sub-tropics, warm air pushes northwards, hemming in cold air around the pole. These two patterns flip back and forth irregularly.

For reasons that are not yet clear, pressure in the sub-tropics this year was much stronger than in the Arctic. And researchers have not yet determined

how rising temperatures affect the Arctic oscillation. Until a few years ago, climate models tended to show pressure in the Arctic strengthening, reducing the amount of warming during winter at temperate northern latitudes. The latest models find the reverse.

However, climate change is still responsible for anomalies like this one. At the average global temperature in 1950, a winter this mild was all but impossible. In today's climate, such reprieves from the cold should occur once every 11 years. And if global warming continues on its current trajectory, winters like this year's could become standard within a few decades.

Mild winters offer benefits. Heating is cheaper, flu seasons are shorter and fewer people die overall. But problems mount as well. Without hard frosts, pests can survive and multiply to attack crops more harshly. Warmer winters are usually wetter, changing snowfall patterns. This can shrink the snowpack that supplies rivers, and cause floods. Even people who bemoan frigid winters may miss them if they vanish. ■



气候变化

凛冬不至

去年11月至今年3月，北半球的气温保持平稳

气候变化最常被提及的风险是自然灾害：野火和飓风变得更猛烈，洪水更汹涌，干旱持续更久。但是，全球变暖近期最显著的影响之一却是世界许多地方的天气异常温和。

北半球于3月20日结束的这个冬季是有记录以来气温第二高的冬天，也是陆地上有史以来最温暖的一个冬天。欧洲和亚洲气温异常的情况最显著，两地12月至2月的平均气温分别比1951到1980年的均温高出 3.2°C 和 3.1°C ，比各自之前的历史峰值高 0.8°C 和 0.7°C 。经过一个正常的秋天后，气温连续几个月与11月的水平相近。在波士顿，1月份的每日低温往年一般都在 -6°C 上下徘徊，而今年1月份的平均最低气温为 0°C ；东京的这两个数字分别是 0°C 和 5°C 。按地方标准衡量，俄罗斯的这个冬天最温暖。莫斯科1月份的日均低温为 -2°C ，远低于通常的 -13°C 。

去年跨今年的“伪冬天”尚未成为一种新常态。决定北半球冬季寒冷程度的主要因素是“北极涛动”：北极和副热带空气间的相对压力。当北极的气压较高时，来自北极的冷空气会向南推进，给许多地方带来寒冷干燥的冬天。当副热带的气压较高时，温暖的空气会北上，围住极地周围的冷空气。这两种模式不规律地来回切换。

今年副热带的气压远高于北极，原因尚不清楚。而研究人员还没有确定气温上升会如何影响北极涛动。直到几年前，气候模型往往都还显示北极的气压在增强，从而降低北温带地区冬季变暖的程度。最新的模型得出的发现正相反。

然而，气候变化仍与此次这样的气温异常脱不了干系。回到1950年那样的全球平均气温，像今年这样暖和的冬天几乎不可能出现。在如今的气候中，这种寒冬暂时缺席的情况应该会每11年发生一次。而如果全球变暖继

续沿目前的轨迹发展，像今年这样的冬天可能会在几十年内变成常态。

暖冬有其益处。取暖费用降低，流感季节缩短，总体死亡人数减少。但问题也越来越多。没有严霜，害虫就会存活并繁殖，继而更猛烈地啃噬作物。更温暖的冬天通常也更潮湿，连带改变降雪模式。这可能会导致补充河流的积雪减少，并引发洪灾。如果冬季消失，即使那些在严冬叫苦连天的人恐怕也会想念这个季节。 ■



Postcards from doomsday

This is the end

Mark O'Connell's postcards from doomsday are oddly uplifting

FOR MUCH of human history, Mark O'Connell points out in "Notes from an Apocalypse", the world has been about to end. As St Augustine observed in the fifth century, the earliest followers of Jesus believed themselves to be living in the last days of creation. In the centuries since, humans have faced plagues and fires and floods and earthquakes and wars and the threat of nuclear annihilation—perpetually proclaiming the end of days. All the while, the world has continued spinning on its axis. But, the author asks, amid an increasingly irreversible climate crisis, what if now really is the end?

When he began writing this book, Mr O'Connell says, he was depressed, a malaise brought on by an obsession with the future—or rather, with the possible lack of it. He pondered the individual's role in the age of climate change, and his own responsibilities as a father. "I couldn't sneeze without thinking it was a portent of end times," he writes. He was spending too much time on the internet (he had set his home-page to an online forum devoted to the topic of "collapse"). In the grip of this doomsday spiral, Mr O'Connell set out to probe both the reality and the idea of the looming crisis, embarking on what he calls "a series of perverse pilgrimages".

He delves into the internet subculture of "preppers", a group mostly comprising American men who stockpile freeze-dried food and guns. He treks to the Black Hills of South Dakota, where a property magnate is hawking survivalist bunkers, and stops at a Mars Society Convention in California. He goes on a nature retreat with a group that believes Western civilisation is destined to disintegrate and seeks alternative forms of society. For his best chapter, he goes to the ruins of Chernobyl and

considers the ironies of apocalypse tourism.

These vignettes offer a fascinating insight into a species obsessed with its own demise—and into the ways humankind is trying to confront the hard-to-bear reality of climate change. These range from the absurd (colonisation of Mars), to the selfish (billionaires buying up New Zealand), to the poignant (difficult conversations with young children). Along the way, Mr O’Connell moves nimbly between scenes and eras, skipping from the poetry of Czeslaw Milosz to a history of the Grand Tour. It helps that he is funny, too. Oddly, all these ruins leave him feeling more peaceful, though the process of parenting might also have helped.

Readers, for their part, will emerge feeling doomed—yet oddly uplifted. “The fact that the world is continuing on as always—that the sun is shining, and the bees circling the clover, and the tomatoes ripe in the fields—doesn’t mean it hasn’t already come to an end,” Mr O’Connell reflects. One of the strengths of his book is that it simultaneously makes the reverse of that proposition clear: the world is ending, and, as usual, it is carrying on. “Notes from an Apocalypse” was written before the covid-19 pandemic, but it offers a timely if eccentric consolation all the same. ■



寄自末日的明信片

末日已至

马克·奥康奈尔从末日寄来的明信片离奇地令人振奋【《末世笔记》书评】

马克·奥康奈尔在《末世笔记》（Notes from an Apocalypse）一书中指出，在人类历史的大部分时间里，世界都快要走向毁灭。正如奥古斯丁在五世纪所记述的，耶稣最早的追随者相信自己生活的这个世界已时日无多。之后的几个世纪，人类面临过瘟疫、火灾、洪水、地震、战争以及核毁灭的威胁——它们时时刻刻都在宣告末日的到来。然而一直以来，世界还在继续绕着地轴转动。但是，作者问道，鉴于世界正陷入一场日益不可逆转的气候危机之中，万一这一次末日真的来临了呢？

奥康奈尔说，刚开始写这本书的时候他很抑郁。未来在他脑海中挥之不去——或者更确切地说是可能再无未来的情形，这令他深感愁闷。他思索着个人在气候变化的时代扮演的角色，也思考自己为人父的责任。“我连打个喷嚏都会觉得是末日的预兆。”他写道。他花了太多时间泡在网上，还把一个专门讨论“崩塌”话题的在线论坛设为了主页。他在末日恐惧中愈陷愈深，不能自己，于是开始探究有关这场即将到来的危机的现实和观念，踏上了他所谓的“一系列反常规的朝圣”。

他深入研究了“末日准备狂”这一互联网亚文化。这个群体的成员主要是储存冻干食品和枪支的美国男性。他长途跋涉抵达南达科他州的黑山，一个房地产巨头正在那里在兜售避难地堡。后来他又在加州的火星学会年会上驻足。他跟随一个团队展开乡野隐居之旅，这群人相信西方文明注定要瓦解，因而想另觅社会形式。为了撰写书中最精彩的一章，他还去了切尔诺贝利的废墟，感受“末日游”的讽刺。

这些小故事趣味盎然地引领读者窥探一个沉迷于自身消亡无法自拔的物种，以及人类正如何试图对抗气候变化这一难以承受的现实。这些方法多种多样，有的荒诞（殖民火星），有的自私（亿万富翁大举到新西兰置业），有的沉重（与年幼的孩子开展艰难的对话）。奥康奈尔敏捷自如地

穿行于不同的场景和时代，从切斯瓦夫·米沃什（Czeslaw Milosz）的诗歌跳跃到壮游（Grand Tour）的历史。他还很风趣，这一点很加分。奇怪的是，游历了所有这些废墟后，他心境反而更平和了，不过育儿的过程可能也有帮助。

而对读者来说，他们读罢会感觉人类在劫难逃，却又反常地感到鼓舞。

“世界一如既往地运行着——阳光明媚，蜜蜂绕着三叶草飞舞，西红柿在地里成熟——但这并不意味着世界还没走到尽头。”奥康奈尔思忖道。他这本书的一个优点在于它同时阐明了这个观点的反面：世界正走向终结，但也像往常一样继续。《末世笔记》写于新冠病毒大流行之前，却提供了及时而又古怪的慰藉。■



The recession in rich countries

Picking off the weak

Countries around the world are bracing for a deep downturn. Our ranking shows which might suffer most

AS THE VIRUS upends productive activity across the world, the question now is how bad things will get. On April 14th the IMF warned that the global recession would be the deepest for the best part of a century. But the severity of the pandemic and the uncertainty around the duration of lockdowns are such that economists' models, trained on business cycles in the post-war era, are of little use. Some companies, such as Starbucks and Dell, have pulled their guidance on annual earnings, declining even to hazard a guess about the future. Amid the fog, however, one thing seems certain: some economies will suffer much more than others.

Economic crises expose and exacerbate structural weaknesses. Analysis by *The Economist* of five decades of GDP data finds that growth rates in rich countries tend to converge during expansions, as even the weakest economies are pulled along. Yet during downturns performance diverges markedly. In the first half of the 2000s the average annual gap between the GDP growth rates of the best- and worst-performing rich countries was five percentage points. In 2008-12, in the recession that followed the global financial crisis, the gap widened to ten points.

This recession will be no different. Three factors should help separate the bad economic outcomes from the dire ones: a country's industrial structure; the composition of its corporate sector; and the effectiveness of its fiscal stimulus. *The Economist* has used indicators of these to rank, roughly, the exposure of 33 rich countries to the downturn. Some, such as those in southern Europe, appear far more vulnerable than America and northern European countries (see chart).

Take industrial structure first. Lockdowns will slam countries that depend on labour-intensive activities. Those with large construction sectors, such as many central European countries, look vulnerable. So do those that rely on tourism—it accounts for one in eight non-financial jobs in southern Europe. Conversely, those with large mining industries, which require less labour, may do better. Here Canada looks relatively insulated.

Industrial structure also influences the share of people who can work from home, and thus dodge the worst disruption of the lockdowns. In a paper published on April 10th Jonathan Dingel and Brent Neiman of the University of Chicago estimate that fully 45% of jobs in Switzerland could plausibly be done from home. Many Swiss work in industries, such as finance, where all they really need to do their job is a laptop. Others elsewhere do not have this luxury. Less than a third of jobs in Slovakia, a big manufacturing hub, can be performed remotely; home working is also difficult in southern Europe. Research by Indeed, a job-search website, and Ireland's central bank finds that since the pandemic began, countries where home working is less prevalent have seen bigger falls in the number of online job advertisements.

The shape of the corporate sector is the second consideration. Economies with a large share of small firms are more likely to be scarred by long shutdowns. Minnows tend to have few if any cash buffers, making it hard for them to survive a drought in revenues. A survey by researchers at the University of Chicago, Harvard University and the University of Illinois finds that a quarter of small firms in America do not have enough cash on hand to last even a month. Nearly half of Italians and Australians work for firms with fewer than ten employees, compared with a fifth in Britain and an even lower share in America.

A third determinant of the economic pain to come is the nature of fiscal support. Rich countries have deployed stimulus on an unprecedented

scale. Even by the most conservative estimate, these packages are more than twice as large as in 2008-09. But the size of the stimulus varies widely across countries. Most tallies find that support in America and Japan is the most generous, as a share of GDP; investors, who see their assets as a haven, are happy to provide the necessary funding. Yet some euro-area governments with high debt levels are more cautious, perhaps constrained by the fear that, as members of a currency union, they enjoy only a partial backstop from the central bank. The average fiscal boost in France, Spain and Italy, as a share of GDP, is about half of that provided in Germany.

The design of the stimulus, though, matters as much as its size. Broadly speaking, rich countries have taken one of two approaches to preserving living standards. Some are concentrating on supplementing household incomes. America is sending cheques to families and making unemployment benefits far more generous; Japan is offering handouts to the needy. By contrast, policy in northern Europe and Australia aims mostly to maintain employment by subsidising wages.

Government pledges to protect jobs are normally a bad idea. They prevent workers moving from failing sectors to up-and-coming ones, slowing the recovery. The coronavirus recession may be different, however. If the lockdowns are lifted soon, some European economies will be able to resume production quickly. Elsewhere workers will have to search for jobs, and bosses to hire them. Some American workers will even do better to stay on benefits than find work; according to Noah Williams of the University of Wisconsin-Madison, benefits in six states could exceed 130% of the average wage. That will mean it takes longer for GDP to recover its pre-pandemic level once the lockdowns lift. Instead of leading to a painful few months, the damage could be much longer-lasting. ■



发达国家的衰退

除掉弱者

世界各国准备迎战深度衰退。我们的排名显示哪些国家可能创伤最重【新冠报道】

随着病毒严重扰乱了全世界的生产活动，现在的问题是事情会糟糕到什么程度。国际货币基金组织（IMF）4月14日警告称，这将是将近一百年来最严重的全球衰退。然而，鉴于疫情的严重以及封城持续时间的不确定性，经济学家根据战后的商业周期训练出来的模型没有了用武之地。星巴克和戴尔等公司已经撤回年度盈利预告，甚至对未来闭口不谈。但是，在迷雾之中，有一点看来是肯定的：一些经济体承受的创伤会远超过其他经济体。

经济危机会暴露并加剧结构性缺陷。本刊对50年来GDP数据的分析发现，在经济扩张时期，发达国家的增速往往趋同，即便是其中最疲弱经济体也会被带动着向前。但在经济下行时大家的表现却明显分化。在本世纪头五年里，发达国家之间GDP年增速最高和最低的平均差距为五个百分点。到了2008至2012年全球金融危机之后的衰退期，差距扩大到十个百分点。

这次衰退也不会例外。有三个因素应该可以帮助区分哪些国家将面对糟糕的经济后果，哪些则是到了岌岌可危的程度：一国产业结构、企业部门的构成，以及财政刺激的有效性。本刊使用这些指标对33个发达国家在此次衰退时的脆弱程度做了粗略排序。其中一些，例如南欧国家，似乎比美国和北欧国家脆弱得多（见图表）。

先看产业结构。封城将沉重打击依赖劳动密集型产业的国家。那些建筑业规模庞大的国家看起来就很脆弱，比如许多中欧国家。依赖旅游业的国家也是如此——在南欧，旅游业提供了八分之一的非金融部门就业。相反，那些有着大型采矿业（需要的劳动力较少）的国家可能表现好些。加拿大看起来就相对未受影响。

产业结构还影响着有多大比例的劳动者可以在家工作，从而避开封城带来

最严重的扰乱。芝加哥大学的乔纳森·丁格尔（Jonathan Dingel）和布伦特·尼曼（Brent Neiman）于4月10日发表的一篇论文估计，瑞士有多达45%的工作似乎都可以在家完成。许多瑞士人在金融等行业工作，他们其实只需要一台笔记本电脑就能干活。其他地方的人可没有这么好的条件。在大制造业中心斯洛伐克，只有不到三分之一的工作可以远程操作；在南欧，居家工作也很难实现。求职网站Indeed和爱尔兰央行的研究发现，自疫情开始在全球流行以来，在远程工作较不普遍的国家，网上招聘广告减少的幅度更大。

第二个考虑因素是企业部门的构成。小企业占比高的经济体更容易因长期停工而受损。小微企业一般没什么现金缓冲，因此难以在收入枯竭的情况下生存下去。芝加哥大学、哈佛大学和伊利诺伊大学的研究人员开展的一项调查发现，美国四分之一的小企业手头的现金连一个月都维持不了。近一半的意大利人和澳大利亚人在雇员不到10个人的公司工作，在英国该比例为五分之一，在美国还要更低。

判断未来经济困苦程度的第三个因素是财政支持的特点。富裕国家已经部署了规模空前的刺激措施。即使按最保守的估算，这些刺激计划也比2008至2009年的规模高出一倍以上。但各国财政刺激的规模差异很大。多数统计显示，按占GDP比例计算，美国和日本的支持最为慷慨；投资者将这两国的资产视为避风港，也乐于提供必要的资金。而一些背负高债务的欧元区政府出手更谨慎，或许是担心自己作为一个货币联盟的成员只能从央行获得部分支持。按占GDP比例计算，法国、西班牙和意大利的平均财政刺激规模只有德国的一半左右。

不过，刺激方案的设计与规模同等重要。一般而言，富裕国家普遍采取以下两种方法之一来维持生活水平。一些国家集中精力补助家庭收入。美国正向家庭发放支票，同时大幅提高了失业救济的慷慨程度；日本也向贫困人口提供救助。相比之下，北欧国家和澳大利亚的政策主要是通过补贴薪资来维持就业。

政府出面保障就业通常不是个好主意。这样做会妨碍工人从没落的产业转

移到有前景的新兴行业，拖慢经济复苏的步伐。但是，这次冠状病毒导致的衰退可能有所不同。如果不久之后就解除封城，一些欧洲经济体将可以迅速恢复生产。而其他地方的劳动者则不得不重新找工作，雇主也要重新招工。一些美国劳动者依靠失业救济甚至会比重新就业过得更好；威斯康辛大学麦迪逊分校的诺亚·威廉姆斯（Noah Williams）指出，有六个州的救济可能超过了平均工资的130%。这意味着，一旦封城解除，GDP需要更长时间才能恢复到疫情之前的水平。这不只是苦熬几个月的问题，损害可能会长久得多。 ■



China's economy

Fighting with shadows

Despite a dramatic slowdown, the government is being unusually parsimonious

GOLDEN EAGLE WORLD is a glistening monument to commerce, a nine-storey mall with endless stores and restaurants, virtual-reality arcades and spas, even a zoo. But it is now trying something more basic, setting up food stalls outside to drum up business. Although China is back to work, customers have been slow to return. The giant mall in the eastern city of Nanjing has used giveaways and promotions, all to limited effect. “We’ve got to be prepared for a protracted war,” says one of its executives.

Most in China would recognise the term “protracted war”. It is a reference to Mao’s strategy for fighting Japan’s invading army in the 1930s: be patient and, little by little, wear the enemy down. It also happens to be a good description for the government’s approach to bringing the economy back from the coronavirus shutdown. It is shaping up to be a long, grinding battle, not a rapid victory.

Growth in the first quarter compared with the prior year was negative—China’s first official contraction in more than four decades. In the past this would have guaranteed a big stimulus. Yet this time its response has been more restrained. Other countries have announced huge spending packages. Why has China been so stingy?

There are two critical things to note. First, appearances are somewhat deceptive; a closer look reveals similarities between China’s economic policy response and those of other countries. Second, China would like to do more, but the lingering covid-19 threat is holding it back.

Start with the obvious contrasts between China’s actions and those of other

governments. Japan's fiscal stimulus, for instance, is around 10% of its GDP, and rises to twice that when loans and loan guarantees are included. China, meanwhile, has made no special announcement, instead rolling out a hodgepodge of policies that, added up, reach perhaps 3% of its GDP.

Many governments are using new tools to help struggling businesses. Corporate bail-outs have been a core element. America has earmarked \$850bn for loans to companies. Britain set aside £330bn (\$412bn) for loan guarantees. China, by comparison, does not need such fiscal parachutes. They are built into the system: as much as 80% of corporate loans go to state firms and hence already enjoy implicit guarantees.

China, without any fanfare, is in fact leaning on state-owned banks. The total amount of new credit issued last month was equivalent to 5% of last year's GDP—the highest for any month since 2010, the tail-end of a giant stimulus. Arrangements are often discreet. The Golden Eagle executive says that in late February a group of bankers came to the mall to determine which tenants they could prop up.

With such backstops in place, the financial fallout from the outbreak has been limited so far. The peak-to-trough drop in China's stockmarket was 16%, less than half of America's plunge. Credit spreads exploded in Western bond markets; in China they have barely widened (see chart). Defaults have been rare. In the past two months just four companies missed bond payments in China for the first time, less than half as many as during the same period last year. "In the bad times you see more advantages of the system," says Yu Yongding, a former adviser to China's central bank.

But make no mistake. This is still a major departure from China's customary largesse. A typical stimulus policy—variations of which were seen in 2009, 2012 and 2016—would involve some combination of a surge in infrastructure spending, incentives to spur consumption, and loosened

restrictions on the property market. All have been conspicuously absent so far.

In part this reflects a newfound prudence. Given China's heavy debt load, economic authorities have fought to rein in leverage and snuff out financial risks over the past few years. They are loth to see their progress undone. But there is also a more important reason for restraint. Many economists in China have come to the conclusion that it is simply too soon for an all-out push to revive growth.

Peng Wensheng, chief economist with Everbright Securities, a brokerage, wrote in a recent essay that the unknowns of covid-19 mean that policy is sure to be wrong. If the government is overly optimistic about the pandemic, it will stoke the economy too soon, forcing it to backtrack. If overly pessimistic, it will wait too long to ease curbs, requiring more stimulus later on. The risks, he concluded, were asymmetric: it would be far better to defer the rebound than to reimpose lockdowns. Mr Yu puts it more bluntly. "Until the pandemic is under control, the main objective is survival," he says. Zhong Zhengsheng, chief economist of CEBM, an advisory firm, adds that stimulus will be more effective when global supply chains are up and running—an argument that no country, not even one as big as China, can get too far ahead of the rest of the world.

In practice China's economy is undergoing a daily stress test. The authorities are letting more activity resume, probing the limits of what is safe and how comfortable people feel. At Golden Eagle World, managers had hoped for a full recovery by now. Instead, business is still as much as 20% below normal, a gloomy portent for the economy. Such are the uncertainties that China's leaders have not yet declared an economic-growth target for this year, a figure that normally serves as a lodestar for officials up and down the country.

The uncertainty touches even basic matters, such as whether to eat in restaurants. Last month Nanjing launched a campaign to encourage residents to leave their homes, handing out 318m yuan (\$45m) in shopping vouchers. But signs around the city still admonish people to avoid crowds and stay in well-ventilated spaces. The pandemic descended on China and the world suddenly—but its shadow will take much longer to disappear. ■



中国经济

暗影格斗

尽管经济增长急剧放缓，政府出手却异常吝啬【新冠报道】

金鹰世界是一座闪亮的商业丰碑。这家九层高的购物中心内设有无数商铺和餐厅，还有虚拟现实游戏厅和水疗中心，甚至还有动物园。但目前它正在尝试一些更原始的做法——搭设露天小吃摊以招徕顾客。尽管中国正在复工复产，顾客的回归却缓慢。这家位于中国东部城市南京的巨型购物中心以赠品和促销活动来吸引顾客，但成效有限。“我们得准备好打一场持久战。”一位高管表示。

大多数中国人都熟悉“持久战”这个词。它源自毛泽东在上世纪30年代对抗日本侵略军的战略：保持耐心，一点一点消耗敌军。它恰好能描绘中国政府在因新冠疫情封城后重启经济的战略。事情正在演变成一场漫长而艰苦的战斗，难以速战速决。

第一季度经济同比增速为负数，是40多年来中国首次官方报告经济收缩。换在过去，政府肯定会推出大规模经济刺激措施。但这次政府的反应更克制。其他国家已纷纷宣布巨额支出计划。为何中国如此吝啬？

有两个关键问题值得注意。第一，表象有一定程度的欺骗性：细察之下可发现中国的经济对策与他国之间存在相似之处。第二，中国有意采取更多措施，但疫情威胁未退，令行动受阻。

先看中国在行动上与其他国家政府的明显对比。例如，日本的财政刺激金额约占其GDP的10%，如果加上贷款和贷款担保还要再翻一倍。相比之下，中国没有专门宣布什么刺激计划，而是推出林林总总的政策，总额可能达到GDP的3%。

许多政府正采用新工具援助陷入困境的企业。企业纾困一直是核心要素。美国已确定拨款8500亿美元用于向企业贷款。英国已留出3300亿英镑

（4120亿美元）用作贷款担保。相比之下，中国不需要这种财政“降落伞”。保护机制已内置于其体系之中：多达80%的企业贷款流向国企，因而它们已经享有隐性担保。

虽没有大张旗鼓，中国实际上正通过国有银行纾困。上个月的新增贷款总额相当于去年GDP的5%，是自2010年（一轮大规模刺激措施的尾声）以来最高的月度新增额。相关行动往往低调谨慎。金鹰世界的高管表示，2月下旬，一群银行人员来到购物中心评估该资助哪些租户。

因为有这些后盾机制，到目前为止疫情对中国造成的金融冲击有限。中国股市从峰值下跌的最大幅度为16%，不到美国暴跌幅度的一半。西方债券市场的信用息差飙升，在中国则基本没有扩大（见图表）。债务违约并不多见。过去两个月，中国只有四家公司首次未能按时偿付债券本息，不到去年同期的一半。“艰难时期更能显现我们的制度优势。”中国人民银行前顾问余永定说道。

但别误会。这还是和中国惯常的大手笔刺激大相径庭。典型的刺激政策（在2009年、2012年和2016年都可看到它的变奏曲）往往是三方面措施的某种混合：大幅增加基建支出、刺激消费、放宽对房地产市场的限制。但显然，如今这三样明显都还没有出现。

这在一定程度上反映出一种新出现的审慎态度。鉴于中国沉重的债务负担，经济主管部门在过去几年一直努力控制杠杆，防金融风险于未然。他们是不愿看到前功尽弃的。但变得克制还有一个更重要的原因。中国许多经济学家认为，全面推动经济复苏还为时过早。

光大证券的首席经济学家彭文生近期在一篇文章中写道，新冠疫情充满不确定性，这意味着政策难免会出错。如果政府对这场大流行病过分乐观，过早刺激经济，将会导致疫情反复。假如过分悲观，太迟放松隔离措施，以后就需要更多经济刺激。他总结认为，风险是不对等的：推迟反弹远好过再次封城。余永定更直截了当地表示：“在疫情得到控制之前，主要目标是生存。”咨询公司莫尼塔的首席经济学家钟正生补充说，等到全球供

供应链恢复运行时再推出刺激措施会更有效。这种观点即是认为没有哪个国家能远远跑在世界其余地区的前头，就算庞大如中国也不行。

实际上，中国经济现在每天都在经受压力测试。政府正逐步让更多活动恢复，摸索安全措施和人们舒适度的边界。在金鹰世界，管理人员本希望到现在一切已完全恢复正常，但实际业务仍只有正常水平的八成。对整体经济而言，这是个黯淡的预兆。鉴于这样的不确定性，中国领导人尚未宣布今年的经济增长目标，以往这个目标会是中国各级官员工作的指导原则。

这种不确定性甚至触及到一些基本事项，比如要不要在餐厅堂食。上个月，南京发起了一项鼓励居民走出家门的活动，发放了3.18亿元人民币的消费券。但是，城内各处的标语仍劝告人们避免聚集，留在通风良好的场所。疫病突袭了中国及世界，其阴影的消散却要慢得多。 ■



Distributed companies

The nowhere firm

Pandemic lessons for all businesses from startups born office-less

“WEIRDLY, THINGS haven’t changed much”, says Kyle Mathews as he sprays disinfectant on his hands. At least at work. His startup, Gatsby, helps websites manage content in the cloud. It has no headquarters and its 50-odd employees straddle the world, from Mr Mathews’s home in Berkeley, California, to Siberia.

Such “fully distributed” firms were on the rise before covid-19. As national lockdowns spread, conventional ones are forced into similar arrangements. Those that have grown up this way offer lessons.

Distributed organisations are as old as the internet. Its first users 50 years ago realised how much can be done by swapping emails and digital files. These exchanges led to the development of “open source” software, jointly written by groups of strangers often geographically distant.

Today most distributed startups have open-source roots. Gatsby is one. Nearly all 1,200 employees of another, Automattic, best known for WordPress, software to build websites, work from home. GitHub, which hosts millions of open-source projects (and was acquired by Microsoft in 2018), may be the world’s biggest distributed enterprise. Two-thirds of its 2,000 staff work remotely. Most firms that build blockchains, a type of distributed database, are by their nature dispersed.

Plenty of startups start out distributed to avoid high rents—and so high wages—in Silicon Valley and other tech centres. Many opt to stay that way. Joel Gascoigne, boss of Buffer, which helps customers manage social-media accounts, works remotely in Boulder, Colorado. Stripe, an online-payments

firm, has a head office in San Francisco but its new engineering hub is a collection of remote workers.

Distributed startups exist thanks to a panoply of digital tools—most obviously corporate-messaging services such as Slack (chat) and Zoom (videoconferencing), as well as lesser-known firms like Miro (virtual whiteboards for brainstorming) or Donut (which pairs employees to forge personal bonds). Others, like Process Street, Confluence or Trello, help manage work flow and keep track of what goes on in virtual corridors—crucial when people do not share the same physical space. Firms offering organisational scaffolding for distributed firms include Rippling, which manages payroll and employee benefits, grants workers access to corporate services and sets up their devices. Much that is now done in spreadsheets could be turned into a virtual service, predicts Rich Wong of Accel, a venture-capital (VC) firm (and early investor in Slack).

Besides new tools, distributed firms need novel management practices. One rule is not to mix physical and virtual teams. Online participants in mixed meetings often feel excluded. GitHub's boss, Nat Friedman, has all employees—himself included—log in to meetings virtually, even if they are in the office. Looking over someone's shoulder to see if they are working (or worse, use software to do it) is another no-no. Remote workers do not slack off, as some managers fear. Trust your team, set clear and, where possible, measurable goals, and let people do their thing, counsels Mr Mathews. To foster camaraderie, Buffer organises an annual in-person retreat (covid-19 will push it online this year).

Trust also requires transparency and explicitness—another reason documentation is key, says Michael Pryor, co-founder of Trello (whose workforce is 80% remote). Discussions that lead to a decision must be captured in writing, he explains, so everyone understands the trade-offs being considered. As a result, distributed firms favour wordsmiths, not

good speakers as traditional firms do. Good writing demands clear thinking and discipline, says Mr Friedman, who has been managing distributed teams for 20 years. VCs duly report that distributed startups tend to be better at preparing board meetings.

The pandemic may lead some companies that have outsourced lots of operations to the cloud to go a step further and get rid of at least some offices. “I just don’t think we are going to go back [to business as usual]”, says Frank Sloatman, boss of Snowflake, a database firm. Even digerati like Twitter plan to turn more virtual.

Still, some businesses suddenly forced into remote work will rue the experience, predicts Mr Gascoigne. Without a learning period they will get all the drawbacks and few of the benefits. Brainstorming and other creative activities are possible online but take practice—and even then feel like an imperfect *ersatz* of an actual room. Recruiting and breaking in new employees is hard virtually. According to one recent survey of 3,500 remote workers, one in five struggles with loneliness. That is partly why GitHub and Trello operate optional offices.

Most businesses will always have to be located somewhere and need people to work side by side. But as technology improves, swathes of the knowledge economy will gradually move more functions online, thinks Venkatesh Rao of Ribbonfarm, a consultancy. New firms will erect a new virtual floor, which others then inhabit. The coronavirus-fuelled exodus to cyberspace is unlikely to be the last. ■



分布式企业 乌有公司

从原本就没有办公室的创业公司身上学习应对大流行病的经验【新冠报道】

“挺奇怪的，其实没太大变化。”凯尔·马修斯（Kyle Mathews）一边往手上喷消毒液一边说。至少在工作上是这样。他的创业公司Gatsby帮助网站管理存储在云上的内容。它没有总部，50来个员工分布在全球各地，从马修斯在加州伯克利的家一直到西伯利亚。

这种“完全分布式”公司在新冠疫情之前就呈增多之势。随着越来越多的国家开始封城隔离，传统的公司也被迫采取类似的做法。而那些以此种方式成长起来的公司提供了经验。

分布式组织和互联网的年纪一样大。50年前，它的第一批用户意识到通过电子邮件和数字文件的往来能做许多事。这些交流让“开源”软件（由通常在地理位置上相隔甚远的一群陌生人共同编写）得以发展。

时至今日，大部分分布式创业公司都出身于开源。Gatsby就是其中之一。另一家公司Automattic的1200名员工几乎全部在家办公。Automattic最著名的产品是创建网站的软件WordPress。拥有数百万个开源项目的GitHub（于2018年被微软收购）可能是世界上最大的分布式企业，其2000名员工中有三分之二远程工作。大多数建造区块链（一种分布式数据库）的公司从其特性上就决定了它们是分散作业的。

很多创业公司从一开始就是分布式的，从而避免了硅谷和其他科技中心的高租金和高工资。许多公司选择一直保持这种方式。帮助客户管理社交媒体账户的公司Buffer的老板乔尔·加斯科因（Joel Gascoigne）在科罗拉多州博尔德（Boulder）远程办公。线上支付公司Stripe的总部设在旧金山，但它的新工程中心是一群远程工作人员在运作。

分布式创业公司的存在要归功于大量的数字工具，其中最明显的是企业信

息服务，如Slack（聊天）和Zoom（视频会议），以及不太知名的公司，如Miro（用于头脑风暴的虚拟白板）或Donut（将员工配对以建立个人联系）。还有像Process Street、Confluence和Trello这样的工具，它们帮助管理工作流程，并在虚拟通道跟踪进展，这在人们不处在同一个物理空间时至关重要。为分布式公司搭建组织的公司包括Rippling，它负责管理工资和福利，让员工使用公司服务并配置他们的设备。风险投资公司Accel（Slack的早期投资者）的瑞奇·王（Rich Wong）预测，现在在电子表格中完成的很多工作都可以转变成虚拟服务。

除了新的工具，分布式企业还需要新的管理方法。规则之一是不要将实地团队和远程团队混在一起。当两批人混在一起开会时，在线接入的人常有格格不入的感觉。GitHub的老板纳特·弗里德曼（Nat Friedman）让包括他自己在内的所有员工都虚拟地接入会议，即使他们人就在办公室里。另一个禁忌是时刻监控员工是不是在工作（或者更糟，用软件来监督）。远程办公的员工不会像一些经理担心的那样会偷懒。马修斯建议，要信任你的团队，尽可能设定清晰、可衡量（有可能的话）的目标，让员工自行安排工作。为了培养同事之间的友谊，Buffer每年组织一次面对面的聚会（今年因新冠疫情将改为线上）。

Trello（其员工有八成为远程办公）的联合创始人迈克尔·普赖尔（Michael Pryor）表示，信任还需要清晰透明和明确表达，这也是文件记录非常重要的另一个原因。他解释说，最终做出决策的那些讨论必须以书面形式记录下来，这样每个人都能了解其中涉及的权衡取舍。因此，分布式公司更喜欢擅长文字的人，而不是像传统公司那样喜欢擅长演讲的人。弗里德曼已经管理分布式团队20年，他认为好的写作需要清晰的思维和训练。风投公司的报告也颇合时宜地印证说，分布式创业公司更善于准备董事会会议。

眼下这场大流行病可能会促使一些已经将大量工作放到云端的公司更进一步，砍掉至少一部分办公室。“我认为我们不会再回去（过去那种模式）了。”数据库公司Snowflake的老板弗兰克·斯鲁特曼（Frank Sloatman）说。即使是像Twitter这样的数字精英企业也准备让自己变得更加虚拟化。

尽管如此，加斯科因预计，一些突然被迫开始远程办公的企业会对这样的经历感到懊恼。没有经过一个学习阶段，它们会体验到所有那些弊端而非益处。头脑风暴和其他创造性活动确实可以在网上开展，但需要练习，而即使经过练习，也仍会让人感到无法完美替代现实空间。通过虚拟途径招聘新员工并且训练他们适应工作是一件难事。近期一项对3500名远程工作者的调查显示，五分之一的人在与孤独做斗争。这也是GitHub和Trello仍然保留办公室供员工选择的原因之一。

大多数企业通常还是得安置在某个地方，也还是需要人们肩并肩地工作。但咨询公司Ribbonfarm的凡卡特什·拉欧（Venkatesh Rao）认为，随着技术的进步，大量的知识经济将逐渐把更多的工作转移到网上。新企业将建立一个新的虚拟空间，其他人将会入驻其中。由新冠病毒引发的向网络空间的大迁移不太可能是最后一次。■



America v China

Huawei and 5G Geopolitics

Open standards, not sanctions, are America's best weapon against China's telecoms giant

TECHNOLOGY IS POWER. Whoever controls the global digital infrastructure controls the world. That is why America is so worried about China's rise as a technological superpower. It also explains why it is going to such lengths, even using European-style industrial policy, to rein in Huawei, China's leading maker of telecoms equipment. The company leads the world in 5G, the next generation of mobile networks, which are expected to become the central nervous system of the global economy.

Yet by any measure America is losing the fight against Huawei, along with what President Donald Trump, steeped in zero-sum thinking, calls the "race to 5G". The Chinese firm keeps on growing; the rollout of 5G in China continues apace; and most of America's allies have so far ignored its entreaties to ban Huawei gear entirely from their national 5G networks on security grounds. Even so, the Trump administration seems intent on doubling down on its strategy. If hawks have their way, any chipmaker that uses American technology, which nearly all do, will soon have to ask for permission in Washington, DC, to sell its wares to Huawei.

The problem with America's strategy is that it is trying to win today's "tech cold war", as some call it, with yesterday's arsenal. In effect it is trying to build an impenetrable wall around Huawei by any means necessary. This is a fool's errand in a hyper-connected world in which technology and talent can flow freely. It only provides extra incentives for Huawei—and China—to become technologically self-sufficient. If America wants to win the race to 5G and, more generally, the battle for digital supremacy, it needs a new approach. Happily, the country's own technology industry points the

way: it has thrived on openness, software and a healthy balance of competition and co-operation. And that approach is at last now being applied in telecoms.

Mobile networks, long dominated by specialised hardware, are becoming defined by software. On April 8th Rakuten, a Japanese online giant, launched the world's first fully "virtualised" mobile network, built using general-purpose hardware and lots of software. Other mobile carriers will follow suit. Such networks would go a long way towards dealing with America's concern about Huawei: that using the firm's gear in 5G networks could let the Chinese government intercept data or sabotage rival economies.

Virtualised networks need not rely on one vendor, but can be built with components from many, allowing carriers to pick and choose—and, if necessary, to steer clear of those made in China. They also create an opening for American tech firms, which play only a small role in the mobile-telecoms networks of today. (Many of the components of Rakuten's network are made in America.) Moreover, such networks are cheaper to develop, make and maintain than conventional ones, because they are made mostly from off-the-shelf hardware, controlled by software—doing away with the argument of many mobile operators, that banning Huawei would force them to buy more expensive kit from Ericsson and Nokia, its main competitors.

Admittedly, virtualised networks will not solve all security problems, and the underlying standard, called OpenRAN, is not yet mature. But it is early days for all 5G networks. It will take years to roll them out fully and the covid-19 crisis has done nothing to speed up the process. So there is time.

The Trump administration and other governments should do all they can to accelerate the development of virtualised networks by subsidising research

and perhaps even mandating the use of technical standards that allow mobile networks to be virtualised. All this may sound far-fetched at a time when America's government appears stuck in the past and incapable of coming up with a coherent strategy. But as in many other domains, covid-19 creates room for new thinking. America will either pursue a tech cold war with an uncertain outcome, or help create an industry of the kind that American tech firms understand and have thrived in—letting Chinese companies join in only if they follow the rules. Sometimes establishing a robust, safe technology is not about concentrating power so much as diffusing it. ■



【首文】中美对抗

华为和5G地缘政治

开放的标准，而非制裁，才是美国对付中国通信巨头的最佳武器

科技就是力量。谁控制了全球数字基础设施，谁就控制了世界。这就是美国如此担心中国崛起为科技超级大国的原因。这也解释了美国何以要竭尽全力遏制中国的通信设备制造巨头华为，甚至为此采取欧洲式的产业政策。华为在5G上领先于世界，而这个下一代移动网络预期会成为全球经济的中枢神经系统。

然而无论怎么看，美国都在输掉与华为的争战，以及沉浸在零和思维里的特朗普所称的“5G竞赛”。这家中国公司不断发展壮大；5G继续在中国快速推广；美国以安全为由要求盟国在本国的5G网络中完全禁用华为的设备，但迄今为止大多数盟国都无视这一请求。即便如此，特朗普政府似乎仍打算加强这项战略。如果鹰派得偿所愿，那么任何使用美国技术的芯片制造商，也就是几乎所有的芯片制造商，很快都将不得不征求华盛顿特区的许可才能把产品卖给华为。

美国战略的问题在于，它试图用昨天的武器库来赢下今天的“科技冷战”（一些人的称法）。实际上，它正尝试用尽一切必须手段在华为周围竖起一道无法穿透的墙。在一个技术和人才可以自由流动的高度连接的世界里，这只会徒劳无功。它只会进一步刺激华为，以及中国，让它们追求技术上自给自足。如果美国想赢得5G竞赛以及更广泛的数字霸权之战，就需要一种新的方式。所幸，美国自己的科技产业指明了道路：它依靠开放、软件，以及竞争与合作之间的健康的平衡而蓬勃发展。而这种方式现在终于用到了通信上。

长期以来由专用硬件主导的移动网络正转向由软件来定义。4月8日，日本网络巨头乐天（Rakuten）推出了世界上第一个完全“虚拟化”的移动网络，用通用硬件和大量软件建成。其他移动运营商也将效仿。这样的网络能大大解除美国对华为的担忧——它担心在5G网络中使用华为的设备可能

会让中国政府拦截数据或破坏竞争对手的经济。

虚拟网络不需要依赖单个供应商，而是可以用许多供应商的组件构建，让运营商可以挑挑拣拣，必要时还可避开中国制造的组件。虚拟网络也为美国科技公司创造了机会，这些公司在目前的移动通信网络中仅扮演很小的角色。（乐天网络的许多组件是美国制造的。）此外，这类网络开发、建造和维护的成本比传统网络更低，因为它们主要由软件控制的现成硬件构成，这也使得许多移动运营商担忧的理由不复存在，即封杀华为会迫使它们从华为的主要竞争对手爱立信和诺基亚那里购买更昂贵的设备。

诚然，虚拟化网络无法解决所有安全问题，而且名为OpenRAN的基础标准尚未成熟。但所有5G网络都还处于发展初期。要完全部署它们要花好几年，新冠肺炎更是让这个过程快不起来。所以还有时间。

特朗普政府和其他国家政府应尽一切努力，通过补贴研究，甚至强制使用允许移动网络虚拟化的技术标准，来加速虚拟化网络的发展。在美国政府似乎沉湎于过去而无法提出连贯一致的战略的当下，这听起来似乎不切实际。但和其他许多领域一样，新冠肺炎创造了探索新思路的空间。美国要么打一场结果不确定的科技冷战，要么得帮助建立一个美国科技公司理解且已在其中蓬勃发展的行业——中国公司只有遵守规则才能加入。有时候创立强健、安全的技术需要的不是集中力量，而是分散力量。■



Manufacturing at a distance

Still made in China

Covid-19 is changing factories. Some of the new ways of doing things will be permanent

MANY OF THE robots on factory floors operate in cages, fenced off from their human colleagues. The separation prevents the machines, in the routine and mindless pursuit of a bolt, from crushing the leg, hand or chest of a worker who happens to get in the way.

Now factory operators do not just need to keep human workers at a safe distance from robots; they have to keep them at a safe distance from each other, too. In China, fences between workers are among the measures bringing factories back to life.

Most Chinese factories are now back to operating at around 80% of capacity. Some are pushing 100%. Foxconn, the Taiwanese contract manufacturer which assembles the majority of Apple's iPhones in China, says that with the help of tests for the virus and chest x-rays it has been able to get all its operations on the mainland back up and running with no risk to the health of its workers. In a call to investors on April 1st it reported that it was on target to provide Apple with all the 5G iPhones it needs for the launch of the device this autumn.

Many of the measures that made China's great reopening possible were boring-but-important changes to existing protocols; more hygiene measures, more separation between workers, and screening (companies in China and elsewhere are trying to get their hands on a lot of tests for SARS-CoV-2 infection).

But there has also been investment in automation and remote operation that has brought forward improvements not expected for some time to

come. Anna Shedletsy, the boss of Instrumental, a firm which uses machine learning to help manufacturers improve their processes, says that in electronics manufacturing “We’re going to do five years of innovating in the next 18 months.”

Modern high-tech factories already have systems in place to control who comes in or out and what they have on their person. The procedures which identify workers now take their temperatures, too. Many factories are also relying on a variety of “health code” apps developed by provincial Chinese governments. These run through portals inside WeChat and AliPay, two payment apps, to determine the worker’s health status and travel history. Willy Shih of Harvard Business School, who studies Chinese factories and supply chains, says such techniques were developed during the outbreaks of SARS and H1N1, in 2003 and in 2009, respectively. “Normally you change out of street clothes and go through a security check,” he says. “In many respects the [new protocols] are a small incremental addition.”

Once inside the factory, the changes required depend on what the workers are making. Those in car factories are already spread out and do not need much repositioning—though some manufacturers are using fences to enforce separation. The parts the workers handle are regularly disinfected as they pass through the assembly process, says Tu Le, a consultant. At a phone factory in Guangdong province, though, changes in layout are immediately apparent. Workers no longer cluster around each step of the assembly process in dense U-shaped cells; instead they are spread out, increasing their safety at the expense of some speed.

| *Making it better*

The obsessive and precise standards of modern global production make it comparatively easy for factories to adapt in such ways. However well a production process is adapted, though, things can still all go to pot if less cautious suppliers have to shut down and the parts the factory needs from

them run out. As a result factories around the world have been stockpiling ferociously since news of the outbreak broke in January, going against the nature of modern just-in-time supply chains.

Another problem is new product introduction (NPI), a vital part of the business cycle in the electronics industry which is roughly 10% of Chinese manufacturing by value. During NPI, engineers from companies abroad fly in to tweak and tune the development of new products—something which today's all-but-closed Chinese border makes impossible.

This has afforded Ms Shedletsky's company a nice opportunity. The firm sells a system which uses machine learning to examine images of every single item a factory makes at every single stage of its assembly. It lets users explore the causes of any flaws, thereby increasing yields and reducing wasted time, money and materials. The amount of detail captured by the system also lets engineers from client companies inspect and manage production from halfway around the world—which under covid-19 has become a primary selling-point.

Engineers at P2i, a client of Instrumental's which makes nanotechnology coatings for electronic devices, can sit at their headquarters in Oxford inspecting work at factories in China at a level of detail previously only accessible to someone on the spot. (Some of them have done the same while quarantined in hotels just down the road from the plant in question.) Neal Harkrider, the firm's chief operating officer, says it has started connecting its manufacturing equipment to the internet, so that it can make the adjustments that Instrumental's system recommends remotely, closing the developmental loop.

There is a near miraculous irony to the idea that the nanotechnology embodied in the protuberant proteins and RNA programming of SARS-CoV-2 is changing, through its decidedly macroscopic effects on human

health and the world economy, the processes of a company like P2i that fashions its own wares back down on the virus's own scale. But in truth it is merely accelerating a transformation that the world's manufacturers were undergoing already. As products become more complex and their components more minute, there comes a point when human hands and eyes cease to be useful instruments for their assembly.

For a glimpse of that future, look at the world's most complex manufacturing operations, those that produce semiconductors. Chip factories have hardly felt the impact of covid-19 at all. This is because laying down nanometre-scale transistors by the billion is far too complex for human minds to contemplate, let alone human hands to achieve, and so humans do not need to gather together on a shop floor to do it.

The world's leading contract manufacturer of semiconductors, Taiwan's TSMC, runs its most advanced facilities from central control rooms in which humans manage machines that move the silicon being engineered around in a hyperclean environment that human workers rarely visit. In Wuhan, ground zero for the pandemic, Yangtze Memory Technologies, a Chinese chip company that is a darling of Beijing, kept operating throughout the months of lockdown which ended in April 8th, its controlling engineers shuttled in on special trains.

For the manufacture of chips and screens, all-but-complete automation is unavoidable. In other contexts, the cost of re-engineering systems and buying new kit has kept people in the loop and on the floor. They will not vanish overnight. But covid-19 has provided a new spur for more factories to approach the machinic perfection of chip foundries. That new distancing between human and machine is likely to long outlive the disease itself. ■



隔离式制造

仍是中国制造

新冠肺炎正在改变工厂。一些新的工作方式将成为常态【新冠报道】

工厂车间里的许多机器人都在笼子里工作，与它们的工人同事隔开。这种隔离是为了避免机器在按部就班地寻找零部件时，撞到碰巧挡了道的工人的手脚或胸口。

现在，工厂经营者不仅要让工人和机器人保持安全距离，还必须让工人彼此之间也保持安全距离。在中国，在工人之间设置栅栏成了让工厂复产的措施之一。

大多数中国工厂现已复产，恢复到正常产能的80%左右。有些工厂正在努力实现100%复产。在中国组装了大部分苹果iPhone手机的台湾代工企业富士康表示，通过病毒检测和胸透检查，在中国大陆的所有业务已经在不危及员工健康的情况下恢复运营。在4月1日的投资者电话会议中，富士康表示正按计划生产，将能为苹果足量供应于今年秋季推出的5G版iPhone。

中国得以大规模复工复产的许多措施都是对既有工作规范做出的枯燥但重要的改动：更多卫生措施、拉大工人间隔，以及筛查（中国和其他地方的公司都在尽量实施大量新冠病毒感染检测）。

但在自动化和远程操作方面也有所投资，带来了原本预计还要一段时间才能出现的改进。使用机器学习帮助制造业改进流程的公司Instrumental的老板安娜·谢德列茨基（Anna Shedletsky）表示，在电子制造方面，“我们要在未来18个月内完成五年的创新。”

现代高科技工厂早已配备了控制人员进出的系统，同时也可检测他们随身携带的物品。这些识别工人身份的程序中现在也加上了测量体温。许多工厂还依赖中国各省政府开发的各种“健康码”应用。健康码通过两大支付平台（微信和支付宝）中的入口使用，用来确定工人的健康状况和旅行史。

哈佛商学院研究中国工厂和供应链的史兆威（Willy Shih）表示，这些方法是在2003年非典和2009年H1N1疫情期间开发的。“通常你要换下自己的衣服，然后通过安检。”他说。“在很多方面，（新的程序）只是稍微增加了些内容而已。”

进入到工厂里头后的改变则取决于工人生产的是什么产品。在车厂里，工位原本就比较分散，不需要太多重新部署，但也有一些制造商用栅栏强制隔开工人。咨询师乐途（音译）说，工人经手的零部件会在装配线上不断消毒。不过，在广东一家手机厂，工位布局的变化一目了然。工人不再按每个装配步骤分批挤在U型单元里，而是分散开来，牺牲一些速度以换取更高的安全性。

| 精益求精

现代全球化生产严苛而精确的标准使得工厂相对容易适应这种改变。然而，无论生产流程调适得多好，一旦有供应商出现疏漏而被迫关停，导致工厂所需的零部件断供，一切努力仍可能付之东流。正因如此，1月疫情爆发的消息传出后，世界各地的工厂开始疯狂囤货，完全背离了现代“及时”型供应链的特性。

另一个问题是新产品导入（NPI），这是电子产业商业周期的关键一环，而电子产业约占中国制造业产值的10%。在新产品导入期间，海外公司的工程师要飞过来微调和优化新产品的开发——如今在中国几乎完全关闭边境的情况下已经不可能了。

这对谢德列茨基的公司来说是一个良机。这家公司销售的系统采用机器学习，检查工厂组装线上每个环节生产的每件物品的图像。这让该系统的用户可以探查任何缺陷发生的原因，从而提高良品率，减少时间、金钱和物料的浪费。该系统采集的大量细节也可以让客户公司的工程师在地球另一端参与生产的检查和管理——在新冠肺炎疫情期间这已成为一个主要卖点。

Instrumental的客户P2i专为电子器件提供纳米涂层技术。现在该公司的工

工程师可以坐在牛津的总部检视中国工厂里的生产状况，而这样细致的检查以往只能在现场进行。（一些工程师在那家工厂附近的酒店里隔离时也曾这么操作过。）公司的首席运营官尼尔·哈克莱德（Neal Harkrider）表示，公司已经开始将生产设备连上互联网，以便根据Instrumental系统的建议远程做出调整，实现了闭环开发。

新冠病毒的突起蛋白和RNA编码体现了一种纳米技术，它在宏观层面上给人类健康和世界经济带来了明确的影响，从而改变了P2i这类公司的生产流程，而P2i的工艺本身正是在类似病毒的级别上进行，真是一种不可思议的讽刺。但事实上，这只不过是加速了世界制造业早已开始的变革而已。随着产品越来越复杂、组件越来越微小，到了一定程度之后，人的手和眼在组装产品时已无用武之地。

要一窥未来的面貌，只需看看世界最复杂的制造工艺——半导体生产。芯片工厂几乎完全没有受到新冠肺炎的冲击。这是因为要排布数十亿计的纳米级晶体管实在过于复杂，远非人类大脑所能想象，更不用说靠人手来实现，所以根本不需要工人聚集在车间里工作。

台湾的台积电是全球领先的半导体代工厂，其最先进的工厂都是通过中央控制室来操控运行的。员工在中控室操纵机器在超洁净环境中加工硅器件，鲜少需要进入生产环境。中国芯片公司长江存储科技位于这次疫情的震中武汉市，作为备受北京重视的企业，它在4月8日之前武汉封城的几个月里一直保持运作，其控制工程师乘坐专门列车分批进入。

就芯片和屏幕制造而言，接近完全自动化是不可避免的。在其他领域，重新设计系统以及购买新设备都需要成本，因此在工艺流程和生产车间里仍然保留了人类员工。他们不会在一夜之间消失。但新冠肺炎给更多工厂提供了新的动力去追求芯片厂那种完美的机械化。疫情终会过去，但人与机器之间进一步的疏远应该会长久持续下去。 ■



The Economist film

Vaped and confused: should e-cigarettes be banned?

British public health experts say that e-cigarettes are around 95% less harmful than tobacco. So other than nicotine, what else is in them?



经济学人视频

驱散电子烟迷雾：它应该被禁吗？

英国公共健康专家认为电子烟比烟草的危害少95%。所以除了尼古丁之外，它的主要成分是什么？



Inequality, revisited

A modern Marx

A bestselling economist sets out the case for socialism

THOMAS PIKETTY'S "Capital in the Twenty-First Century", first published in 2013, made the French economist a household name. Combining heavy economic theory with data wizardry and commentary on the novels of Jane Austen and Honoré de Balzac, Mr Piketty argued that capitalism almost inevitably generates high and rising inequality. Many of his claims—that the stock of wealth in an economy grows faster than income, for instance, or that inequality in the West is approaching levels last seen during the Belle Époque—are now both familiar and fiercely debated.

Mr Piketty's new book is over 1,000 pages long and looks far beyond the West. Austen and Balzac turn up again—joined by "Black Panther", a recent blockbuster film, and Chimamanda Ngozi Adichie's novel "Americanah". Mr Piketty says the tome is "in large part a sequel" to its predecessor, yet in an important way it is a clear change of direction. In "Capital" Mr Piketty shared Karl Marx's goal in the work of the same name that he published in 1867: to reveal the economic logic of the capitalist mode of production. "Capital and Ideology", by contrast, is closer to the sociological writings of Marx and his followers, especially "The German Ideology" (1845-46), which sought to explain the social and political means by which capitalists maintained power over the working classes.

The scope of Mr Piketty's analysis is wider than Marx's, however. "Every human society must justify its inequalities," he begins. The book surveys not only capitalist societies but colonial, slave-owning and feudal ones, too. In almost all, income and wealth have been distributed highly unequally. To retain their dominant position, Mr Piketty says, elites have used "ideologies", which he describes as "a set of *a priori* plausible ideas

and discourses describing how society should be structured”. “Plausible” they may be, but for Mr Piketty all such ideologies are in a crucial sense illegitimate or unjust. His deconstruction of these rackets leads him to advocate a transition to a hardline version of socialism.

| *Some of the people, all of the time*

Mr Piketty spends much of the book explaining how ideological techniques have varied. In the Middle Ages church authorities said the natural order required small numbers of clergy and nobility and a mass of labourers; the lower ranks were meant to meekly accept their lot. In India the “Manusmriti”, a compendium of laws compiled in the second century BC, proposed “a social structure and rules intended to...restore order to the Hindu social and political system”. In the 18th century Western elites declared that slavery was justified because the enslaved needed moral guidance; similar arguments were thereafter used in favour of colonialism. And so on.

None of this analysis of elite skulduggery is very novel. For example, Theodor Adorno and other members of the Frankfurt School argued that the media turned people into capitalist drones. Michel Foucault examined how prisons, hospitals and schools shaped good capitalist subjects.

And Mr Piketty’s account of ideology is less well developed than some such predecessors’. In part this is because he flits between case studies (with strange digressions, such as an explanation of the role of vegetarianism in Hinduism). It is not clear who exactly is promulgating the ideologies he sketches, or how. Moreover, in his overly pessimistic view of history, elites are only ever self-serving. Take the repeal of the Corn Laws in Britain in the mid-1840s, an episode which Mr Piketty barely mentions. Some bigwigs wanted to preserve the privileges of the landed gentry by maintaining high tariffs on imported grain, but others genuinely wanted to reduce the cost of food for the working classes.

Nevertheless, his book has virtues that many post-Marxist critiques lack. For one thing, it is more readable. The prose is pithy and light on theory. Mr Piketty draws on an impressive range of historical statistics. In the early 1980s, he relates, income inequality in Soviet Russia was only marginally lower than it was in Europe. His numbers show how the definition of “elite” has changed over time. Just before the revolution of 1789 the French church owned almost a quarter of the country’s property; today all non-profit organisations in France own just 1%. Above all, Mr Piketty’s sweeping scholarship enhances, rather than obscures, his central argument.

It is a familiar one. In 1867 Marx said the “essential difference between...a society based on slave-labour, and one based on wage-labour, lies only in the mode in which this surplus-labour is in each case extracted”.

Capitalism, in other words, was just as exploitative and immoral as slavery or feudalism—it just did a better job of covering it up. As Mr Piketty casts his eye over a millennium of global history, he reaches a strikingly similar conclusion.

| *The tyranny of property*

From today’s perspective, many past societies appear obviously unjust. It now seems self-evident that colonialism was immoral, for instance, and that feudalism deprived people of agency. Many of the arguments once deployed against liberal reforms now seem blatantly self-interested.

Thomas Jefferson’s views on the emancipation of slaves are a stark example: “We have the wolf by the ear, and we can neither hold him, nor safely let him go. Justice is in one scale, and self-preservation in the other.”

Mr Piketty believes that “the justifications [for inequality] given in the past turn out, if studied carefully, to be no more incoherent than those of the present.” He calls the current inequality regime “neo-proprietarian”, an ideology characterised by absolute respect for property rights and the distribution of income and wealth that results. It is a thin creed, in his

view. The notion that people have “an inviolable natural right [to] strictly private property” cannot withstand analysis, since the “accumulation of wealth is always the fruit of a social process, which depends, among other things, on public infrastructures...the social division of labour, and the knowledge accumulated by humanity over centuries.” At the same time, access to fundamental goods, such as education, is so unequal that the resulting distribution of income and wealth must be illegitimate.

This is too gloomy—as some of Mr Piketty’s own data show. Inequality has risen in most countries in recent decades, but it remains much lower than it was a century ago. The world is healthier and wealthier than ever; the author accepts the rise in life expectancy, though he begrudgingly points to “the limitations of available demographic sources”. The development of capitalism from the 18th century onwards greatly lifted average living standards. Meanwhile, considerable (if incomplete) progress has been made on racial and gender equality. But for Mr Piketty, history lurches from one inequitable regime to the next, each scarcely better than the last.

The last part of his book focuses on his alternative to “neo-proprietarianism”. He is no fan of Soviet communism, in part because he accepts that society “sometimes requires small businesses funded with private capital and employing a handful of workers”. And though he is encouraged by the willingness of politicians in the mid-20th century to confront elites, for instance by steeply raising income and inheritance taxes, he cannot bring himself to endorse 20th-century social democracy. It fell short, he thinks, not least because “progressive taxation...power-sharing in firms...democratic budgeting and public ownership were never explored as fully or systematically as they might have been.” Instead he proposes a new form of socialism.

This system bears many of the hallmarks of a movement *The Economist* has called “millennial socialism”, which is on the rise on both sides of the

Atlantic. The core idea is to “democratise” the economy, transferring control from capitalist and government elites to ordinary folk. Employees would have a decisive say in the management of their firm: think of Bernie Sanders’s plan to put workers on boards. Public services, especially education, would be vastly enhanced. Every youngster would get a cash lump sum. Mr Piketty envisages radically higher taxes on the rich, not just to raise revenue but to drastically reduce their clout. He imagines a wealth tax of up to 90% on the largest fortunes.

| *Keeping the red flag flying*

Such measures would unquestionably reduce income and wealth inequality, perhaps to all-time lows. But would they create better societies? After all, socialism carries its own risks and distortions. Reductions in material inequality might be offset by increases in other sorts—in access to public services, say, or in free expression and political power. Businesses run by “the workers” might be captured by trade unions. A more powerful state might become more self-serving. Would such societies be truly just and their inhabitants truly free? In the end, Marx came to worry about this complication. Not Mr Piketty.

Then there is the economy itself. Many thinkers on both left and right agree with him that inequality is too high, and that, even in mature democracies, income and wealth are often accumulated unfairly. Unlike him, most resist the idea of a socialist overhaul, in part because they fear it would leave everyone, including the poorest, worse off. You don’t have to be a plutocrat to fret that sky-high wealth taxes would play havoc with incentives, reducing investment and entrepreneurship.

Mr Piketty waves away such concerns in a few paragraphs, an oddly brief discussion given the book’s length, not to mention his profession. He provides some graphs which purport to show that high tax rates are actually good for economic growth. “Bill, Jeff and Mark”, he reckons, “would no

doubt have lived their lives in exactly the same way” in the face of confiscatory taxes (never mind that they would lose control of Microsoft, Amazon and Facebook). He evinces a breezy disregard for orthodox economics, asserting, for example, that “there is no obvious reason why wealth redistribution should be limited to property in land”. That ignores the widespread opinion that, since its supply is fixed, land may be treated differently to other assets.

This book may well become as famous as “Capital”. But it is hard not to conclude that, deep down, Mr Piketty believes the worth of a society is measured by its Gini coefficient alone. For all his flair and learning, that is a mistaken ideology. ■



再论不平等

当代马克思

一位写下畅销书的经济学家倡导社会主义【《资本与意识形态》书评】

托马斯·皮凯蒂的《21世纪资本论》于2013年首次出版，这位法国经济学家因而成为家喻户晓的人物。皮凯蒂把厚重的经济理论、精妙的数据分析，以及对简·奥斯汀和巴尔扎克的小说的评论相结合，论证资本主义几乎不可避免地会导致严重且不断加剧的不平等。他的许多论断如今已为人熟知且成为人们激辩的主题，例如，经济体内财富存量的增长快于收入的增长，或者西方国家内的不平等程度正逼近欧洲“美好年代”时的水平。

皮凯蒂的新书厚达1000多页，视野远远超越了西方世界。奥斯汀和巴尔扎克再次出现，加之以近年的热门影片《黑豹》（Black Panther）和奇马曼达·南戈齐·阿迪奇（Chimamanda Ngozi Adichie）的小说《美国史迹》（Americanah）。皮凯蒂说自己这本书“很大程度上是在续写”前作，但实际上这部新作发生了一种很重要的方向上的明显转变。皮凯蒂在《21世纪资本论》与卡尔·马克思在1867年发表的《资本论》的目标一致：揭示资本主义生产模式的经济逻辑。相比之下，《资本与意识形态》更接近马克思及其追随者的社会学著作，尤其是试图阐释资本家控制工人阶级所用的社会和政治手段的《德意志意识形态》（The German Ideology，1845至1846年）。

然而，皮凯蒂分析的范围要比马克思广。他在开篇写道：“每一个人类社会都必须为其不平等现象辩护。”该书不仅审视了资本主义社会，还探讨了殖民社会、奴隶社会和封建社会。几乎在所有这些社会里，收入和财富分配都高度不平等。皮凯蒂表示，为了维持自身的主导地位，精英阶层运用了“意识形态”手段，用他的话说就是“描述社会理想架构的一系列貌似合理的先验观点和说法”。这些意识形态也许“貌似合理”，但在皮凯蒂看来，它们在一个重要意义上都不合法或不公正。对这些骗局和不公的解构促使他主张转向一种强硬派社会主义。

| 一部分人，一直以来

皮凯蒂以大量篇幅解释意识形态手段的多种多样。在中世纪，教会统治机构宣称，少量神职人员和贵族加上大量劳动者是社会的天然秩序；底层阶层注定要恭顺地接受自己的命运。印度的《摩奴法典》（Manusmriti）是一部公元前二世纪汇编的法典，其中提出“一种社会结构和规则，意在……恢复印度教社会和政治体系秩序”。在18世纪，西方精英阶层宣称奴隶制度是正当的，因为被奴役者需要道德教化。类似论调后来被用来支持殖民主义。凡此种种不一而足。

这种对精英阶层蒙蔽手段的分析并不新鲜。例如，西奥多·阿多诺（Theodor Adorno）等法兰克福学派学者就曾经指出，媒体将人们变成了资本主义的寄生虫。米歇尔·福柯（Michel Foucault）也研究过监狱、医院和学校如何塑造资本主义的顺民。

皮凯蒂就意识形态的论述不如上述某些前辈那么充分。一定程度上是因为他在案例研究间穿插跳跃，时不时还有不明所以的题外话，例如解释印度教中的素食主义的作用。他所描绘的意识形态究竟是谁在宣扬、怎样宣扬的，书中并没有清楚交代。而且，他对历史的回顾过分悲观，描绘出的精英阶层永远只有自私自利这一面。比如，他基本没有提及19世纪40年代中期英国废除《谷物法》这一事件。当时某些权贵想维持对进口谷物的高关税以保护地主士绅的特权，但另一些权贵则真心希望降低工人阶层的食物开支。

但是，皮凯蒂的新书有着不少后马克思主义评论没有的优点。一方面，该书可读性更强。它文笔简洁，较少讲述理论。皮凯蒂调用了各种各样的历史统计数据，令人印象深刻。他提到，在上世纪80年代初期，前苏联民众收入不平等的程度仅略低于当时的欧洲。他列举的数字显示了“精英阶层”的定义在不同时期的演变。在1789年法国大革命之前，法国教会拥有全国近四分之一的财产；如今，法国所有非营利组织仅拥有本国财产的1%。最重要的是，皮凯蒂触角广泛的分析支撑而非掩盖了其核心论点。

他的论点并不陌生。早在1867年马克思就说过，“奴隶制社会与雇佣劳动

社会.....两者之间的本质区别仅在于对剩余劳动的榨取方式”。换言之，资本主义与奴隶制度或封建制度一样存在剥削且不道德，只不过掩饰得比较好而已。皮凯蒂回顾了全球千年历史，得出的结论与这惊人地相似。

| 财产暴政

以今天的视角来看，过往许多社会显然是非正义的。比如说，殖民主义是不道德的，封建主义剥夺了人的自主权，如今这些似乎都是不证自明的。曾用以反对自由改革的许多论点现在看来都是公然的利己主义。托马斯·杰斐逊对解放奴隶的看法就是个鲜明的例子：“我们是骑虎难下，既不能扣留他，也不能安全地放他走。天平的一边是正义，另一边是自我保护。”

皮凯蒂认为，“仔细研究就会发现，过去对于（不平等）的辩解并不比现在的那些更含混矛盾。”他称当前的不平等制度为“新有产阶级社会”，这种意识形态的特征是绝对尊重财产权及由此产生的收入和财富分配。在他看来，这一信条的理据薄弱。人们拥有“绝对私有财产不可侵犯的天然权利”，这一理念经不起分析，因为“财富的积累始终是一种社会过程的结果，而社会过程取决于众多因素，如公共基础设施.....社会分工，以及人类几个世纪以来积累的知识”。同时，获得基础性商品（如教育）的机会非常不平等，由此产生的收入和财富分配必然是不正当的。

这就太过悲观了——皮凯蒂自己的一些数据也显示事情不至于此。近几十年来，大多数国家的不平等现象有所加剧，但仍远低于一个世纪前。如今整个世界比过往任何时候都更健康、更富裕。皮凯蒂承认人类预期寿命有所提高，但他心有不甘地指出“现有人口统计来源存在局限性”。自18世纪以来，资本主义的发展极大提高了人们的平均生活水平。同时在种族和性别平等方面也取得了相当大（虽然还不完全）的进步。然而在皮凯蒂看来，历史不过是从一个不平等制度转向另一个，每一个都不比上一个好多少。

书中最后一部分重点论述了他认为可以替代“新有产阶级主义”的社会制度。他并不崇尚苏联式共产主义，原因之一是他承认社会“有时需要由私

人资本投资并雇用少量工人的小企业”。20世纪中叶，政客们愿意挺身挑战精英阶层利益，例如大幅提高所得税和遗产税，这让皮凯蒂感到鼓舞，但没能让他转而支持20世纪的社会民主。他认为这种制度还不足够，尤其是因为“累进税收.....企业权力共享.....民主预算及公有制从没有得到原本应有的全面或系统的运用”。作为替代，他提出了一种新型社会主义。

这一制度带有本刊称之为“千禧社会主义”（millennial socialism）运动的许多标志性特征，这股风潮在大西洋两岸都呈上升趋势。其核心思想是经济“民主化”，将控制权从资本家和政府精英手上转移给社会大众。员工能对公司管理拥有决定权：比如像美国民主党总统竞选人伯尼·桑德斯（Bernie Sanders）设想的那样让员工进入董事会。公共服务，特别是教育，会得到巨大提升。每个年轻人会一次性得到一笔现金。皮凯蒂还设想对富人大幅加税，不仅是为增加政府收入，还为大大削弱富人的社会影响力。他设想针对顶级巨富征收高达90%的财富税。

| 让红旗继续飘扬

这些措施无疑会减轻收入与财富不平等的程度，可能会降至历史最低点。但它们能造就更进步的社会吗？毕竟，社会主义自有其风险和扭曲。物质不平等减轻了，但其他方面的不平等可能加剧，比如公共服务，或者言论自由和政治权力，最终结果可能是相互抵消。由“劳动者”经营的企业可能会被工会占领。更强大的政府可能会变得更加为自身利益服务。这样的社会真的能做到正义吗？其民众真的能拥有自由吗？最终，马克思对于这些并发症心怀忧虑。皮凯蒂却没有。

然后还要考虑经济本身。无论左派还是右派，许多思想家都同意皮凯蒂认为不平等程度过高的观点，以及即使在成熟的民主国家，收入和财富也往往是通过不公平的手段积聚的。但不同于皮凯蒂，大多数思想家反对进行社会主义大改革的想法，部分是因为他们担心这会让所有人都过得更不好，包括最贫困的民众。一个人就算不是富豪财阀，也一样会担心超高的财产税将大大破坏激励机制，重挫投资和创业精神。

皮凯蒂只用了几段话将这些担忧一笔带过。相比全书的篇幅，这一部分短

得出奇，何况他还是位经济学家。他摆出一些图表，想要表明高税率实际上有利经济增长。他认为，面对“充公税”，“盖茨、贝佐斯、扎克伯格的日子肯定还和以前一模一样”（不用去管他们会分别失去对微软、亚马逊、Facebook的控制权）。皮凯蒂表现出对正统经济学的一种轻率的漠视，例如，他断言“没有明显理由认为财富的重新分配应仅限于土地财产”。这忽视了一个普遍的理念：土地供应量是固定的，因此对土地财产的处理可能要有别于其他资产。

这本书很可能会变得和《资本论》一样有名，但难免会让人觉得皮凯蒂从心底里认为一个社会的价值只是由基尼系数衡量的。纵有一身才学，这可是一种错误的意识形态。 ■



Covid and the company

Sinking, swimming and surfing

The pandemic and the damage done will accelerate trends that were already reshaping business

SOMETIMES CHANGE is so vast and dislocating that it is hard to tell disaster from opportunity. In March Ocado, a British online grocer, saw its servers so overloaded that it suspected hackers. “We thought that we were under a denial-of-service attack,” says Tim Steiner, the company’s boss. In fact, Britons were desperately trying to arrange to get food and drink deliveries for the weeks ahead. After Boris Johnson, the prime minister, announced a national lockdown the site filled three weeks’ worth of delivery slots in an hour.

Companies for which the ill wind of covid-19 has blown some good have been very much in the minority. In February, even as stockmarkets began to crash, business leaders could console themselves with three observations. First, they bore no blame for the crisis. Some downturns, such as the dotcom bust of 2000-01 and the financial crisis of 2007-09 are seen through a quasi-biblical lens of retribution—just deserts for orgies of speculation. This was more like a tsunami, or a war; its casualties had some hope of being treated as innocent victims deserving of support, rather than the authors of their own fate.

Second, most companies—particularly in America—went into the crisis in pretty solid shape; employment was booming, order books were relatively full and the easing of America’s trade war with China augured well. Third, within days of global markets melting down China was tentatively reopening some factories and lifting some of its draconian lockdowns. This suggested a V-shaped recovery, or at worst a U-shaped one, something requiring not life-and-death measures but a battened-down Sufi stoicism:

“This, too, shall pass.” As Dara Khosrowshahi, who runs Uber, said confidently as late as early March, “At least from what we’ve seen the bounceback can be pretty quick.”

Unfortunately, many European countries and some American states immediately began to impose social-distancing measures and, soon thereafter, lockdowns. Businesses found themselves looking into the abyss of a largely moribund economy. According to the International Labour Organisation sectors now facing a severe decline in output, and thus a high risk of lay-offs and furloughs, employ almost 38% of the global workforce: some 1.25bn workers (see chart 1).

Government handouts in America and Europe should ease the pain of some of that unemployment—if fully implemented and if the benefit systems work. But many of the proposed beneficiaries, such as florists, gyms and bakeries, will still go short. Whether they scrape by or go under, that will prolong the slump in consumer confidence—as will the possibility of a second wave of illness after restrictions are lifted. One pessimistic Wall Street banker talks of a future neither V-shaped, U-shaped or even W-shaped, but “more like a bathtub”.

Yet even as they walk through the valley of the shadow of death, chief executives and corporate strategists are beginning to look to the post-covid world to come. What they think they see, for good or ill, is an acceleration. Three existing trends—the deglobalisation unpicking the business world that grew up in the 2000s; the infusion of data-enabled services into ever more aspects of life; a consolidation of economic power into the hands of giant corporations—look likely to proceed at a faster rate than before, and perhaps to go further, too. Optimists—and business folk tend to look on the bright side—see this acceleration as offering new possibilities for reinvention, even resurrection. Pessimists see inefficiencies and insularity weighing on profitability for many years to come.

Whether or not such doldrums lurk in the future, the present is a mad swell of chop and change in which the fortunes of different regions and sectors vary wildly.

China's economy shows distinct signs of recovery. Bernstein, an investment firm, notes that many of the swanky metropolitan restaurants it tracks there were full by the first weekend in April. That said, many migrant workers have yet to return to work. Air and rail traffic remain severely curtailed, as do car sales. The Chinese, though, are at least making cars to sell. European and American plants are shuttered.

Neither is the gloom within countries evenly spread. Some sectors are doing worse than others, and in all the fortunes of the most and least resilient are far apart (see chart 2). Should the coming recession not kill off animal spirits entirely, there will be lots of opportunities for corporate upheaval, takeovers and strategic shifts.

China's government may encourage its state-owned firms to go global by buying distressed car companies in Europe. The share price of Daimler is less than half what it was when Geely, a Chinese carmaker, bought a 10% stake in 2018. Car companies may also see offers from technology giants keen to improve co-operation between metal bashers and the engineers of autonomy—currently wary at best. The healthier airlines, such as Qantas and IAG, owner of British Airways, will snap up airport slots from their bankrupt rivals and may try to acquire others only just staying aloft. Private-equity firms, which have mountains of committed investor cash, may start buying up fundamentally sound but impecunious suppliers in various industries, aware that when demand returns such companies will see its first fruits. Anand Mahindra, chairman of the Mahindra group, one of India's largest conglomerates, says that as well as big corporations buying smaller ones, many smaller firms will look to merge with peers.

Around the world, small and medium-sized firms are particularly exposed. In America, a survey published on April 3rd by MetLife, an insurer, and the US Chamber of Commerce found that 54% of non-sole-proprietor firms with fewer than 500 employees were either closed or expected to close in coming weeks. It has been a similar story in China. As well as driving unemployment, this has systemic implications. Though such firms are often relatively inefficient, the nimbler ones can play a role in supply chains that would be hard to duplicate. Aware of this, some big firms, such as Unilever, are attempting to buoy up suppliers by paying them more quickly.

Much of this activity will happen on the fly, as disasters and opportunities present themselves. As time goes by, though, the currents of the great acceleration will begin to assert themselves. For companies enmeshed in the comparatively freewheeling, Anglo-American model of business that has been in competition with Chinese-style state capitalism in recent years it will be a distinct shock.

Take China and its supply-chain primacy first. By 2017, when average Chinese manufacturing wages had become as high as those in the poorer parts of Europe, it was clear that the logic which saw a large fraction of the world's supply chains pass through the country needed re-examining. The former boss of a big American company's Chinese operations says that in the past few years the trade war and other risks of business disruption saw many global firms seek to reduce their dependency on China. One of their favoured strategies was to put more business into factories elsewhere in Asia.

But the acute stage of China's covid-19 crisis made it clear how essential China remains as a provider of inputs to such factories elsewhere in Asia and around the world. "What people thought was a global supply chain was a Chinese supply chain," says Mr Mahindra. The quest for supply chains

independent of Beijing needs to go further, and deeper.

Joerg Wuttke, president of the EU Chamber of Commerce in China, says that if there is one lesson people are drawing from the pandemic in this regard it is that “single source is out and diversification is in.” In other words, companies do not just need suppliers outside China. They need to build out their choice of suppliers, even if doing so raises costs and reduces efficiency. Mr Mahindra expects to see new demand for production in Vietnam, Myanmar and possibly, if it can grasp the opportunity, India.

For some, the need to have more suppliers looks like an opportunity to promote possibilities at home. The government-owned Development Bank of Japan plans to subsidise relocation costs of companies that bring production facilities back to the country. Rich Lesser, the CEO of Boston Consulting Group (BCG), which advises big global firms, says that robotics and other new approaches to manufacturing make the case for moving factories closer to home more compelling, because they reduce the cost difference. Just as previous information technology was put to work underpinning the spread of supply chains, so today’s can be used to shorten them—potentially making companies more responsive to local tastes.

And the range of the changes information technology makes possible will only increase: that is the essence of the second current of post-covid acceleration. The growth of firms built on digital connections with and between hundreds of millions, or billions, of people, and which collect reams of cloud-based data in the process, was central to the bull market that met its end in February. That growth still has plenty of room to run.

Responding to covid-19 has seen many people and companies realise that IT had more to offer them than they had realised. Zoom, an online videoconferencing service, was serving 10m customers a day at the

beginning of the year, most of them in business meetings. Now it is providing zoom people a day not just with meetings, but with Tai Chi classes and “quarantinis”. Slack, which provides a medium by which far-flung colleagues can co-ordinate things, has become part of dinner-table conversation. It is not only young tech-companies, and tech companies that were previously mostly used by the young, that have prospered. Microsoft’s Teams product is gaining many converts. No one expects the amount of distance working ever again to be as low as it was before the virus hit.

Restrictions put in place during the SARS outbreak of 2003 helped accelerate China’s embrace of e-commerce. Covid-19 is having a similar effect, even in economies where e-commerce is already common. Chris Grigg, boss of British Land, one of Britain’s biggest retail and office landlords, says that as a result of covid-19 his company has brought forward by several years the time when it expects the share of shopping done online in Britain to double from its current 20%—already among the highest levels in the world. The pandemic may not just highlight the convenience of online life; it may also make some of its drawbacks less disturbing. Germans, who have historically well-founded privacy concerns, are resistant to anything that looks like “surveillance capitalism”. But Karl Haeusgen, chairman of HAWE, a maker of hydraulic pumps, says an app that helped maintain public health by tracing covid-19 infections could make them less protective of their data. If that were the case, they might become converts to other data-driven business, too.

This trend will be good news for giants of the tech scene such as Alphabet, Amazon and Apple. So will other factors. The need for economic resilience will be added to the arguments against breaking up the biggest tech companies. If the tech world splinters into rival Chinese and Western camps each side will want its champions.

If things look pretty good for big tech, though, they look none too shabby for big everything else. As the world gets back on its feet, big firms will have better access to capital markets, giving them an extra edge over smaller competitors. And across the world there will be one increasingly big customer, too—the state. As Mr Mahindra says, “the only engine of consumption for the next 12 to 24 months will be government.” Big companies fit well with big government: they make its life simpler; they lobby it more assiduously.

These trends will inevitably have pernicious side-effects. Less dependence on China will mean less access to the rapid-fire innovation that takes place there. The bigger the tech firms, the harder it will be for startups to gain sufficient scale to challenge them. Not impossible; Zoom has done well in a world where bigger companies offer services along similar lines. But more difficult.

But though innovative businesses may face challenges in the post-covid world, they may also help bring it into being. This is not just because pharmaceutical and biotech companies are feverishly searching for drugs and vaccines. It is because business can knit people together. Mr Lesser of BCG argues that companies which build a bond with “emotionally vulnerable” consumers during the crisis may help reduce their anxieties on the other side—anxieties which might otherwise linger. Businesses will need to encourage people back to restaurants, bars and boutiques when lockdowns end but fears persist. And because small companies are being badly hit, recovery in these sectors will need to see new relationships formed.

Mr Lesser recalls the anxiety he used to feel walking through Grand Central Station after September 11th 2001. He would look at the throngs and queues for coffee and quicken his step at the thought of another catastrophic attack. Eventually, though, that fear subsided and the cavernous space

regained its appeal. This, too, shall pass. ■



新冠肺炎与企业

沉没，游泳，还是弄潮

这场大流行病及其破坏将加速本已在重塑商业的趋势

有时候，变化来得翻天覆地，让人难以分辨是机遇还是灾难。3月，英国在线日杂店Ocado的服务器严重超载，它怀疑是黑客在捣鬼。公司老板蒂姆·施泰纳（Tim Steiner）说：“我们以为遭到了拒绝服务攻击。”实际上是英国人在抢着订购未来几周的食品和饮料。首相鲍里斯·约翰逊宣布全国封城后，Ocado的网站在一小时内收到的订单就用掉了未来三周的配送能力。

新冠的邪风所过之处，有所受益的企业只是少数。2月，即便是股市开始崩盘之时，企业领导人可以用三种观点聊以自慰。首先，这场危机责任不在他们。对于像2000至2001年的互联网泡沫破灭和2007至2009年的金融危机这样的经济衰退，人们会从类似《圣经》中因果报应的角度来看待，觉得那些是对疯狂投机的报应。而这次更像是一场海啸或战争，伤者不认为自己是自作自受，而希望被视为无辜的受害者，理应得到帮助。

其次，大多数企业，尤其是美国的企业，在危机来临时的状态都相当稳健——就业增长强劲，订单相对充足，美中贸易战缓和也是个好兆头。第三，在全球市场崩溃后不久，中国开始尝试复工复产，并放松了一些严厉的封城措施。这表明经济将呈V型恢复，或者最不济也会是U型恢复，因而不需要采取生死攸关的措施，只需要准备好践行苏非派的坚忍：“都会过去的。”优步的老板达拉·科斯罗萨西（Dara Khosrowshahi）3月初还自信地说：“至少就我们所见，反弹可能会很快。”

不幸的是，许多欧洲国家和美国一些州紧接着开始施行社交隔离，不久后又封城。企业发现自己正凝视着经济大部分濒临崩溃的深渊。根据国际劳工组织的数据，眼下面临产出严重下降的行业，也就是很可能裁员和放无薪假的行业，雇用了全球近38%的劳动力——约12.5亿名员工（见图表1）。

如果美国和欧洲政府的救济措施能得到充分实施，福利制度也能起作用的话，应该能减轻一些失业的痛苦。但是，花店、健身房和面包店等许多政府打算救济的对象仍将捉襟见肘。无论它们是勉强维持还是倒闭，消费者信心的滑坡都将延长，解除限制措施后出现第二波疫情的可能性也将有同样的影响。一位悲观的华尔街银行家认为未来经济的恢复既不会是V型，也不会是U型，甚至都不是W型，而“更像是浴缸型”。

不过，首席执行官和企业战略家即便还在穿越死亡阴影笼罩的山谷，他们已开始展望疫情结束后的世界。他们认为未来的变化将会加速，不论是向好还是向坏。现有的三个趋势看起来很可能会发展得更快，而且影响可能会更深远。它们分别是：去全球化——它正在瓦解于本世纪头十年发展起来的商业世界；基于数据的服务融入生活的更多方面；经济影响力向超大企业集中。乐观主义者和往往会看向光明面的商界人士认为，这种加速为再创造甚至是复兴提供了新的可能性。悲观主义者则预计效率低下和封闭孤立会在未来很多年里影响盈利能力。

| 晕船

不管未来经济是否会陷入低潮，眼下的现状已是风起云涌，变幻莫测，不同地区和行业的命运大相径庭。

中国经济显现出明显的复苏迹象。投资公司盛博指出，4月的第一个周末，它所追踪的许多中国大城市里的时髦餐厅都宾客满堂。尽管如此，还有大量外来务工人员尚未复工。航空和铁路运输仍然受到严重限制，汽车销售也是如此。不过，中国人至少在制造汽车以供销售。欧美的汽车制造厂仍然大门紧闭。

在各国内部，不景气的程度也有所不同。有些行业的境遇比其他行业糟糕，总体来讲，适应力最强和最弱的企业之间命运相去甚远（见图表2）。如果即将到来的衰退不能完全消灭动物精神，那么在公司重大变动、收购和战略转变方面将有很多机遇。

中国政府可能会鼓励其国有企业收购陷入困境的欧洲汽车公司，以此走向

世界。中国汽车制造商吉利2018年买入了戴姆勒公司10%的股份，现在戴姆勒的股价还不及当时的一半。汽车公司可能还会收到科技巨头的收购要约，这些巨头很想改善传统车厂和无人驾驶研发者之间的合作——目前这两者之间的关系最好的也不过是互相提防。状况较好的航空公司，例如澳洲航空（Qantas）和拥有英国航空（British Airways）的国际航空集团（IAG），将从破产的竞争对手那里抢夺机场起降时段，并可能试图收购其他只是勉强度日的对手。拥有大量已到位投资者资金的私募股权公司可能会开始收购各行业中基本面良好但资金窘迫的供应商，因为它们知道，当需求恢复时可从这些公司率先收获成果。印度最大的企业集团之一马恒达（Mahindra）的董事长阿南德·马辛德拉（Anand Mahindra）表示，大型企业收购小企业的同时，许多小企业之间也将探索合并。

在世界各地，中小企业面临的风险尤其大。在美国，保险公司大都会人寿（MetLife）和美国商会4月3日发布的调查发现，员工少于500人的非独资公司中，有54%已经倒闭或预计将在未来几周内倒闭。中国的情况也差不多。这不仅会推高失业率，还会产生系统性影响。尽管这些公司通常效率相对较低，但那些更灵活的公司可以在供应链中发挥难以复制的作用。鉴于这一点，联合利华等一些大公司正努力加快向这些供应商付款以缓解它们的财务困境。

随着灾难和机遇的来袭，这类举措很多都将是匆忙实施。但随着时间的推移，“大加速”的洪流会开始显现自身影响力。近年来，相对自由放任的英美商业模式一直在与中国式国家资本主义竞争。对那些融入英美模式的企业而言，这样的洪流会带来明显的冲击。

先来看中国及其供应链的主导地位。到2017年，中国制造业的平均工资已赶上了欧洲经济较落后的地区，那时就已经很清楚，需要重新分析全球供应链的一大部分放在中国是否合理。一家美国大企业的中国区前主管说，过去几年中，贸易战和其他业务中断的风险促使许多跨国公司寻求减少对中国的依赖，它们偏爱的策略之一是把更多业务转移到亚洲其他地区的工厂。

但是，中国新冠疫情高峰期的情况表明，对亚洲和世界其他地区的工厂而言，中国仍然是至关重要的供应方。“人们以为的全球供应链其实是中国供应链。”马辛德拉说。寻求不依赖中国的供应链还需要更深远的努力。

中国欧盟商会会长伍克德（Joerg Wuttke）表示，如果说人们从这次大流行病中吸取了一个教训，那就是“单一供应源已经过时，多元化是新风尚。”换句话说，企业不仅仅需要中国以外的供应商。它们还需要扩大供应商的选择范围，即使这样做会增加成本并降低效率。马辛德拉预计越南、缅甸，以及印度（如果它能抓住机会的话）将有新的生产需求。

对一些国家来说，扩大供应商的必要性似乎是一个在国内增加可能性的机会。国有的日本开发银行（Development Bank of Japan）计划对把工厂迁回日本的企业给予搬迁费用补贴。为大型跨国公司提供咨询服务的波士顿咨询公司的首席执行官李瑞麒（Rich Lesser）表示，由于机器人技术和其他新的制造方法缩小了成本差异，把工厂搬回距离本国更近的地点变得名正言顺了。之前信息技术曾是供应链延伸的基础，如今信息技术也同样可用来缩短供应链，这可能让企业对本地需求的响应更快。

信息技术可能带来的变化的范围将只会越来越大：这就是疫情后的第二个加速浪潮的实质。许多企业成长的基础是它们与数亿乃至数十亿人之间以及这些人彼此之间的数字连接，还在此过程中收集了大量基于云的数据，这种成长是在2月底结束的这一轮牛市的核心，而且在未来仍有很大的发展空间。

抗击新冠疫情让许多人和企业意识到，信息技术能为他们提供的东西比他们意识到的更多。在线视频会议服务Zoom年初时的日用户数为1000万，主要用途是商务会议。现在它每天有2亿用户，他们不仅用它来开会，还用来上太极课和共饮“隔离鸡尾酒”。Slack让天各一方的同事得以协调工作，现已成为餐桌话题的一部分。现在业务红火的不仅是年轻的科技公司，还有过去以年轻用户为主的科技公司。微软的群聊产品Teams收获了许多新用户。没人认为远程工作量会再跌回到疫情爆发前的水平。

在2003年SARS爆发期间实施的限制措施加快了电子商务在中国的普及。新冠肺炎也有类似的推动作用，即使在电子商务已经很普遍的经济体中也一样。英国最大的零售和写字楼物业业主之一British Land的老板克里斯·格里格（Chris Grigg）表示，受新冠肺炎影响，他的公司已经把英国在线购物份额预计实现翻番的时间比原来的预测提前了几年，目前这一份额为20%，已经位列世界最高水平。这场大流行病也许不仅突显了线上生活的便利，可能还让网络的某些弊端不再那么令人担忧。德国人向来对隐私问题有很多顾虑，这样的担心也有充分的理由，所以他们对任何看起来像“监视资本主义”的东西都比较抵触。但液压泵制造商HAWE的董事长卡尔·霍伊斯根（Karl Haeusgen）表示，通过跟踪新冠感染来帮助维护公众健康的一款应用可能会让德国人不再那么小心翼翼地保护自己的个人数据。若真如此，他们可能也会转变心意，接受其他受数据驱动的业务。

对于Alphabet、亚马逊和苹果这样的科技巨头来说，这一趋势将是利好。其他因素也是如此。恢复经济的需要将成为反对拆分超大科技公司的又一个理由。如果科技业分裂成相互敌对的中国阵营和西方阵营，那么双方都将希望有自己的领军企业。

但是，如果说科技巨头形势大好，其他行业的巨头情况也不坏。世界从疫情中恢复的过程中，大企业将有更多的机会利用资本市场，这让它们比规模较小的竞争者更具优势。而在世界各地，也将有一个越来越大的客户——政府。正如马辛德拉所说：“未来12到24个月内唯一的消费引擎将是政府。”大企业和大政府很合拍：大企业让大政府的日子更简单；它们游说大政府也更努力。

这些趋势将不可避免地产生有害的副作用。减少对中国的依赖将意味着利用中国创新大潮的机会也随之减少。科技公司规模越大，创业公司就越难达到足够的规模去挑战这些大公司。不是说不可能，Zoom就在一众提供类似服务的大公司中表现出色——但难度会更大。

但是，尽管创新企业可能会在疫情过后面临挑战，它们也可能帮助塑造未来。这不仅是因为制药和生物技术公司正在疯狂地寻找药物和疫苗。这主

要是因为企业可以把人们凝聚在一起。波士顿咨询的李瑞麒认为，在疫情期间与“情绪脆弱”的消费者建立起纽带关系的公司可能会在疫情过后帮助他们缓解焦虑，否则这类情绪可能会挥之不去。人们在隔离结束后会继续担忧，企业就需要鼓励人们重新走进餐馆、酒吧和服装店。由于小企业目前受到的冲击很大，这些行业要复苏就需要建立新的客户关系。

李瑞麒回想起他在2001年9月11日之后穿过纽约中央车站时的焦虑感。看着周围人来人往，咖啡柜台前排起长龙，他会不由加快脚步，生怕发生另一场灾难性的袭击。但最终，这种恐惧逐渐消退，这个宏伟宽敞的空间又恢复了往日的魅力。一切终将过去。 ■



Covid-19

Absence of evidence is not evidence of absence

How important is silent transmission in the covid-19 pandemic?

FEW STORIES are as prominent in the study of infectious diseases as that of Mary Mallon, a cook to wealthy families, and also to a maternity hospital, in New York in the early 1900s. As she went from one employer to another, typhoid fever, then deadly in one case in ten, followed in her wake. Public-health officials eventually joined the dots and identified her as a carrier of *Salmonella typhi*, the bacterium that causes the disease. What was striking about Typhoid Mary, as the newspapers nicknamed her, was that she herself was healthy—proof that people could harbour and transmit *S. typhi* without showing symptoms of the illness it causes.

Such silent transmission, as epidemiologists call the phenomenon, has since been observed in many diseases—among them measles, influenza and HIV/AIDS. A fresh addition to the list is SARS-CoV-2, the coronavirus behind the covid-19 pandemic now raging. Accumulating evidence suggests a substantial chunk of the infections it causes are transmitted by people whose symptoms have not yet appeared—or even, like Mallon, who never develop symptoms at all. That has implications for the methods countries are employing to curb the pandemic.

Currently, none of the evidence on asymptomatic transmission is watertight. According to Gerardo Chowell of Georgia State University, in Atlanta, the best way to determine the share of SARS-CoV-2 infections that happen in this way is to follow up a large number of households in which someone is already infected and then track who subsequently infects whom. For this to work, everyone involved would have to be tested daily. If this were done, comparing subtle variations from person to person in the virus's genetic material would show who caught it from whom.

Definitive studies of this nature are not yet available, though some are probably in the works, Dr Chowell reckons. In the meantime, a growing collection of other research is shedding light on the matter. This work comes in three strands.

The first is a set of studies of people in groups for which unusual circumstances have made possible tallying each and every infection. These studies permit a fairly precise estimate of the share of those infected who have no symptoms. One such group are the passengers and crew of the *Diamond Princess*, a cruise ship on-board which the infection rate exploded because of a bungled quarantine. Of 634 people thus infected, 52% had no symptoms at the time of testing, including 18% who never developed symptoms. The residents of Vo, an Italian town in which all 3,300 people were tested twice, is another much-cited example. Of those in Vo found to be infected, 50-75% had no symptoms at the time of the test. A smaller but similarly useful cohort was several planeloads of Japanese evacuated from Wuhan, the Chinese city where the epidemic began. Among the 12 people in this group found to be infected, five have never developed symptoms.

| *The rest is silence*

All this suggests that the number of infected people unwittingly infecting others could be quite large. What is unclear is how infectious these people actually are. That is what the second strand of research on the asymptomatic and presymptomatic transmission of SARS-CoV-2 deals with. It draws on various laboratory studies. In several of these the amount of the virus in nasal and throat swabs taken from infected people who were presenting no symptoms at the time was similar to the amount found in those who had symptoms. Indeed, for those who do go on to develop symptoms, the amount of virus they have in them peaks close to the onset of those symptoms, which suggests that it may be easily transmissible at an

early stage of infection.

As a persistent cough is a common symptom, it might be expected that those who are symptomatic are more effective in spreading the virus than those who are not. Contrariwise, however, those with symptoms often feel unwell and take to their beds. They are, therefore, coughing mainly onto their sheets and blankets rather than onto strangers in the street.

The third strand of research into the question of silent spreading is mathematical modelling. One such study was published in *Science* on March 31st by Luca Ferretti of Oxford University and his colleagues. It used data on 40 infected people for whom the source of their infection was known with high probability, and the timing of their symptoms and those of the people who infected them was well documented. The researchers estimate that between a third and a half of transmission occurs from people who are without symptoms at that point—a result which broadly agrees with estimates from similar studies by others.

Collectively, all this research may help explain why SARS-CoV-2 has spread with such ferocity. But the study, in particular, of those who are infected but never present symptoms is also crucial to understanding how that spread may ebb—for the pool of those who have been infected and are, therefore, immune to reinfection at least in the short term also includes these people. Pandemics end when the pathogen causing them runs out of individuals to infect. Some of those susceptible will have died. Enough of the rest would then be immune for the population to have developed “herd immunity”. In the case of the current pandemic of SARS-CoV-2, the more silent infections there have been, the faster this herd immunity will arrive. ■



新冠肺炎

证据不足不等于不存在

新冠大流行中的隐性传染有多重要？【新冠报道】

传染病学史上，没什么故事比玛丽·梅伦（Mary Mallon）的更出名。在上世纪初的纽约，她在富人家庭和一家妇产医院做厨师。她在不同的雇主间走动，所到之处都爆发了伤寒感染——当时这种病的死亡率为10%。公共卫生官员最终看出了端倪，确定她是伤寒沙门氏菌这种引发伤寒的细菌的携带者。最令人吃惊的是“伤寒玛丽”（当时报刊给玛丽·梅伦取的绰号）本人健康状况正常，这证明人可以携带并传播伤寒沙门氏菌而自身没有任何伤寒症状。

流行病学家称这种现象为隐性传染，之后在麻疹、流感和艾滋病等许多疾病中都有发现。最新加入这一清单的是新型冠状病毒，正是它引发了目前肆虐全球的新冠肺炎。越来越多的证据表明，相当一部分感染案例是由尚未出现症状的病毒携带者传播的，其中一些甚至会像“伤寒玛丽”那样，始终都没有症状。这会对各国遏制疫情的措施产生影响。

关于无症状传染，目前还没有什么无懈可击的严密证据。根据美国亚特兰大乔治亚州立大学流行病学家杰拉尔多·乔威尔（Gerardo Chowell）的说法，要确定新冠病毒无症状感染的比例，最好的办法是大量追查已有成员感染的家庭，看随后谁传染给了谁。这种方法要成功，就必须每天对所涉人员做检测。如果能做到，只要对比从每个感染者体内获取的病毒遗传物质，寻找细微差异，就能显示谁感染了谁。

乔威尔表示，目前尚未有这种性质的权威性研究发布，不过有一些可能正在进行中。同时，越来越多的其他研究也给这个问题提供了启示。它们有三个方向。

首先是针对特殊人群开展的一系列研究，这些人群所处的特殊环境令研究人员得以统计分析其中每一个感染案例。这些研究可对无症状感染的比例

做出还算精确的估计。“钻石公主”号上的乘客和船员就是这样一个群体。由于隔离防疫不力，这艘邮轮上的感染率激增。在船上被感染的634人中，52%在检测时并无症状，18%始终没有出现症状。另一个被广泛引用的例子是意大利沃镇（Vo），镇上3300名居民全部接受了两次检测。在被感染者中，50%至75%的人在检测时并无症状。另一个规模较小但同样适用的群体是从最早爆发疫情的中国城市武汉乘坐包机撤离的几批日本侨民。其中被发现感染的12个人中，5人始终没出现症状。

| 其余都是隐性

所有这些表明，会在无意中传染他人的无症状感染者数量可能相当大。目前还不清楚的是这些人的传染性到底有多强。第二个研究方向正是要了解新冠病毒在无症状及发病前的传染情况。它利用许多不同的实验室研究成果。其中一些研究显示，检测时无症状的感染人群，其鼻咽拭子中的病毒量与有症状感染人群的相似。实际上，在那些后来出现症状的感染者中，检测发现其携带的最高峰病毒量与症状初发时相近，表明病毒可能在感染早期阶段就容易传播。

鉴于持续咳嗽是新冠肺炎的一大常见症状，人们可能会觉得有症状患者比无症状者的传染性更强。但实际正相反，有症状患者往往会因为感到不适而卧床休息，因此他们往往是对着自家床单和毯子咳嗽，而不是在大街上对着陌生人。

关于隐性传染的第三个研究方向是数学建模。牛津大学的卢卡·费雷蒂（Luca Ferretti）及其同事3月31日在《科学》杂志上发表了一项相关研究的结果。该研究使用了40名感染源具有高概率明确性、自身及感染源出现症状的时间都有清晰记录的感染者数据。研究人员估计，有三分之一到一半的传染是源自当时无症状的感染者。这一结果与其他人开展的类似研究得出的结论基本一致。

所有这些研究在总体上可能有助于解释新冠病毒的传播为何如此凶猛。但是，有关始终不出现症状的感染者的研究对于了解这场传染病可能如何消退尤其也至关重要，因为由于受过感染而至少在短期内具有免疫力的人群

也包括了这些人。当大流行病的病原已无对象可感染时，疫情就会结束。届时一些易感者已经死亡，而余下的人口里将有足够多的人对病毒免疫，从而形成“群体免疫”。对目前这场新冠疫情而言，已发生的隐性传染越多，群体免疫就能越快实现。■



The pandemic and the state

Creating the coronopticon

Surveillance through apps and data networks can do much to keep covid-19 at bay, but at what cost?

HAVING BEEN quarantined at his parents' house in the Hebei province in northern China for a month, Elvis Liu arrived back home in Hong Kong on February 23rd. Border officials told him to add their office's number to his WhatsApp contacts and to fix the app's location-sharing setting to "always on", which would let them see where his phone was at all times. They then told him to get home within two hours, close the door and stay there for two weeks.

His next fortnight was punctuated, every eight hours, with the need to reactivate that always-on location sharing; Facebook, which owns WhatsApp, requires such affirmation so people do not just default to being tracked. Compared with his first lockdown—in a spacious apartment, with family and dogs for company—the ten-square-metre flat with two tiny courtyard-facing windows was grim. When he emerged, on March 8th, he immediately donned mask, goggles and gloves and took a ferry to the island of Lamma where he galloped down lush forest trails for 30km, high on freedom, injuring his knees in the process. He still has trouble sleeping. But he is fit to work, and Hong Kong is content that he poses no risk to the health of his fellow citizens.

Mainland China and South Korea have reduced the number of reported new covid-19 cases down to around 100 a day or less; Hong Kong, Singapore and Taiwan never saw steep rises in the first place (see chart 1). Now they all face the same challenge: how to limit the all-but-inevitable rise in cases that will follow when they relax current controls, a rise which can already be seen in some places. To meet that challenge they are all turning to

information technology.

Their efforts, like others elsewhere, are experimental. They risk failure; they also risk adverse side-effects, most obviously on civil liberties. But around 2.5bn people have now been put on some sort of lockdown during the pandemic (see chart 2). Only a fraction of them have been or will be infected, and thus become immune. The rest, when they emerge, will need watching—for their own sakes, and for the sakes of those around them.

The tools in use fall into three categories. The first is documentation: using technology to say where people are, where they have been or what their disease status is. The second is modelling: gathering data which help explain how the disease spreads. The third is contact tracing: identifying people who have had contact with others known to be infected.

When it comes to documentation, most of the action is in quarantine: replacing phone calls and home visits with virtual checking-up. While Hong Kong uses WhatsApp, South Korea has a customised app that sounds an alarm and alerts officials if people stray; as of March 21st 42% of the 10,600 people under quarantine there were using the app. Taiwan uses a different approach, tracking quarantined people's phones using data from cell-phone masts. If it detects someone out of bounds, it texts them and alerts the authorities. Leaving quarantine without your phone can incur a fine; in South Korea fines for breaking quarantine are hefty, and will soon be accompanied by the threat of prison.

Phones need not just send data back to the government; they can also pass data on to third parties. China's Health Check app, developed by provincial governments and run through portals in the ubiquitous payment apps Alipay and WeChat, takes self-reported data about places visited and symptoms to generate an identifying QR code that is displayed in green, orange or red, corresponding to free movement, seven-day and 14-day

quarantines. It is not clear how accurate the system is, but Alipay says people in more than 200 cities are now using their Health Check status to move more freely.

| *Cellular biology*

A group of academics, developers and public-health officials from the World Health Organisation (WHO) and elsewhere are building a similar WHO MyHealth app. When reliable tests for immunity—whether gained through infection or, one day, vaccination—become available, such documentation apps may be used to communicate their results in some places, too.

When it comes to helping with modelling and situational awareness, there is a wealth of data. Phone companies know roughly where all their mobile customers are from what cell their phones are using. And because advertisers will pay to tailor ads, internet companies such as Bytedance, Facebook, Google and Tencent gather scads of data about what their billions of users are doing where. Modellers can use data from both kinds of company to fine-tune predictions of the spread of disease.

Governments can use the same data to check how their policies are performing at a district or city level. In Germany Deutsche Telekom has provided data to the Robert Koch Institute, the government's public-health agency, in an aggregated form which does not identify individuals. The British government is in talks with cell-phone carriers about similar data access. It could simply require it: the Investigatory Powers Act of 2016 gives it the power to take whatever data it wishes from any company within its jurisdiction in order to fight the virus, and to do so in secret. In practice, negotiation and openness make more sense. The belief that personal data are being passed to the government in secret could erode exactly the sort of trust on which an "all in it together" fight, as called for by Boris Johnson, the prime minister, depends.

Google, which may well have more information about where people are than any other company around, says that it is exploring ways in which it could help modellers and governments with aggregated data. One example could be helping health authorities determine the impact of social distancing using the sort of data that allow Google Maps to tell users about how congested streets or museums are.

Computational social scientists, who use data from digital systems to study human behaviour, are mulling over other ways that this kind of data might inform and improve epidemiological models. One problem with current models, says Sune Lehmann of the University of Copenhagen, is that they assume that people mix and interact in a uniform manner; that passing a friend and a stranger in the street is exactly the same sort of interaction. His research group has written machine-learning software which can sift through historical records from mobile-phone providers to diagnose and explore how relationships modulate such interactions. Applied to current data this understanding might show that interactions between friends in coffee shops are not that important for the spread of disease, but that the delivery of packages is—or vice versa. During an extended pandemic, such information could, if reliable, be a great help to policymakers trying to keep bits of the economy running.

The use of data becomes most fraught when it moves beyond modelling and informing policy to the direct tracking of individuals in order to see from whom they got the disease. Such contact-tracing can be an important public-health tool. It also has a resemblance to modern counter-terrorism tactics. “The technology to track and trace already exists and is being used by governments all around the world,” says Mike Bracken, a partner at Public Digital, a consultancy, and former boss of the British government’s digital services. To what extent those capabilities are now part of the fight against covid-19, no one will say.

One reason governments keep secret the procedures and powers by which they seize and make use of data is a concern that informed enemies would thus evade them. When it comes to public health, this is unconvincing. Complex as it is by the standards of RNA-based viruses, SARS-CoV-2 is not going to change its behaviour because of what the spooks are doing. But their adversaries are not the only people that spooks like to keep in the dark. Citizens concerned with civil liberties fit the bill, too. This is why Mr Bracken expects governments not to be forthcoming about any use they are making of such capabilities in the fight against covid-19: to be frank would, he says, “expose the power that governments have very quickly”.

Apparently unworried about doing so, on March 16th Israel’s government authorised Shin Bet, the internal security service, and the police to use their technical know-how to track and access the mobile phones of those who have been infected. Israel’s High Court initially limited the powers; after parliamentary oversight was established, though, they were good to go.

South Korea, too, is using digital systems to ease the load on its human contact tracers. At the beginning of the outbreak the Korea Centers for Disease Control and Prevention ran their requests for location histories through the police, who used their channels to data controllers to retrieve the required information. But the KCDC says that system was too slow, and it has now automated the request process, allowing contract tracers to pull data in automatically through a “smart city” dashboard. This data-request system was put into operation on March 16th. Korean news reports say that the automation has reduced contact-tracing time from 24 hours to ten minutes.

It might also be possible to do something similar from the bottom up, thus limiting government snooping. Start with an app that sends coherent health and travel data to a central registry, as China’s Health Check purports

to. Then add sufficiently smart and powerful number-crunching for the system to be able to find all the places where two people's histories cross. When someone gets sick, the system can then alert all the other users whose paths that user crossed. Because the infrastructure would be separate from that of the spooks, it could be much more open, scrutable and trustworthy.

Such approaches, though, face serious problems. The number of people an infectious person actually infects will almost always be much smaller than the number they encounter. Sean McDonald, an expert on public health and digital governance, says a system which alerted all the people that an infected person had been near over the past week could lead to a demand for tests that would entirely overwhelm the capacity available in most countries. If the relative risk of, say, walking past someone on the street and drinking from the same water fountain an hour apart were known, and if the data picked up such niceties, things might be different. But they are not.

An alternative to too much testing would be not enough. Annie Sparrow, an epidemiologist who advises Tedros Adhanom Ghebreyesus, director-general of the WHO, points out that modellers without field experience tend to misunderstand the psychology of testing. The stigma associated with a disease, she says, is likely to outweigh the rational pull of keeping oneself and one's family safe. And both Dr Sparrow and Mr McDonald point out that any solution which relies on smartphones and internet access inherently ignores the half of the planet which does not have internet access. Mr McDonald says he would prefer to see the data wizards apply themselves to easier problems such as optimising the supply chains for medical goods like masks and ventilators.

| *Big brother is contact-tracing you*

Google says that, having heard epidemiologists make such points, it is not

planning to use the location data it collects to do contact tracing. The data-collection mechanisms built into products like Android or Google Maps are “not designed to provide robust or high-confidence records for medical purposes and the data cannot be adapted to this goal”, the company says. Facebook says something similar. Both companies can be assumed to think that talking explicitly about how well they might be able to do such things would raise concerns about privacy.

What Google and Facebook will not do, though, the government of Singapore is quite up for. Its Government Technology Agency and health ministry have designed an app which can retrospectively identify close-ish contacts of people who come down with covid-19.

When two users of this new app, called TraceTogether, are within two metres of each other their phones get in touch via Bluetooth. If the propinquity lasts for 30 minutes both phones record the encounter in an encrypted memory cache. When someone with the app is diagnosed with the virus, or identified as part of a cluster, the health ministry instructs them to empty their cache to the contact-tracers, who decrypt it and inform the other party. It is especially useful for contacts between people who do not know each other, such as fellow travellers on a bus, or theatre-goers.

The app’s developers have tried to assuage concerns about privacy and security. Downloading it is not compulsory. Phone numbers are stored on a secure server, and are not revealed to other users. Geolocation data are not collected (though Google’s rules governing apps that use Bluetooth mean that they will be stored on Android phones running the app). They are planning to publish the app’s source code and make it free to reuse, so that others may capitalise on their work.

Singaporeans trust their government. Since TraceTogether was released on March 20th it has been downloaded by 735,000 people, or 13% of the

population, according to government data. Several Singaporeans your correspondent spoke to one overcast day in the business district were unaware that they could be prosecuted for refusing to hand over their data to the health ministry. But they had no intention of frustrating the authorities. "I'd rather be responsible than irresponsible," said one trader.

In an attempt to get past the uproar about the security services tracking the infected, Israel's Health Ministry has launched a similar app that allows people choosing to use it to see if they have come into contact with other users who subsequently took ill. The government says that the app, which uses open-source software, does not share data with the authorities. The WHO MyHealth app, also open-source, might in time take on a similar contact-tracing function.

This patchwork of global systems presents its own challenge: how to make them talk to each other so that they can stimulate a global response to the disease, not just one that operates at a national or city level. Yves-Alexandre de Montjoye, who studies computational privacy at Imperial College, in London, says that governments should come together to agree on common protocols for handling covid-19 data, making it easier to pool their resources. Compared with finding ventilators and protecting health-care workers, though, this is pretty low down the list of anyone's must-dos.

And there's the rub. Covid-19 demands an array of drastic, immediate responses. It also requires thinking that looks beyond the next two weeks. The network of computers built for entertainment, convenience, connection and security is helping in all sorts of quotidian ways, from video-conferencing to team-working to gaming for rest and recuperation. But it also provides a network of sensors that can co-ordinate the responses of both individuals and whole populations to a degree unimaginable in any previous pandemic. Countries are learning how to make use of that panopticon's power in a pell-mell, piecemeal way. The systems that they

lash together may last a long time. It would be best to keep an eye on them. ■



大流行病与国家

创造新冠全景监控

通过应用和数据网络监控可以有效阻止新冠肺炎的传播，但代价几何？【新冠报道】

埃尔维斯·刘（Elvis Liu）在中国北方省份河北的父母家中隔离了一个月后，2月23日回到了香港的家。边检人员让他把边检办公室的号码添加到WhatsApp联系人中，并将该应用的位置共享设置为“始终开启”，这样他们就可以随时查看他手机所在的位置。然后，他们让他在两个小时内回家，关上门，居家隔离两周。

接下来的两周里，每隔八个小时他就要把位置信息分享功能重新设定为“始终开启”——WhatsApp的母公司Facebook要求做出这样的确认，以免人们只是默认接受被追踪状态。与他之前的隔离环境相比（宽敞的公寓，有家人和狗陪伴），这个面积10平方米、仅有两个面向内庭的小窗户的公寓让人很压抑。3月8日结束隔离的那天，他立即戴上口罩、护目镜和手套，乘渡轮去了南丫岛，沿着草木茂盛的林中小径飞奔了30公里。自由的感觉让他兴奋不已，过程中还伤了膝盖。他现在还是有些睡不好。但他的健康状况可以工作。他对其他市民的健康没有任何威胁，这让香港满意。

中国大陆和韩国报告的新增新冠肺炎病例已减少到每天约100例或更少。香港、新加坡和台湾从一开始就未出现过病例数急剧上升的情况（见图表1）。现在它们都面临着同样的挑战：当它们放宽当前的防控措施后，该如何控制接下来几乎不可避免的病例数上升，这种情况在某些地方已经出现。为应对这一挑战，它们都开始诉诸于信息技术。

和其他地方一样，它们的努力是试验性的，有可能失败，也有可能出现不良副作用，最明显的就是限制公民自由。但在这场大流行病期间，全球已有约25亿人受到某种形式的隔离（见图表2）。他们中只有一小部分已经或将感染，并因此产生免疫力。其他人结束隔离后，为己为人都需要继续被监视。

它们使用的工具分为三类。首先是信息记录：利用技术来了解人们当前的位置、此前出行的轨迹，或当前是否感染等健康状况。第二类是建模：收集有助于解释疾病传播方式的数据。第三是追踪接触者：识别与已知感染者接触过的人。

先看信息记录，这主要是针对隔离状态，用虚拟的检查替代电话和上门拜访。香港用的是WhatsApp，韩国有一个定制的应用，如果隔离中的人擅自行动就会发出警报，提醒官员。截至3月21日，韩国10,600被隔离的人中有42%使用了这款应用。台湾采用了另一种方法，用手机基站的数据来追踪被隔离人员的手机。如果检测到有人出了隔离区，就会向他们发送短信并提示相关部门。不带手机出隔离区可能会被罚款：在韩国，违反隔离措施会被处以高额罚款，不久后可能还会被处以监禁。

手机不仅可以把数据传输给政府，还可以传给第三方。中国各省政府开发出了健康码，通过广泛使用的支付应用支付宝和微信上的入口运行，录得使用者自行报告的到访地点和症状数据，生成绿色、橙色或红色的识别二维码，分别对应可自由行动、需隔离七天和隔离14天三种状态。这个系统的准确性如何尚不清楚，但支付宝称，现在有200多个城市的人们使用健康码更自由地出行。

| 蜂窝生物学

一批学者和开发人员正与来自世卫组织及其他地方的公共卫生官员一道，开发一个类似的应用“世卫组织健康助手”（WHO MyHealth）。等到可以开展可靠的免疫测试的时候（无论是通过感染还是有朝一日通过疫苗获得免疫），这类信息记录应用或许还可以在一些地方用于告知相关结果。

在协助建模和态势感知方面，数据十分丰富。手机运营商可以通过手机使用的蜂窝网络大致了解所有移动用户的位置。而由于广告主会花钱专门定制广告，因此字节跳动、Facebook、谷歌和腾讯等互联网公司收集了数十亿用户在哪里做什么的海量数据。建模人员可以利用电信公司和互联网公司的数据来调整对疾病传播的预测。

政府也可以利用这些数据来检查其政策在区或市一级的执行情况。在德国，德国电信以汇总的形式（无法识别个人身份）向政府公共卫生机构罗伯特·科赫研究所（Robert Koch Institute）提供了数据。英国政府正在与手机运营商就类似的数据访问权限展开谈判。它其实可以直接要求运营商提供数据：2016年的《调查权力法》（Investigatory Powers Act）赋予了英国政府这样的权力，令它可以从管辖范围内的任何公司获取想要的任何数据以对抗病毒，而且可以秘密进行。而在实践中，谈判和公开的做法更好。如果公众认为个人数据被秘密交给了政府，可能会削弱他们对政府的信任，而这种信任正是首相约翰逊号召的“全民抗疫”的基础。

谷歌掌握的用户位置信息可能比其他任何公司都多，它表示正在探索利用汇总数据帮助建模人员和政府的方法。一种可能性是拿谷歌地图用来告知用户街道或博物馆拥挤状况的那类数据，去帮助卫生部门确定社交隔离的效果。

计算社会学家利用数字系统产生的数据研究人类行为，他们也在探索方法来利用这类数据搭建和改进流行病学模型。哥本哈根大学的苏尼·莱曼（Sune Lehmann）说，当前的模型存在一个问题，它们假设人们接触和互动的方式是统一的，在街上碰到朋友和陌生人时发生的互动是完全相同的。他的研究小组编写了机器学习软件，可以梳理手机运营商的历史记录，以判断并探索不同的人际关系对互动方式的影响。将这种新洞见添加到当前的数据上，可能会揭示朋友在咖啡店里的互动对疾病的传播没那么重要，而送快递的影响却可能很大，或者正相反。在持续较久的大流行病期间，此类信息（如果可靠）可能会对试图保持经济部分运转的政策制定者有极大的帮助。

当数据的使用超出建模和辅助决策的范围，而用于直接追踪个人以查明传染源时，就变得最叫人头痛。接触者追踪可以是重要的公共卫生工具，与现代反恐策略也有相似之处。英国政府数字服务的前负责人、咨询公司 Public Digital 的合伙人麦克·布拉肯（Mike Bracken）说：“追踪技术已经存在，并且正为全世界的政府所使用。”现在，这些技术正在多大程度上应用于对抗新冠肺炎，没人会清楚说明。

政府要对获取和利用数据的程序和权力保密，原因之一是担心敌方在知情后会逃避追踪。在公共卫生领域，这个理由难以令人信服。尽管在RNA病毒中新冠病毒是非常复杂的一种，但它并不会因为情报机关的行动而改变行为。但是，情报机关并不只想对敌方保密，也想对关心公民自由的公民保密。所以，布拉肯估计政府不会乐于透露任何它们在抗击新冠病毒时运用这类能力的情况——如果坦诚相告，“会很快暴露政府拥有的权力”，他说。

以色列政府看样子对运用这种技术并不担心，它在3月16日授权国内安全部门辛贝特（Shin Bet）和警察部门利用自身技术知识来追踪并访问被感染者的手机。最初以色列高等法院限制了这项权力，但确立了议会监督机制之后，新规就付诸实施了。

韩国也在利用数字系统减轻追踪接触者的工作量。疫情爆发初期，韩国疾控中心（KCDC）向警察部门发出访问定位记录的请求，后者利用自己的渠道，通过掌握数据的机构获取所需的这类信息。但KCDC表示这样的系统太慢，现已将请求流程自动化，让追踪接触者的工作人员通过“智慧城市”数据可视化仪表盘自动提取数据。该数据请求系统于3月16日投用。韩国新闻报道称，自动化把追踪接触者所需的时间从24小时缩短到了10分钟。

或许也可以自下而上地做到类似的事情，从而减少政府的窥探。首先，可以利用某个应用把清楚连贯的健康和出行数据发送到一个登记中心，中国的健康码据称就是这样。然后加上足够智能和强大的数据分析功能，使系统能够找出两个人的定位记录重叠的所有地点。当某个人染病时，系统就可以向与这个人有交集的其他所有用户发出警报。这种系统的基础设施与情报机关的分离，所以可能更开放、易读也可信赖得多。

然而这类方法也面临严重的问题。一名感染者实际能感染的人数几乎总是比他遇到的人少得多。公共卫生和数字治理专家肖恩·麦克唐纳（Sean McDonald）表示，如果系统向过去一周内在感染者附近出现过的所有人发出警报，可能会导致对检测的需求激增，完全超出大多数国家或地区的

检测能力。如果能知道在大街上与某人擦肩而过，或与某人相隔一小时在同一个喷泉式饮水机喝过水的相对风险，并且如果数据能发现这样的细节，情况可能会有所不同。但事实并非如此。

找到替代大量检测的方案还不够。世卫组织总干事谭德塞的顾问、流行病学家安妮·斯派洛（Annie Sparrow）指出，没有实战经验的建模人员往往会误解检测带来的心理影响。她说，因疾病而来的污名很可能压倒保持自己和家人安全的理性思考。斯派洛和马克唐纳都指出，任何依赖智能手机和互联网接入的解决方案都首先忽略了地球上还有一半人没有接入互联网。马克唐纳说，他希望数据专家专心去解决更容易解决的问题，例如优化口罩和呼吸机等医疗产品的供应链。

| 老大哥正在追踪你的接触者

谷歌表示，在听取了流行病学家的这类观点后，它不打算将收集到的位置数据用于追踪接触者。谷歌认为，安卓系统或谷歌地图之类产品中的数据收集机制的“设计初衷并非是为医疗用途提供可靠或高可信度的记录，而且也不能为满足这一用途而调整数据”。Facebook也表达了相似的观点。估计两家公司都认为明确谈论自己在这方面能做得多好可能会引发对隐私的担忧。

不过，谷歌和Facebook不愿意做的事情，新加坡政府倒是不介意。它的政府科技局（Government Technology Agency）和卫生部设计了一个应用，可以回溯识别新冠肺炎感染者的密切接触者。

这款新应用名为TraceTogether。当两个用户相距不到两米时，他们的手机就会通过蓝牙建立联系。如果近距离接触持续30分钟，两部手机便都会在加密的内存缓存中记录这次接触。如果有使用该应用的人被确诊感染病毒或被识别为有接触史，卫生部会指示他们提供缓存中的接触者数据，并根据解密后的数据通知接触的另一方。对于曾同乘公交车或去了同一家剧院等彼此不相识的接触者而言，这款应用特别有用。

该应用的开发人员已在努力缓解公众对隐私和安全性的担忧。应用下载是

非强制的。电话号码存储在安全的服务器上，不会透露给其他用户。地理位置数据不会被收集（不过根据谷歌对使用蓝牙的应用的规定，这些数据将存储在运行该应用的安卓手机上）。开发人员计划发布该应用的源代码，让它可以被免费重新使用，这样其他人也可以利用他们的成果。

新加坡人信任政府。政府数据显示，自TraceTogether于3月20日发布以来，已有73.5万人（占新加坡人口的13%）下载。一个阴沉的日子里，本刊记者在中央商务区采访了几名新加坡人，他们并不知道到拒绝把自己的数据交给卫生部门可能会被起诉。但是他们无意阻挠政府。“我更愿意负起责任，而不是逃避责任。”一名交易员说。

为了走出因国家安全机构追踪感染者引发的纷争，以色列卫生部推出了一个类似的应用，让人们可以选择使用该应用来查看自己是否曾与染病的其他用户有过接触。政府表示，该应用使用开源软件，不与政府共享数据。世卫组织的应用MyHealth也是开源的，未来可能会加上类似的接触者追踪功能。

全球这些零零散散的系统本身也带来了一个挑战：如何彼此沟通，以促进针对疫情的全球响应，而不仅仅是不同国家或城市各自为政。在伦敦帝国理工学院研究计算隐私的伊夫-亚历山大·德蒙乔伊（Yves-Alexandre de Montjoye）认为，各国政府应该团结一致，共同商定使用新冠肺炎数据的通用协议，以更方便地集结资源。不过，与寻找呼吸机和保护医护人员相比，这在各国的要务清单上排得很靠后。

这正是障碍所在。抗击新冠肺炎需要一系列快速激进的响应，还需要思考两周以后的举措。为娱乐、便利、连接和安全而构建的计算机网络在各种司空见惯的方面提供了帮助，如视频会议、协同工作，乃至放松解闷的游戏。但它还提供了一个传感器网络，可以协调个人和整体人口的响应，程度之高是在以往任何一次大流行病期间都无法想象的。各国正在仓促而零散地学习利用这种全景监控的力量。它们手忙脚乱赶出来的系统可能会延续很长时间。最好留个心。■



Allianz

Lonely work

The boss of Europe's largest insurer on dealing with market turmoil

OLIVER BÄTE still goes to his office every day on Munich's Königinstrasse, next to the English Garden, but it is mostly empty. "You are always alone as a CEO," says the boss of Allianz, who took the reins of the 130-year-old insurance giant in 2015. And never more so than during a pandemic, when you are in charge of 147,000 employees in over 70 countries, who are looking after hundreds of thousands of customers, many of whom are in financial despair because of covid-19. "Italy is overwhelmed," says Mr Bäte. Only 30 of its several thousand employees in Milan are at the office.

The company will support clients wherever it can, says Mr Bäte. He is frequently on the phone with officials in Brussels and Berlin, discussing ways to help governments marshal money for programmes to support small and mid-sized companies.

Thousands of firms are looking to their insurers, as well as the state, to cover some of the costs of shutting down. But neither property-and-casualty nor life-insurance policies generally cover pandemics. This is mainly because the risk is huge and unpredictable, but also because such policies were not until now much in demand. Allianz covers certain elements of a pandemic, such as business interruption for two weeks. But it can only underwrite slices of the risk, says Mr Bäte. Otherwise even the strongest insurer would go bust.

Legal wrangles over policy exclusions loom over the industry. State lawmakers in America (where insurance is regulated at state level) have proposed new laws to force insurers to pay billions of dollars for business interruptions related to mandatory shutdowns. The issue is simmering in

Europe, too—though fewer cases are likely to end up in court. Politicians are also urging insurers to lower premiums in other business lines, for instance car insurance, or to divert profits from these to help stricken corporate policyholders. Insurers can make more money than usual from motor policies during lockdowns, since quieter roads mean fewer accidents.

Allianz has many more immediate concerns. As the owner of Euler Hermes, a big provider of credit insurance—which firms buy to protect receivables from loss—Allianz is directly exposed to rising corporate defaults. Mr Bäte vows to try to keep small businesses going by not making drastic cuts to the credit lines it offers with such policies. France is set to offer a reinsurance backstop to limit potential losses for credit insurers that help keep covid-stricken firms afloat; Germany may follow suit.

Allianz's huge asset-management arm—the world's second-largest active fund manager—is heavily exposed to the carnage, too. The business, which comprises PIMCO, a bond-fund giant, and the smaller Allianz Global Investors, oversees some \$2.3trn and generates up to a quarter of group profits. It had a very good January and February, but in March it was “like turning a light switch off”, says Jackie Hunt, who leads the division. Clients rushed to redeem funds, especially in fixed income, after stockmarkets plummeted (Mr Bäte says Allianz beat an “early” retreat from American equities). Hedging has become more difficult. The cost of protection for a book of variable annuities, for instance, “shot through the roof”, says Mr Bäte. “It's a hundred million here, a hundred million there.”

Allianz is exposed to markets both in its life-insurance business, as an investor of clients' premiums, and as an earner of fund-management fees. Ms Hunt thinks the crisis will speed up the move from active to passive management in equities and squeeze fee margins. Yet she insists that this is a time when active managers prove their value, especially in fixed

income.

When time allows, Mr Bäte says, he is pushing on with a plan to slim Allianz down and increase efficiency by embracing AI and machine learning. He estimates that up to half of his working day is taken up with covid-related issues. The outlook is unclear: for now, he says, he is not pondering a profit warning. He is preparing for an annual general meeting on May 6th, which for the first time will take place virtually. It will be a lonely day for the gregarious former McKinsey consultant. ■



安联

高处不胜寒

欧洲最大保险公司的老板应对市场动荡【新冠报道】

奥利弗·贝特（Oliver Bäte）每天还是去慕尼黑柯尼根斯特拉斯大街（Königinstrasse）上的办公室上班，那里毗邻英国公园（English Garden）。不过办公室里几乎空无一人。“CEO总是孤家寡人一个。”这位安联老板说。他从2015年开始执掌这家有着130年历史的保险巨头。在一场大流行病期间担当此任，就更是如此了。他统领着散布在70多个国家的14.7万名员工，这些员工又照管着几十万个客户，其中很多因为新冠肺炎陷入财务困境。“意大利已经沦陷了。”贝特说。安联在米兰有几千名员工，目前在办公室值守的不过30人。

贝特表示，安联将不遗余力地支持客户。他经常与布鲁塞尔和柏林的政府官员通电话，讨论如何帮助政府筹集资金，为中小企业解困。

成千上万的公司指望着保险公司能和政府一道，承担停工给自己造成的部分损失。但无论是财产事故险还是人寿险，通常都不承保大流行病。这主要是因为其风险巨大且不可预测，但也因为之前对这类保险的需求并不是很大。安联赔付大流行病造成的某些损失，比如营业中断持续两周。但贝特表示，安联只能承保部分风险。否则即便实力最强的保险公司也会破产。

在保险行业，围绕除外责任条款的各种法律大战即将打响。美国的一些州议员（美国的保险业由各州监管）已经提议制定新的法律，要求保险公司必须为强制停工引发的营业中断支付数十亿美元。这一议题在欧洲也呼之欲出，尽管最终对簿公堂的案件可能会少于美国。政客们还敦促保险公司降低车险等其他险种的保费，或把这些险种的利润转而用来帮助那些遭受疫情打击的投保公司。封城期间，保险公司从车险中赚到的钱可能会比平时多，因为道路冷清了，交通事故也就少了。

安联还面对许多更紧迫的问题。它旗下的裕利安怡（Euler Hermes）是信用保险的大型供应商，企业购买这种保险以防范自己的应收账款受损。安联目前直接面对企业违约增多。贝特誓言，不会大幅削减这类保险的信用额度，以尽力维持小企业的运转。法国准备提供再保险支持，让那些帮助企业渡过疫情难关的信用保险公司降低潜在损失。德国可能也会效仿。

安联庞大的资产管理部门（全球第二大主动型基金管理公司）也极有可能因这场浩劫遭受重创。该部门包括债券基金巨头太平洋投资管理公司（PIMCO）和规模相对较小的安联环球投资（Allianz Global Investors），管理着大约2.3万亿美元资产，为集团创造了多达四分之一的利润。其负责人杰基·亨特（Jackie Hunt）表示，该部门今年头两个月势头很好，但到了3月份“就像关掉了电灯开关”。股市暴跌后（贝特说安联“及早”从美国股市抽身而退），客户争相赎回基金，尤其是固定收益的基金。对冲变得更加难做。例如，一份可变年金的保险成本“高到爆棚”，贝特说，“这里要一个亿，那里又要一个亿。”

安联在两方面都面临着市场风险：一是利用客户的人寿险保费开展投资；二是赚取基金管理费。亨特认为，此次危机会加速证券从主动管理型向被动管理型转变，并挤压佣金的利润空间。但她坚持认为现在正是主动型基金管理公司证明自身价值的时候，尤其是在固定收益领域。

贝特表示，如果时间允许，他将推进一项计划，积极采用人工智能和机器学习来给安联瘦身并提高效率。他估计自己目前最多有一半时间都花在了与新冠肺炎相关的事务上。前景尚不明朗，他表示自己现在还没考虑发布利润预警。他正在为5月6日召开的首个网络股东年会做准备。对于这位爱交际的前麦肯锡咨询师来说，那将是孤独的一天。■



The gig economy

Visible and vocal

Amid the pandemic, home-delivery services are proving vital in China. They are powered by a new sort of worker

DURING THE recent peak of covid-19 cases in China, large metal shelving-units appeared at entrances to residential compounds across Shanghai. Outsiders were not allowed in. But somewhere was needed to hold the myriad packages ordered online by the millions of residents who were staying at home. The shelves groaned under the weight of disinfectant and vitamin tablets, sacks of rice and flour, cooking oil and vegetables.

Food-delivery firms played a crucial role in helping people in China endure the lockdown that began in Hubei province in late January, and the less stringent forms of quarantine that were subsequently implemented in cities across the country. Since early March there have been very few newly detected cases of covid-19 except among travellers from abroad. So controls have eased, allowing shops and restaurants to reopen. But many people are playing safe and staying largely housebound. State media have been calling home-delivery workers “heroes”. Few would disagree.

Even before the crisis they were beloved of urbanites. The combination of an abundant supply of cheap labour, a large middle class and near-universal access to smartphones had fostered the growth of online food-delivery services to a degree unmatched in the rich world. People could have everything from coffee to congee whisked to them in under 30 minutes on the back of a scooter, typically by one of the sector’s two titans, Ele.me and Meituan-Dianping. More than 400m people, or about half of the country’s internet users, had encountered a *waimai xiaoge*, or “takeaway lad” (more than nine in ten are men) at their door. Residents had become so used to receiving hot meals from them that they jokingly compared them to

parents.

After the novel coronavirus hit, their services became a lifeline. When officials told firms to stay shut, they allowed exceptions for “essential” services, including those delivering cooked food and groceries. Wary of eating meals prepared by others, many people turned to online supermarkets. Sales of dumpling wrappers and sauces grew more than sevenfold on Meituan’s grocery service—even as takeout orders more than halved, as the giant reported in a downbeat first-quarter forecast. The new joke is that the covid-19 epidemic has turned China into a nation of chefs.

The lives of the *xiaoge* have changed, too. Zhang Shuai, a 24-year-old from the central city of Zhengzhou who delivers for Meituan in Shanghai, has to wear a mask while working. The firm takes his temperature twice a day, notes it on a card pinned to his jacket and uploads it to the app for users to see. He undergoes many more checks when he picks up orders and carries them into residential compounds, most of which are now open again to outsiders.

Yet the job is still alluring to people like Mr Zhang. Indeed, he signed up with Meituan when infections were mounting. It was just too hard to find any other job, he says. And, at 10,000 yuan (\$1,400) a month, his earnings are higher than the average urban wage in Shanghai, partly thanks to subsidies from Meituan and tips from grateful customers. He will quit only when the disease ends. Another migrant worker says he shares his single-room accommodation with five other riders. Is he anxious about living cheek-by-jowl with them? “I’m not afraid of death,” he grins, speeding off.

The gig economy has transformed Chinese cities. Young workers from villages were once largely invisible to urban residents as they toiled on production lines. Now many of them eschew regimented factory work in favour of less structured lives. They have become omnipresent, clad in

their firms' coloured jackets and weaving perilously through traffic. Millions also work for other kinds of app-based transport services, for example as couriers or drivers for ride-hailing companies.

The *xiaoge* have helped build food delivery in China into a \$46bn business, the world's largest and twice the size of America's. In 2018 Meituan and Ele.me had about 6m riders between them. Demand for workers is growing fast. Sanford C. Bernstein, a research firm, reckons Meituan will need more than 1m delivery people a day next year, 200,000 more than last year. On average last summer, its yellow-jacketed army handled 20,000 orders a minute.

For migrants from the countryside, the job is an unusually easy ticket to city life. Factory workers must have a skill, and often a home-town peer to vouch for them. But some riders are hired as soon as they upload copies of an identity card and health certificate to an app. The pay is usually better than on an assembly line.

Nearly one-third of Meituan's riders were once factory hands. Their switch reflects a nationwide trend. In 2018, for the first time, more migrant workers took up jobs in services than in manufacturing.

The epidemic could result in even more of them doing gig work. Many of China's battered companies are shedding staff, but not food-delivery firms. Freshippo, Alibaba's e-grocer, has engaged 2,000 staff from 30 idled restaurant chains. Since the start of the epidemic Meituan has hired more than 450,000 new riders, most of them for work in their home provinces because of virus-related travel restrictions.

In recent years gig jobs have given workers a cushion, says Ji Wenwen of the China University of Labour Relations. In Hegang, a coal town by the Amur river on the Russian border, a tenth of takeaway riders were once miners.

One of them is Luo Qiong, who makes twice as much with Ele.me as he did down the pit. “I earn more than local civil servants,” he says proudly.

The dreams of today’s migrants are often different from those of factory workers in the earlier years of China’s industrial boom. Many have never worked the land and have no intention of returning to it. They are better educated. A fifth of delivery workers have been to university or vocational college. And they want respect. In surveys, nearly half of riders at Meituan express anxiety about their status. Fewer than one in three at Ele.me feel they are respected enough by customers.

Such frustrations may grow. During the epidemic, firms rolled out contactless delivery systems, with packages being hung on door knobs or, in some big-city office and apartment blocks, placed in dedicated lockers installed by the companies. Face-to-face interaction with *waimai xiaoge*, once a near-daily feature of city life, ceased. It may never be fully restored.

Food delivery allows migrant workers to choose their own work hours, but the stress is still immense. Many riders are hired by middlemen who impose tough requirements for the job. The pressure is evident: heavily burdened delivery people often run the final distance to drop-off points. The Hong Kong Confederation of Trade Unions, a pro-democracy labour group, describes gig workers as an “immense army of precariats”.

Among the army’s recruits is a lanky 22-year-old in a baggy Ele.me jacket who prefers to be identified only by his surname, Liu. He says that, in his distant home-town near the eastern city of Suqian, he would need to “work as long as the machines” in order to earn as much as he does in Shanghai. He now puts aside 5,000 yuan a month. But he works six days a week, ten hours a day, even in the grimmest weather. Mr Liu says he jumps red lights every day to avoid late-delivery penalties. In the first half of 2019, Shanghai recorded 12 road accidents a week involving food-delivery riders. Many go

unreported.

Over the years, factory workers have used their collective power to press for better pay and conditions. It is harder for dispersed delivery workers to do this, says Geoffrey Crothall of China Labour Bulletin (CLB), an NGO in Hong Kong. If some riders go on strike, algorithms can redirect orders to others still working.

Still, riders use social media to their advantage. They have large chat groups on messaging services such as WeChat and QQ, in which they discuss delivery routes but also employment terms and grievances. Meituan says that two in five of its riders were recommended for the job by home-town friends—recreating, to some extent, the solidarity of the factory. Mr Liu has found a WeChat group filled only with riders from his town. Delivery workers also forge bonds when they congregate, as they often do in areas with good internet connections or near busy food courts.

Such networking enables them to co-ordinate strikes. CLB says the food-delivery industry has become “a major source of worker unrest” (see chart). The NGO recorded the first strike by *waimai xiaoge* in 2016. The tally is now 121. Protests have been about wage arrears, pay cuts and fines.

Because workers are not formal employees, companies can usually ignore their complaints. In 2018 a rider was banned from Ele.me’s platform for going on strike for two days about low wages. Still, the two biggest firms know well the public’s sympathy for takeaway riders, who formed one section of a national-day parade through Tiananmen Square in October. They would also rather avoid lots of churn in their workforce.

To boost loyalty, Meituan has created a category call *lepao*, or happy runners, who get paid more for accepting orders in faraway places. It has also helped set up a mental-health hotline for delivery workers. During the

epidemic the firm has offered free online counselling to riders. It will pay up to 300,000 yuan in medical fees to those with covid-19.

In the long run, riders are unlikely to be satisfied. Pun Ngai of the University of Hong Kong says they risk becoming “trapped in the middle”—unable to move forward in urban life and unwilling to retreat to a rural one. Asked, pre-covid, why he had recently travelled 1,700km from his home in the western province of Gansu to Shanghai, a newly arrived *waimai xiaoge* replied, beaming: “Everyone likes a big city.” He paused. “But you can’t do this for ever. You need to do something that gives you a way up.” Contacted recently, he said he had quit. “Too tiring,” he grumbled. ■



零工经济

看得见，听得到

在疫病大流行期间，送货上门服务在中国发挥了至关重要的作用。他们由新一类工人提供【新冠报道】

中国日前经历新冠疫情高峰期间，上海各地的小区门口出现了一排排金属大货架。这些小区不允许外部人员进入，但需要一个地方来存放足不出户的数百万居民从网上订购的海量包裹。这些架子上堆满了消毒剂、维生素片、大袋米面、食用油和蔬菜。

中国自1月下旬起在湖北省封城，随后在全国各地的市镇实施了相对宽松一些的封锁。食品配送公司为帮助民众捱过封锁期发挥了至关重要的作用。自3月初以来，除境外输入病例以外，本地新增确诊病例极少。因此管控已经放宽，商店和餐馆获准重新开张。但许多人谨慎行事，大部分时间仍待在家里。官方媒体一直把送货上门的人员誉为“英雄”。对此应该没人会反对。

即使在危机发生以前，他们就已经深受城市居民的喜爱。源源不断的廉价劳动力、庞大的中产阶级人群和几乎无处不在的智能手机结合在一起，推动了网上外卖服务迅速增长，达到富裕国家无法比拟的程度。人们可以在下单后30分钟内拿到从咖啡到稀饭等各种食物。它们通常由该行业里的两大巨头——饿了么和美团点评的外卖员放在电动车的后箱里递送。超过四亿人——约占中国互联网用户的一半——曾让“外卖小哥”（超过九成外卖员是男性）送货上门。城市居民已经非常习惯从这些小哥那里接过热饭热菜，戏称其为“衣食父母”。

疫病来袭后，外卖员的服务变得性命交关。官员们下令企业停工，但允许保留一些“基本”服务，包括递送熟食和食品杂货。许多人对别人制作饭菜的安全性不放心，转而从网上超市买杂货。根据美团对第一季度营收的悲观预测，其外卖订单减少超过一半，但下属便利超商的饺子皮和调味酱销售额增长了七倍不止。人们现在又开玩笑说，疫情把中国变成了一个厨师

大国。

外卖小哥们的生活也改变了。来自中部城市郑州的24岁的张帅（音译）在上海为美团送外卖，工作时必须戴口罩。公司每天给他测两次体温，用卡片记录结果并别在他的外套上，同时也上传到应用中供用户查看。现在大多数小区已经重新对外开放，他在餐馆取货和送货进小区时还要经过许多道检查。

不过这份工作仍然吸引着张帅这样的人。实际上，他是在感染数字上升时和美团签约的。别的工作都太难找了，他说。而且，他每月可以赚一万块，已经比上海的城市平均工资还高，部分原因是美团给了补贴，还有一些心存感激的用户会打赏。他会一直干到疫情完全结束。另一个外地来的务工者说自己另外五个骑手住在一个单人间里。不怕和他们挤在一起吗？“我不怕死。”他咧嘴一笑，发动车子走了。

零工经济已经改变了中国的城市。过去，从农村来的年轻工人在生产线上劳碌，基本上不被城市居民所看见。现在，他们中的许多人宁愿去严格死板的工厂工作，而选择以更加散漫的方式谋生。他们无所不在，穿着公司的亮色外套，在人流车流中危险地穿梭。除了外卖员，还有数以百万计的人为其他基于应用的运输服务业工作，比如送快递或做网约车司机。

外卖小哥已经帮助中国的食品配送服务发展成为一项460亿美元的业务，规模为全球最大，是美国的两倍。2018年，美团和饿了么共有约600万名骑手。对员工的需求正在迅速增长。研究公司盛博估计，到明年美团每天将需要100多万名外卖员，比去年多20万人。去年夏天，身穿黄色夹克的美团大军每分钟平均递送两万份订单。

对于来自农村的打工者而言，这份工作是打开城市生活超乎想象的捷径。做工厂工人必须具备一定的技能，通常还要有一名同乡做担保人。但是，要做外卖员，有时只要把身份证和健康证明的副本上传到应用就成。收入通常比在装配线上高。

美团的骑手有近三分之一曾在工厂工作。他们转换行业反映出全国趋

势。2018年，外来务工者从事服务业的人数首次超过了制造业。

疫情可能会导致他们中的更多人去打零工。中国许多遭受重创的企业正在裁员，外卖公司却是另一番景象。阿里巴巴的食品杂货电商盒马已经从30家停业的连锁餐厅“借调”了2000名员工。疫情爆发以来，美团已经招募了45万多名新骑手。因为与病毒有关的出行限制，其中许多人都在自己老家所在的省份送货。

中国劳动关系学院的纪雯雯说，近年来，零工工作给劳动者提供了“缓冲器”。在中俄边境黑龙江边的煤城鹤岗，外卖骑手中有一成人过去是矿工。罗琼（音译）是他们中的一个，他在饿了么赚的钱是他做矿工时的两倍。“我赚的比我们这里的公务员还多。”他自豪地说。

和中国刚刚开始产业腾飞时的工厂工人相比，今天的外来务工者怀抱的梦想往往有所不同。许多人从没耕过地，也无意回农村。他们受过更好的教育。外卖、快递人员中有五分之一上过大学或职校。他们希望获得尊重。在调查中，近一半美团骑手表达了自己社会地位的焦虑。在饿了么，不到三分之一的人认为自己获得了用户足够的尊重。

这种挫败感可能会加剧。疫情期间，外卖公司推出了免接触配送系统，把食物杂货挂在门把手上，或者放在它们在一些大城市的办公室和公寓楼群中安装的专用储物柜里。与外卖小哥面对面互动曾经几乎已是城市生活的日常，如今戛然而止。它可能永远不会完全恢复了。

送外卖让外来务工者可以自行选择工作时间，但压力仍然巨大。许多骑手通过中介受雇，而后者对这项工作提出了苛刻的要求。压力是显而易见的：负担沉重的外卖、快递人员通常要负责前往卸货点的最后一段路程。泛民派劳工组织香港职工会联盟（HKCTU）将零工工人描述为“庞大的不稳定无产者”。

这支大军中有一个22岁的瘦高个，套着肥大的饿了么夹克。他希望记者只写他姓刘。他说，在东部城市宿迁附近的远方老家，他得“像机器那样连轴转”才能赚到和在上海一样多的钱。现在，他每个月攒下5000块。但他

每周工作六天，每天工作十小时，即使最恶劣的天气也不例外。小刘说，自己每天都会闯红灯，以免送餐晚了被罚钱。2019年上半年，上海每周录得12起涉及外卖员的道路交通事故。许多事故未上报。

多年来，工厂工人运用他们的集体力量来争取更好的工资水平和工作条件。分散的外卖、快递人员更难做到这一点，香港非政府组织中国劳工通讯（CLB）的杰弗里·克洛索（Geoffrey Crothall）指出。如果一些骑手罢工，算法可以将订单重新派给其他还在工作的骑手。

尽管如此，骑手们也会利用社交媒体帮助自己。他们在微信和QQ等通讯服务上建有大型聊天群，在里头交流递送路线，也讨论雇佣条款和不满。美团称旗下骑手有五分之二是因为同乡推荐而干上这份工作，这在一定程度上重塑了工厂里那种团结。小刘找到了一个微信群，里面全都是他跑外卖的老乡。外卖、快递人员还会在他们经常碰面的地方结识互动，比如网络连接良好的地方或繁忙的美食广场附近。

这样的社交让他们能够协调罢工活动。CLB说，外卖行业已成为“工人骚动的主要源头”（见图表）。根据该组织的记录，外卖小哥们在2016年举行了第一次罢工。至今共121次。抗议活动涉及欠薪、减薪和罚钱。

因为这些工人不是正式雇员，公司通常可以对他们的不满置之不理。2018年，一名骑手因不满配送费太低罢送了一天，结果被饿了么平台封号。不过，两家最大的公司也很清楚公众对外卖骑手的同情——去年10月天安门广场国庆阅兵仪式中，外卖骑手是游行方队之一。此外，公司也要避免员工流动太过频繁。

为提高员工忠诚度，美团推出了一个新的服务队伍“乐跑”，那些愿意派送远距离订单的人能拿到更高的报酬。它还协助建立了一条派送员心理健康热线。疫情期间这家公司为骑手提供了免费在线咨询。它将为患新冠肺炎的员工支付最高30万元的医疗费。

从长远看，骑手们不太可能感到满意。香港大学的潘毅表示，他们有“被卡在中间”的风险——既无法在城市生活中前进，也不愿退回到农村。疫情

爆发前，一位初来乍到的外卖小哥被问到为何从甘肃老家来到1700公里外的上海，他笑答：“谁都喜欢大城市。”顿了下，他又说，“但也不能永远做这个。还得干一些有出路的事。”最近问他，他说已经辞职了。“太累了。”他叹道。■



Coronavirus statistics

Fatal flaws

The death toll from covid-19 appears higher than official figures suggest

THE SPREAD of covid-19 is most often measured by two numbers: how many people are infected, and how many have died. The first is very uncertain. Some carriers show no symptoms, and most countries do not test people who seem healthy. Because data on infections are unreliable, researchers have focused on deaths. Yet new statistics suggest that current fatality numbers may also understate the damage.

Official death tolls for covid-19 may exclude people who died before they could be tested. They also ignore people who succumbed to other causes, perhaps because hospitals had no room to treat them. The latter group has been large in other disasters. For example, when Hurricane Maria struck Puerto Rico in 2017, America recorded only 64 deaths. A study later found that the surge in total deaths was close to 3,000. Many occurred in hospitals that lost power.

Such analysis is not yet possible for nations battling covid-19. The only European country whose total death rate (as calculated by EuroMOMO, a research group) had spiked by March 20th was Italy. This estimate is based on a group of cities. Unfortunately, Italy does not break down covid-19 deaths by city, precluding a comparison of covid-19 and total deaths in the same area.

However, journalists and scholars have crunched their own numbers. *L'Eco di Bergamo*, a newspaper, has obtained data from 82 localities in Italy's Bergamo province. In March these places had 2,420 more deaths than in March 2019. Just 1,140, less than half of the increase, were attributed to covid-19. "The data is the tip of the iceberg," Giorgio Gori, the mayor of

Bergamo's capital, told *L'Eco*. "Too many victims are not included in the reports because they die at home."

Comparable figures can be found across Europe. In Spain *El País*, a newspaper, has published the results of a study by the government's health research centre, showing that "excess" deaths in the Castile-La Mancha region were double the number attributed to covid-19. Jean-Marc Manach, a French reporter, has found a similar disparity in the department of Haut-Rhin.

These differences may shrink over time. Official counts of covid-19 fatalities could be updated to include people who have already died, because confirming the cause sometimes takes several days. The toll from other types of death might fall soon: lockdowns could reduce accidents and violence, and many frail covid-19 victims were already likely to die of other causes. And mortality data are noisy in smaller regions—especially hard-hit ones that may not be representative of entire countries.

Still, the official covid-19 count will always seem too low in places like Nembro, a Bergamasque town of 11,000 people. It suffered 152 deaths in March, with only 39 attributed to the virus so far. "Almost all the old people got it," says Luca Foresti, a researcher. "And therefore they died, a lot." ■



新冠统计

致命差错

新冠肺炎的实际死亡人数似乎高于官方数据【新冠报道】

新冠肺炎的传播情况通常以两个数字来衡量：感染人数和死亡人数。第一个数字非常不确切。有些病毒携带者没有任何症状，大多数国家也不检测那些看起来健康的人。因为感染数据不可靠，所以研究人员一直关注死亡数据。然而新的统计表明，目前公布的死亡人数可能也低估了破坏程度。

新冠肺炎的官方死亡数字可能排除了那些在接受检测之前就已死亡的人。官方也未计算那些死于其他原因的人——可能是因为医院没有多余的空间收治他们。在其他灾难中后者的数量很大。例如，2017年飓风“玛利亚”袭击波多黎各，美国统计的死亡人数仅为64人。之后的一项研究发现死亡总人数激增至近3000人。很多人死在停电的医院里。

这样的分析在那些仍在与新冠肺炎搏斗的国家尚不可行。截至3月20日，意大利是唯一一个总死亡率（由研究机构EuroMOMO计算得出）猛升的欧洲国家。这一估算是基于一组城市得出。遗憾的是意大利没有将新冠肺炎的死亡人数按城市分别列出，因此无法比较同一个地区里的新冠死亡人数和总死亡人数。

不过，记者和学者们自行分析了数据。《贝加莫生态报》（L'Eco di Bergamo）拿到了意大利贝加莫省82个地方的数据。这些地方今年3月的死亡人数比2019年3月多了2420人。其中只有1140人被归为因新冠肺炎死亡，不到新增人数的一半。“这个数据只是冰山一角。”贝加莫省省会的市长乔治·戈里（Giorgio Gori）告诉《生态报》。“太多病亡者没有包含在统计数字里，因为他们死在了家中。”

欧洲各地都能找到类似的数据。西班牙《国家报》（El País）发表了该国政府下属医疗研究中心的一项研究结果，显示卡斯蒂利亚-拉曼查地区的“超量”死亡数是新冠肺炎统计死亡人数的两倍。法国记者让-马克·马纳赫

（Jean-Marc Manach）在上莱茵省也发现了类似的差异。

这些差异可能会随着时间的推移而缩小。官方统计的新冠肺炎死亡人数可能会更新，将已经死亡的人包含在内，因为有时需要几天时间才能确认死因。因其他原因死亡的人数可能很快就会下降：封城可能会减少意外事故和暴力事件，而许多虚弱的新冠肺炎患者本就很可能因其他原因死亡。而且，较小的地区的死亡数据具有干扰性，尤其是那些疫情严重的地区可能并不代表整个国家的情况。

尽管如此，像有1.1万人口的贝加莫小镇嫩布罗（Nembro）这样的地方，官方公布的新冠死亡数字终归显得太少了。今年3月该地有152人死亡，目前仅有39人被认定死于新冠病毒。“几乎所有的老年人都感染了，”研究人员卢卡·佛雷斯蒂（Luca Foresti）说，“他们因此去世了。很多人。”■



Pandemics of yore

How to understand a plague

Five books of science and history that cast light on covid-19

Pale Rider. By Laura Spinney (*Public Affairs; Vintage*). The Spanish flu pandemic that began in 1918 killed around 50m people in a few years—more deaths than in the preceding four years of world war. Young adults seemed to perish disproportionately from what was an especially virulent strain of the influenza virus. Doctors could do very little about the sickness, so countries closed their borders and blamed each other. This book tells the story not only of the devastation at the time, but also of the century of scientific detective-work that was required to understand why the episode was so deadly.

Spillover. By David Quammen (*W.W. Norton; Vintage*). Some of the outbreaks of disease that have caused most distress among human beings have come from animals. Other, non-human primates were the source of HIV; influenza transferred from birds, and coronaviruses from bats. When the human immune system is newly confronted with something that has just hopped the species barrier—a so-called zoonosis—it can be overwhelmed. By tracking the origin of several zoonoses, this book explains how such diseases emerge, why they are so dangerous and where in the world the next ones might arise.

The Rules of Contagion. By Adam Kucharski (*Basic Books; Wellcome Collection*). Today, the freedoms and daily routines of many countries are held in the hands of epidemiologists. Amid the pandemic, these mathematical modellers have supplied scenarios for how travel bans, social distancing or stay-at-home policies could alter the trajectory of covid-19. This book charts the history of this now-pivotal science, from its origins in understanding the spread of malaria at the turn of the 20th century, to its

central role in predicting the dissemination of everything from diseases to fake news in the 21st.

A Journal of the Plague Year. By Daniel Defoe (*Oxford University Press*). A diary of one man's life in 1665, when the bubonic plague swept through London, killing almost 100,000. The book recounts the progress of the disease as it transforms the city, describing streets that are either eerily empty or filled with the sounds and smells of suffering. Defoe was only five in 1665 and wrote the book, which blends historical detail and imagination, more than 50 years after the event. He is thought to have based it on the contemporaneous diaries of his uncle, Henry Foe.

The End of Epidemics. By Jonathan Quick and Bronwyn Fryer (*St Martin's Press; Scribe*). Published two years ago, this book's simple message ought to have been more widely heeded: planning, preparation and open communication count for everything when it comes to ameliorating the vast social and economic damage that a new infection can cause. Using insights from previous outbreaks, the authors offer lessons on how global institutions can best co-ordinate to predict, model and prevent future pandemics. ■



昔日的大流行病 如何理解瘟疫

通过五本科学和历史书理解新冠疫情【新冠报道】

《苍白骑士》，劳拉·斯平尼著（公共事务出版社；Vintage）。1918年开始的西班牙流感大流行在几年内导致约五千万人死亡——比之前四年里世界大战的死亡数还多。因这种特别致命的流感病毒而丧生的年轻人数量似乎高得不成比例。医生对这种疾病几乎毫无办法，各国因而关闭了边境，互相指责。这本书不仅描绘了当时的惨状，还讲述了人们为了解这起事件何以如此致命而在一个世纪内开展的科学探索工作。

《致命接触》，大卫·奎曼著（W·W·诺顿公司；Vintage）。在给人类带来最多苦难的疫病中，有一些的源头是动物。其他非人类灵长目动物是艾滋病病毒的来源；流感由鸟类传给人类，冠状病毒源自蝙蝠。当一种刚刚跨越了物种屏障的疾病——所谓的人畜共患病——来袭之时，人类的免疫系统可能无力招架。这本书追踪了几种人畜共患病的起源，解释了这些疾病如何出现、为何如此危险，以及接下来它们可能会在世界的哪个角落冒头。

《传染的规律》，亚当·库查尔斯基著（Basic Books出版社；卫尔康收藏馆）。今天，许多国家的自由和日常事务都掌握在流行病学家手中。在眼下这场大流行病中，这些做数学建模的人给出了种种模拟场景，演示旅行禁令、社交隔离或让人们待在家中的政策如何改变新冠病毒的发展轨迹。这本书记录了这门目前处于核心位置的科学的历史——从它起源于20世纪初对疟疾传播的探究，到21世纪它在预测从疾病到假新闻等各种事物的传播中起到的核心作用。

《瘟疫年纪事》，丹尼尔·笛福著（牛津大学出版社）。这是一个人在1665的生活日记。当时腺鼠疫席卷伦敦，造成近10万人死亡。这本书讲述了这种疾病如何一步步改变了城市。书中描画的街道不是空旷得可怕，就是充满了苦难的声音和气味。1665年笛福仅五岁，这本书是他在50多年后

写下的，其中有历史细节，也有想象。一般认为他的记述是基于他叔叔亨利·福(Henry Foe)在那个时代的日记。

《流行病的终结》，乔纳森·奎克和布朗温·弗莱尔著（圣马丁出版社；Scribe出版社）。这本书出版于两年前，它传达的简单观点按理说早就该被广泛听取了：要缓解一种新型感染可能造成的巨大社会和经济损害，规划、准备和开诚布公的沟通交流至关重要。作者运用从以前的疫病中获得的见解，为全球机构如何更好地协作以预测、建模并防范未来的大流行病提供了经验。■



The coronavirus pandemic

Testing's testimony

How an antibody test for the novel coronavirus should—and should not—be used

WHEN A NEW virus invades the human body, the immune system leaps into action. First to the scene are antibody molecules of a type called immunoglobulin M (IgM). These bind with proteins on a virus's surface, disabling it and marking it for destruction by cells called macrophages. A few days later the system produces a second type of antibody, immunoglobulin G (IgG), to continue the fight. IgMs are short-lived. They stick around in the bloodstream for three or four weeks before disappearing. IgGs, however, are the basis for a much longer-term form of immunity. This can last for many years, or even a lifetime.

Kits that test for these two types of antibodies when they have been raised specifically by SARS-CoV-2 should soon become available. The virus causing the covid-19 is already being detected with genetic tests, which look directly for current signs of infection in nasal or throat swabs. Tests to detect antibodies will also be able to identify those who have had infections in the past and may now be immune. In the short term, this will be important because it will permit the authorities to identify who may return to their jobs without risk of infecting others. That is particularly valuable in the cases of doctors, nurses and the numerous other health-care workers needed to look after those who are seriously ill. It will also help in the longer run, by revealing how far the virus has spread through a population, and thus whether or not herd immunity is likely to have built up. Herd immunity is the point where insufficient infectible individuals remain in a population for a virus to be able to find new hosts easily, and it is therefore safe to lift social-distancing and stay-at-home rules.

SARS-CoV-2 antibody tests have already been deployed in limited numbers

in China, Singapore and South Korea. Several Western governments, including those of America and Britain, have been buying up millions of surplus antibody tests from China for use in their own countries. Several other types of these tests have also been developed by companies around the world. None, however, has yet been approved for widespread use—for, though such tests are reasonably easy to manufacture, ensuring that they give useful and reliable results is taking a lot of effort.

Each different design of test uses its own recipe of chemicals and processes. Physically, however, many resemble the self-contained plastic sticks employed in the version made by Biopanda Reagents, a British firm. A user first pricks a fingertip. Then he or she introduces a few drops of blood into an opening at one end of the stick. Inside, the blood goes through a series of chemical processes that can identify particular antibodies. It takes around 15 minutes to get a result, and this is displayed in a similar fashion to that used by a typical pregnancy test—the positive identification of an antibody resulting in a coloured line next to its label on the test stick.

There are three interesting signals. A solitary positive for IgM means the person has had a very recent (potentially current) infection. Positives for both IgM and IgG mean the user was infected some time within the past month. A positive for IgG alone means that the infection occurred more than a month ago, and the user should now be immune to a repeat of it. (A negative result probably means no infection, though it could also mean that it is too early in the course of an infection for antibodies to have appeared, since the first IgMs typically turn up only 7-10 days after an infection has begun.)

Before regulators can approve a test for widespread use, they need to validate it. How useful it is can be summarised by two numbers determined during this validation: its sensitivity and its specificity.

A test's sensitivity refers to how good it is at detecting the thing it is meant to detect—in this case the IgM and IgG antibodies associated with SARS-CoV-2. A sensitivity of 95% means that, from 100 blood samples known (by other means, such as previous genetic testing) to be infected, the test will reliably tag 95 correctly as having the pertinent antibodies. The remaining five would be identified as having no antibodies present—in other words they would be false negatives.

The other significant number, a test's specificity, measures how good that test is at detecting only the antibodies it is meant to detect. There are seven human coronaviruses and, ideally, a test would detect only antibodies produced in response to SARS-CoV-2. A test with 98% specificity means that, of 100 known uninfected blood samples, 98 will come back (correctly) as negative and the final two will come back (falsely) as positive. Such false positives could have many causes. A common one is cross-reaction, in which a test responds to the wrong antibodies.

To work out a test's sensitivity and specificity, it needs to be checked against hundreds of samples of known status. Given the novelty of SARS-CoV-2, and therefore the lack of easy access to relevant blood samples, this takes time. The British and American authorities are assessing several tests, but have released no validation data as yet, and have been tight-lipped about when they will do so.

| *Sense and specificity*

An ideal test would be 100% sensitive and 100% specific. In reality, there will always be a trade-off between the two. Make a test acutely sensitive, so that it gives a positive signal with even the tiniest amounts of a relevant antibody present, and it will get less specific. This is because such a fine chemical hair-trigger is likely to be set off by antibodies similar to, but not identical with the target. And vice versa.

This trade-off is not always a bad thing, for it allows different sorts of test to be used in different circumstances. For example, if the intention of testing is to identify doctors and nurses who have antibodies to SARS-CoV-2, so that they can safely return to work with infected patients, because they are themselves now immune to infection, then the most important thing is for a test to have a low rate of false positives. In other words, it needs a high specificity.

By contrast, if the idea is to gather transmission data, sensitivity is the priority. If someone were identified as having had an infection, further tests could trace which of that person's acquaintances were also infected, or had once been infected and were now immune. In these circumstances, a few false positives would not be a disaster. They would probably show up eventually, because those around the allegedly infected individual would not be infected as often as expected. A false negative, though, would mean lost information and a consequent lack of contact-tracing. That would be significant.

Testing of this sort will let doctors understand how a local cluster of infections grows, and therefore what action to take in order to break the chain (meaning, in practice, who needs to be quarantined). This kind of contact-tracing and isolation has been employed to great effect in South Korea through the use of genetic tests for the virus. Antibody tests will enhance the process, by capturing data on those infected in the past as well as the present.

Children are another group who could profitably be monitored using antibody tests. It is now well established that they are less likely than adults to present the symptoms of covid-19, and rarely suffer severe disease. It remains unclear, though, to what degree they are being infected "silently", and are thus able to pass the infection on to others around them while apparently remaining healthy themselves. Antibody tests will reveal

a fuller picture.

Antibody tests will no doubt also be in demand from members of the public wanting to know their immune status—for their peace of mind if nothing else. This might be cause for conflict. Even when they are cleared for general use it will take time for manufacturers to ramp up the production of tests, and those working in health care and one or two other important areas, like teaching, policing and delivering groceries to stores and markets, will surely be at the head of the queue to be tested. It is therefore hardly surprising that unvalidated kits, purportedly for domestic use, are already being offered for sale by unscrupulous online suppliers. Britain's medical regulator, for one, has had to take down several fraudulent websites and is warning people not to use any home-testing kits they find being sold online.

Even when more kits do become available (and with due acknowledgment to the different putative uses of different sorts of test) the next goal for most countries after protecting crucial members of the workforce will be population-level surveillance. This will, as a by-product, provide information to individual members of the public. But its primary purpose will be to track how the epidemic is progressing.

One of the most important elements of this analysis will be determining the rate of silent infection—with all the implications that brings for herd immunity. Comparing recent test data from the Netherlands and Iceland hints at the gap in current knowledge of just how much silent infection there may be. Both countries use genetic testing for the virus, but the Netherlands only tests those with severe symptoms of covid-19, whereas Iceland has been testing widely, even people without symptoms. Unsurprisingly, but crucially, the Icelandic approach has revealed far more infections in younger people than the Dutch one (see chart). Moreover, according to Kari Stefansson, who is leading the Icelandic project, 50% of

those who have tested positive reported no symptoms.

| *Silence is not golden*

Mass testing will be laborious. It will mean taking regular blood samples from millions of people, even though the actual analysis will be done by robots in centralised high-throughput laboratories. To save effort, such projects might piggyback on a country's blood-transfusion services, for donated blood is already subject to rigorous screening for pathogens.

German scientists have announced plans to start, this month, a reasonably large-scale surveillance project. It will monitor blood samples taken regularly from 100,000 participants. Those proving immune may be given a certificate exempting them from restrictions on working or travelling. If nothing else, that would certainly be an incentive to sign up. ■



冠状病毒大流行 检测的证词

应当如何恰当地使用针对新型冠状病毒的抗体检测【新冠报道】

当一种新病毒入侵人体时，免疫系统会马上发动起来。首先赶到现场的是名为免疫球蛋白M（IgM）的一类抗体分子。它们与病毒表面的蛋白质结合，使其失活，并把它标记出来供巨噬细胞破坏。几天后，系统会产生第二种抗体——免疫球蛋白G（IgG）——来继续战斗。IgM昙花一现。它们在血液中留存三到四周后消失。但IgG构成的免疫则要持久得多，可能持续多年乃至终生。

用于检测专由严重急性呼吸综合征冠状病毒2（SARS-CoV-2）引发的这两类抗体的测试盒应该很快就会面市。基因检测已经在探测这种导致新冠肺炎（covid-19）的病毒，它直接寻找鼻咽拭子中当前存在的感染迹象。针对抗体的检测还将能识别出过去曾经感染、现在可能已经免疫的人。在短期内这很重要，因为这可让当局确定谁可以重返工作岗位而不会有感染他人的风险。这对于需要照顾重症患者的医生、护士和其他众多医疗从业人员而言尤为宝贵。长期而言它也很有帮助：揭示病毒在人群中传播的程度，由此判断是否可能已经积累出群体免疫。群体免疫指的是人群中可感染的个体不足，令病毒无法轻易找到新的宿主，因此可以安全地放宽社交疏离和居家规定。

SARS-CoV-2抗体检测已在中国、新加坡和韩国做了有限数量的部署。包括美国和英国在内的几个西方国家政府已经从中国购买了数百万套过剩的抗体检测试剂盒用于本国。世界各地的公司还研发了另外几种抗体检测试剂盒。但是还没有哪一种方法被批准广泛使用，因为尽管这类检测试剂盒比较容易制造，要确保它们给出有用和可靠的结果仍需要大量的工作。

每种不同的检测设计都使用自己的化学和工艺配方。但是，从外形上看，很多都和英国的生物熊猫试剂公司（Biopanda Reagents）生产的独立操作塑料棒相似。用户先刺一下指尖，然后将几滴血引入塑料棒一端的开口

中。血液在塑料棒内部经过一系列化学过程来识别特定的抗体。大约15分钟后出结果，显示方式与常见的验孕棒类似——如果抗体测定阳性，检测棒的标签旁边会出现一条彩色的线。

引发注意的信号有三种。IgM单阳性表示该人在近日（也许是当前）被感染。IgM和IgG同时阳性，表示使用者在过去一个月中的某个时刻被感染。IgG单阳性意味着感染在一个多月前发生，因此使用者现在应该对感染免疫。（阴性结果可能意味着没被感染，尽管这也可能意味着处于感染太早的阶段而尚未出现抗体，因为IgM通常在感染开始后7到10天才出现。）

监管机构在批准一项检测可被广泛使用前需要验证其有效性。验证过程中可以通过确定两个数字来概括它多有用：灵敏度和特异性。

检测的灵敏度是指它探测到应该探测的东西的能力——这里就是与SARS-CoV-2相关的IgM和IgG抗体。如果灵敏度是95%，就意味着在100个已知被感染（通过其他方式确定，例如之前的基因检测）的血液样本中，该检测将可靠地把95个样本正确标记为具有相关抗体。其余5个将被识别为不存在抗体——换句话说就是假阴性。

另一个重要的数字是检测的特异性，衡量的是这个检测在仅仅探测应该探测的抗体这一点上的表现。人类冠状病毒一共有七种，理想情况下，一项检测应该只探测因SARS-CoV-2产生的抗体。如果检测的特异性为98%，意味着在100个已知的未感染血液样本中，有98个（被正确地）报告阴性，最后两个（被错误地）报告阳性。这种假阳性的原因可能有很多。常见的一个是交叉反应，也就是检测对错误的抗体做出了反应。

为了确定某项检测的灵敏度和特异性，需要用成百上千个已知状态的样本来验证。由于SARS-CoV-2很新，缺乏便捷的途径来获取相关血液样本，这就需要一些时间。英美两国当局正在评估几项检测，但尚未发布任何验证数据，并且对何时会发布三缄其口。

| 感知与特异

理想的检测应该是100%灵敏和100%特异的。在实际情况下，两者之间总

会有取舍。如果让一项检测非常灵敏，哪怕出现一丁点相关抗体也能给出阳性信号，那么特异性就会降低。这是因为这样精细的化学反应很容易被与标靶相似但不相同的抗体触发。反之亦然。

这种取舍并不总是一件坏事，因为可以在不同情况下使用不同类型的检测。例如，如果检测的目的是找到拥有SARS-CoV-2抗体的医护，让他们安全地恢复工作来照顾受感染的患者（因为他们现在已经对感染免疫了），那么检测最重要的一点就是假阳性率要低。换句话说，它需要高度的特异性。

相反，如果是收集传播数据，则要灵敏度优先。如果确认了某人已被感染，则可以通过进一步的检测来追踪哪些熟人也被感染，或是曾经被感染而现在免疫。在这种情况下，一些假阳性不会带来灾难。这些假阳性最终也很可能会被发现，因为他们周围的人被感染的概率低于预期。但是，假阴性却意味着丢失信息并导致未能追踪接触者，那可就严重了。

这一类检测可以让医生了解局部聚集性感染的增长情况，从而了解应采取何种措施来打破传染链条（实践中意味着需要隔离谁）。通过对病毒进行基因检测，韩国展开的这种接触者追踪和隔离成效显著。抗体检测同时捕获过去和当前感染者的数据，可进一步加强这一过程。

儿童是另一个可以利用抗体检测来监测而令整体获益的群体。现在人们已经确定，比起成年人，儿童不大会表现出新冠肺炎症状，并且很少出现重症。但是，目前尚不清楚儿童在多大程度上被“隐性”感染，从而在自己看起来依然健康的情况下传染周围的人。抗体检测将揭示更完整的图景。

毫无疑问，想要了解自己的免疫状态的公众也会有做抗体检测的需求——哪怕只是为了换得一个安心。这可能会导致冲突。即便在检测设备被获准通用之后，制造商要扩大生产也需要时间，而从事医护和其他一两个重要领域（如教学、治安、将食品杂货运送到商店和市场）的人肯定也会排在检测队伍的最前面。因此，毫不意外，一些不择手段的在线供应商已经开始出售据称供家庭使用的未经验证的测试盒。比如英国的医疗监管机构就

不得不关闭了几个欺诈性网站，并警告人们不要使用网上出售的任何家用测试盒。

即使等到有更多测试盒可用的时候（并恰当地承认不同类型的检测有不同的设计用途），大多数国家在保护好劳动力中的关键成员之后，下一个目标将是全民监控。这附带着给出了一些个体想知道的信息，但主要目的还是追踪流行病在国家内部的进程。

这项分析中最重要的元素之一将是确定隐性感染率——以及它对于群体免疫的任何影响。比较来自荷兰和冰岛的最新检测数据，就可以看出当前对于可能有多少隐性感染者的认识存在多大的欠缺。两国都进行了病毒基因检测，但荷兰仅检测那些出现严重症状的人，而冰岛一直在进行广泛的检测，哪怕是没有症状的人。毫不意外而至关重要的是，冰岛的方法找出的年轻感染者远多于荷兰人（见图）。此外，领导冰岛检测项目的卡里·斯特凡松（Kari Stefansson）说，测定为阳性的人中有50%没有症状。

| 沉默不是金

大规模检测会很费劲。即使实际的分析将由集中式高通量实验室中的机器人完成，也需要为数百万人定期采集血液样本。为降低工作量，此类项目可能会被搭载在一个国家的输血服务上，因为捐献的血液本来也要经过严格的病原体筛查。

德国科学家称计划在本月开始一个规模还算大的监测项目。它将检测定期从10万名参与者那里采集的血液样本。那些被证明已有免疫力的人将获得免除工作或旅行限制的证书。就为了这一点也值得报名了。■



Schumpeter

You're furloughed!

Should American job-cullers become more European during the current crisis?

IN MID-FEBRUARY Hilton, a hotelier, and its employees had something to celebrate. For the second year running the company came top in *Fortune* magazine's list of best American companies to work for. The perks provided to its 62,000 direct employees in America included extended parental leave, Under Armour-branded uniforms and facilities to let travelling staff ship breast milk home. A mere six weeks later, on March 26th, tens of thousands of those pampered employees were given notice that they would be thrown out of work because of the covid-19 pandemic. That was the day weekly jobless claims in America spiked by 1,000% to 3.3m.

The stratospheric surge of Americans seeking unemployment benefits contrasts with the situation in western Europe. Companies there are struggling just as hard but many are keeping workers on the books at reduced pay. That is a familiar story. In times of economic upheaval, European firms rely extensively on schemes in which the government picks up part of the wage bill, such as Germany's *Kurzarbeit*, France's *chômage partiel* and Italy's *cassa integrazione*. Traditionally, America has shunned such feather-bedding. From frontier days its labour laws have given employers leave to cull jobs almost at will. Not for nothing did the country elect a president whose catchphrase was "You're fired!"

In the current crisis it may seem fair to ask American firms to take a more European approach. After all, business activity has collapsed not because of slothful work habits, but because governments have ordered people to stay at home. This is not a slump that needs to be fixed with an orgy of creative destruction in the jobs market. And however deep the downturn, the rebound could be relatively quick. If so, it makes sense for companies and

employees to maintain ties, so that production can resume briskly when things improve.

Yet one feature of this crisis in fact makes it all the more important to maintain flexible labour practices: the jobs market has bifurcated. In industries that bring people together, such as hotels, airlines, casinos and restaurants, demand for workers has collapsed. Those that provide access to health care (such as hospitals), staples (supermarkets) or services catering to those stuck at home (e-commerce) are clamouring for more staff. For all the merits of Europe's labour-support programmes, the risk is that they last too long and dissuade workers from switching to industries where their help is badly needed.

Already the response of American firms to the jobs crisis is taking an unfamiliar route. Though many of the small businesses that provide about half of private-sector employment in America were quickly forced to let workers go to survive, the government has stepped in to ease the pain. Its \$2trn support programme has temporarily increased unemployment benefits. A \$350bn lifeline to small businesses within the stimulus package encourages them to cling on to staff if they can.

Some bigger American firms, such as Hilton, its rivals like Hyatt and Marriott, and retailers such as Macy's and Gap, are taking a different tack. Instead of sacking staff, they have announced that tens of thousands of their employees will be furloughed, which in America means being put on unpaid leave. Crucially, the furloughed workers get to keep their company health insurance. They can also, in most cases, claim unemployment benefits. To ease resentments, those who remain in work, including executives, will suffer pay cuts.

The use of furloughs represents a change from previous slumps, says Sandra Sucher of Harvard Business School. Common in Europe during the

financial crisis of 2007-09, they were barely used in America. Since then, however, many American firms who laid off workers found subsequent rehiring so difficult that they are loth to suffer the ordeal again, she says.

Another difference with past recessions is the way American firms are encouraging inactive workers to switch jobs to fill temporary vacancies in other industries. Hilton, for instance, is helping its suspended workers to apply for jobs at e-commerce firms like Amazon. This may help keep the labour market relatively fluid at a time of severe stress. (Amid employee absences and increased orders, some workers at Amazon, for instance, are demanding better conditions.) It is also well-suited to the time horizons of the pandemic. As social-distancing measures recede, some of the disease-specific demand for labour will ebb, enabling workers to return to their old jobs.

| *From pulling pints to pulling up potatoes*

This is where Europe could learn something from America. Some industries have far too many workers, whereas others do not have enough. Airline employees are needed to work in hospitals, and rural bar staff could helpfully be dragooned into farmwork amid a shortage of migrant labour. But European countries' schemes for subsidising the wages of furloughed workers often do not make it easy for them to take new jobs, even temporarily, and sometimes discourage it. As Giuseppe Moscarini of Yale University says, support for workers should not preclude labour mobility, even if it encourages them to maintain ties with their existing employers.

Both American and European labour policies have their pros and cons. In America rapid shake-outs in jobs markets help good firms grow and bad firms shrink, promoting dynamism. In Europe worker protections can reduce the devastating toll on employees and their families caused by slumps, but can slow the pace of recovery. American left-wingers believe that more European-style treatment of workers is long overdue—and will

cheer examples of companies volunteering to furlough workers rather than fire them. But if America and Europe want to ensure that hospitals are staffed, deliveries are made and food is on the table, they must remember that flexibility, as well as some security, is essential. ■



熊彼特

你暂时被炒了!

在当前的危机中，一向热衷裁员的美国公司是否应该变得更欧洲化？【新冠报道】

二月中旬，希尔顿酒店集团和它的员工们还欢欣鼓舞。这家公司连续第二年荣登《财富》杂志评选的美国最佳雇主排行榜榜首。它在美国的6.2万名直接雇员享受的福利包括加长育儿假、安德玛（Under Armour）品牌制服，以及帮助出差员工把母乳发送回家的便利安排。仅仅六周后，数万名养尊处优的员工在3月26日接到通知，他们将因为新冠肺炎疫情而被停职。当天，美国一周内申请失业救济的人数急升1000%，达到330万人。

美国申请失业救济的人数暴增，与西欧的情况形成了对比。西欧的企业虽然也在苦苦挣扎，但许多公司还是让员工减薪留职。这种做法很常见。在经济动荡时期，欧洲公司普遍依赖政府推出负担部分工资的方案，例如德国的“缩短工时”（Kurzarbeit）、法国的“部分失业”（chômage partiel）和意大利的“工资补偿基金”（cassa integrazione）。一直以来，美国对这种保护劳动者的做法绕道而行。从开拓边疆的年代开始，美国劳动法就允许雇主几乎随心所欲地裁员。这个国家选出了一位口头禅是“你被炒了！”的总统并不是偶然的。

在当前的危机中，让美国公司更多地效仿欧洲似乎公平合理。毕竟，商业活动停摆并不是因为低效的工作习惯，而是因为政府勒令人们待在家中。这并不是一场需要在就业市场中大举展开创造性破坏才能治愈的衰退。而尽管衰退严重，反弹可能也相对较快。如果是这样，公司和员工维持关系就合情合理，这样一旦局面好转，就可以迅速恢复生产。

然而，这场危机的一个特点实际上凸显了保持灵活就业的重要性：就业市场已经分化。酒店、航空、赌场和餐馆等人群积聚的行业对劳动力的需求一落千丈。而那些提供医疗服务（如医院）、生活必需品（超市）或者顺应隔离生活的服务（电商）则急于增添人手。欧洲的劳工支持计划虽有其优点，但风险在于持续时间过长，阻碍了劳动者转移到人手紧缺的行业。

面对就业危机，美国企业已经开始改变惯常的做法。在提供了美国私营部门约半数岗位的小企业中，尽管有很多都被迫迅速裁员求存，但政府已经介入以缓和局面。政府两万亿美元的救助方案临时提高了失业救济。经济刺激方案中为小企业发放的3500亿美元救助贷款也鼓励它们尽可能保留员工。

一些更大型的美国公司，比如希尔顿及其竞争对手凯悦和万豪，还有梅西百货和盖璞（Gap）这样的零售商，正在采取另一种策略。它们没有直接裁员，而是宣布数以万计的员工将被暂时解雇，在美国这意味着员工要开始无薪休假。至关重要的是，这些停职的员工得以保留在公司的医疗保险。多数情况下他们还可以申请失业救济。为了缓解怨恨情绪，包括高管在内的留在岗位上的员工将被减薪。

哈佛商学院的桑德拉·苏切尔（Sandra Sucher）指出，采用暂时解雇体现出一种不同于以往经济萧条期的转变。2007至2009年金融危机期间，这种操作在欧洲十分常见，在美国几乎不被采用。她说，自那以后，许多缩编的美国公司发现随后的重新招聘非常困难，它们再也不想遭这份罪了。

与以往经济衰退的另一不同是，美国企业现在鼓励闲下来的员工转换工作，去其他行业填补临时空缺。例如，希尔顿正帮助停职的员工去亚马逊等电商求职。在压力巨大的时期，这也许有助于保持劳动力市场的相对流动性。（比如，由于员工缺勤和订单增加，亚马逊的部分员工已经在要求提高待遇。）此举还十分适合这场大流行病的变迁历程。随着社交隔离措施撤销，一些与疫情相关的劳动力需求会回落，劳动者自然也就可以回到原来的工作岗位上。

| 从打啤酒到拔土豆

正是在这一点上，欧洲可以向美国学习。欧洲的一些行业人满为患，一些又人手不足。需要让航空公司的员工去医院工作，乡村酒吧的员工可以征调去支援农活，缓解外来劳工短缺的压力。但欧洲国家为停职劳动者提供工资补贴的计划往往不利于他们去从事新工作，哪怕只是临时性的，有时甚至阻碍了这么做。正如耶鲁大学的朱塞佩·莫斯卡里尼（Giuseppe

Moscarini) 指出的，即便劳工救济措施鼓励了他们与原雇主维持关系，也不应妨碍劳工的流动性。

美国和欧洲的劳工政策各有利弊。美国就业市场的快速调整助力优秀企业成长，让糟糕的企业萎缩，从而提升经济活力。而在欧洲，劳工保护可以缓和衰退对员工及其家庭造成的毁灭性打击，但也可能拖慢经济复苏的步伐。美国的左派人士认为早就应该采取更加欧洲式的劳工措施，他们会把那些主动让员工待岗而非裁员的公司奉为楷模。但如果美国和欧洲希望确保医院人手充足、送货服务顺畅，食品供应稳定，就须牢记，除了一定程度的保障外，灵活性也必不可少。 ■



Russia's economy

Isolationomics

After years of isolation, Russia is only mildly affected by global upheaval—so far

VLADIMIR PUTIN is no doubt feeling smug. The Russian economy ought to be in crisis, but it is not. Covid-19 is causing a global meltdown. The price of oil has slumped below \$30 a barrel, half what it was two months ago. Oil and gas traditionally account for two-thirds of Russian exports. That has sent the rouble sliding. The currency has lost nearly a third of its value since early January.

Yet even as the world's richest countries are in turmoil, taking on vast sums of debt to cushion the blow, Russia's economy shows few signs of panic. This is not because Russia has diversified, defeated corruption, protected property rights, or boosted competition, investment or growth. It has done none of those things. Rather, the Russian economy is less sensitive to the shock because it has already been self-isolating for the past six years. Ever since Mr Putin illegally annexed Crimea and fomented war in Ukraine, the West has imposed sanctions on Russia and Russia has imposed sanctions on the West.

Since then, the aim of Russia's macroeconomic policy has been not to foster growth but rather to build a fortress economy that could withstand a severe shock. Underpinning this policy was a fiscal rule in 2017 that required the budget to balance with an oil price slightly over \$40 a barrel. Anything above that figure was funnelled into a rainy-day fund which had reached 7.3% of GDP on March 1st.

As a result, Russia now sits on one of the world's largest gold and foreign-exchange reserves, worth nearly \$570bn. Oleg Vyugin, a former official at the central bank and the finance ministry, explains the thinking: "We're

protected against external shocks and foreign enemies because we have modern weapons and rockets, but also because we have gold and reserves.” Russia has also raised its pension age and VAT rate, and has boosted its tax take through digital technology. Mikhail Mishustin, the tax-collector-in-chief, was recently promoted to prime minister.

To be sure, the Russian economy remains highly dependent on energy and commodity prices. The dramatic fall in the oil price, partly induced by Russia’s own decision to break out of its deal with OPEC producers, could deprive the government of about 2trn roubles (\$25bn) this year. Russia’s risky bet that it could increase its market share and drive American shale firms out of business may backfire spectacularly if America decides to strike its own deal with Saudi Arabia at Russia’s expense, argues Kirill Rogov, an independent analyst. But for now, Russia has more than enough reserves to see it through the next few years. The decline in the value of the rouble has limited the damage to its public finances caused by the falling oil price. Western sanctions have also made it irrelevant, in many cases, that foreign goods now cost more in roubles.

Cut off from international capital markets since 2014, Russian firms have had no choice but to deleverage. Whereas Western firms took advantage of low interest rates and loaded up on debt, Russia’s corporate debt as a share of GDP has fallen to below 50%, while the state debt-to-GDP ratio is well under 20%. Given that most of Russia’s exports are basic, it is also less vulnerable to disruptions in complex global supply chains. “If you are travelling on a horse, you don’t have to worry about running out of petrol,” observes Natalia Orlova, chief economist at Alfa Bank.

Russia has also become more self-reliant. Its counter-sanctions imposed on food imports from the EU have boosted domestic agriculture, driving down the share of food that is imported by a third in the past five years, to just 24%.

Life in isolation has its downside, as many people outside Russia have discovered since covid-19 struck. Russia is poorer than it should be. Its average annual growth rate since 2014 has been a dismal 0.6%, which is a fifth of the global average. Small- and medium-sized private businesses have shrunk. Quasi-state firms controlled by Mr Putin's cronies have expanded. Rent-seeking is rampant, which means that opportunities for the honest or diligent are frustratingly meagre.

The economic impact of the new coronavirus, which may be more widespread than the government claims, is only likely to deepen Russia's structural problems. On March 25th Mr Putin announced his own response to the virus, a pale imitation of the vast economic packages announced by western governments. It largely transfers the cost of the adjustment to Russia's middle class.

Instead of a lockdown, Mr Putin declared a week-long holiday in Russia. In return, small- and medium-sized businesses are to get a corporate-tax holiday for six months (VAT must still be paid). The social taxes businesses pay on behalf of their employees are to be halved, to 15%.

The president's welfare-support measures were relatively modest. The government is going to increase child benefits by 5,000 roubles a month (\$63) and unemployment benefits by a third to 12,000 roubles. Those who fall sick and lose more than 30% of their income will be able to delay repayments of mortgages and certain other loans.

To compensate for the hit to the national budget, Mr Putin increased the tax on dividends received from offshore holdings from 2% to 15%, effectively levying a new tax on the rich. What this package demonstrates all too vividly is that Mr Putin cares a lot more about bolstering the state than about preserving Russia's market economy, such as it is.

As Ruben Enikolopov of Moscow's New Economic School argues, the biggest risk that confronts Russia is not an economic collapse but a social one, with millions of people losing their livelihoods and beleaguered private firms shrinking yet further. Mr Putin has long talked about restoring a Soviet-style socially oriented state. The crisis risks exposing that what he has built instead is a corporatist state that cares little about its private citizens. ■



俄罗斯经济

隔离经济学

经过多年“隔离”的俄罗斯只是略受全球动荡的影响——目前是如此

普京无疑正在沾沾自喜。俄罗斯经济本应陷入危机，但目前并没有。新冠肺炎正在引发一场全球崩溃。油价跌破每桶30美元，是两个月前的一半。石油和天然气历来占俄罗斯出口额的三分之二。卢布因此下跌，自1月初已经贬值了近三分之一。

然而，正当全球一批最富裕的国家陷入混乱、大举借债以缓和冲击之时，俄罗斯经济却没有表现出多少恐慌的迹象。这并不是因为俄罗斯已经实现了经济多元化，打击了腐败，保护了产权，或者促进了竞争、投资或增长——它在这些方面毫无作为。其原因是，在经历了过去六年自我孤立后，俄罗斯经济对这次冲击已不那么敏感。自从普京非法吞并克里米亚并在乌克兰挑起战争以来，西方国家对俄罗斯实施了制裁，而俄罗斯也对西方实施了反制裁。

自那以后，俄罗斯宏观经济政策的目标已经不是促进增长，而是建立起能够承受住严重冲击的堡垒式经济。支撑这一政策的是2017年的一项财政规定，它将达成财政预算平衡的油价设定为略高于每桶40美元。所有高于这一价位的收入都被注入应急储备基金，到今年3月1日，该基金已达到GDP的7.3%。

这样一来，俄罗斯目前拥有接近5700亿美元的黄金与外汇储备，是全球最大的黄金与外汇储备国之一。对此，俄罗斯央行和财政部的前官员奥列格·尤金（Oleg Vyugin）解释道：“我们能够抵御外来冲击和敌国侵犯，是因为我们不仅拥有现代化的武器和火箭，也拥有黄金和储备。”俄罗斯还延迟了退休年龄，上调了增值税税率，并通过数字技术增加了税收收入。前联邦税务局局长米哈伊尔·米舒斯京（Mikhail Mishustin）不久前晋升总理。

无可否认，俄罗斯经济仍然高度依赖能源和大宗商品价格。俄罗斯自行决定退出与欧佩克产油国的协议，一定程度上导致油价暴跌，为此该国政府今年可能会损失约2万亿卢布（250亿美元）。独立分析师基里尔·罗格夫（Kirill Rogov）认为，如果美国决定抛开俄罗斯，单独与沙特达成协议，那么俄罗斯企图增加自身市场份额并把美国页岩油公司挤出局的冒险做法可能会完全搞砸。但就目前来看，俄罗斯的储备还绰绰有余，可以撑过未来几年。卢布贬值限制了油价下跌对其公共财政造成的损害。很多情况下，西方的制裁也让购买外国商品要花费更多卢布这个问题变得无关紧要。

自2014年俄罗斯企业被国际资本市场拒之门外后，去杠杆成了它们唯一的选择。西方企业趁低利率大举借债，而俄罗斯的企业债务占GDP的比例已降至50%以下，政府债务占GDP的比例更是远低于20%。由于俄罗斯出口的大部分是基本必需品，错综复杂的全球供应链的中断对它的影响相对较轻。阿尔法银行（Alfa Bank）的首席经济学家纳塔莉亚·欧洛娃（Natalia Orlova）说：“如果你是骑马旅行，就不必担心油会用完。”

俄罗斯也已变得更加自力更生。它针对欧盟进口食品的反制裁促进了本国农业的发展，过去五年里其进口食品的比例下降了三分之一，仅为24%。

正如俄罗斯以外的许多人自疫情爆发后所发现的那样，隔离中的日子有其不利的一面。俄罗斯本不应如此穷困。自2014年以来，其经济平均年增速只有区区0.6%，为全球平均水平的五分之一。中小型私营企业萎缩了，由普京的亲信们控制的类国有企业却在扩张。寻租行为猖獗，意味着勤劳守信的人机会少得可怜。

新冠病毒对经济的影响可能比俄罗斯政府宣称的更广泛，它只可能会加剧俄罗斯的结构性问题。普京在3月25日宣布的病毒应对措施只是对西方各国政府宣布的一揽子庞大经济计划的苍白模仿。它在很大程度上将调整应对的成本转嫁给了俄罗斯的中产阶级。

普京没有颁布封城令，而是宣布俄罗斯放假一周。作为补偿，中小企业

将获得六个月的免税期（仍需缴纳增值税）。企业为员工缴纳的社会保障税将减半至15%。

普京的福利支持措施算不上给力。政府计划将儿童补助金每月增加5000卢布（63美元）；失业补助金增加三分之一，至1.2万卢布。那些生病及收入下滑超过30%的人可以延期偿还抵押贷款和其他某些贷款。

为弥补对国家预算造成的损失，普京将境外股份的股息税从2%提高到15%，实际上是对富人开征了一项新税。这一揽子计划非常清楚地表明，普京真正在意的是支撑其政府，而不是保护俄罗斯的市场经济，尽管它的市场经济本就不怎么样。

正如莫斯科的俄罗斯新经济学院（New Economic School）的鲁本·叶尼科洛波夫（Ruben Enikolopov）所指出的，俄罗斯面临的~~最大~~最大风险不是经济崩溃，而是社会崩溃——数以百万计的人失去生计，本就处于困境的私营企业进一步萎缩。普京一直宣称要重建苏联式的社会导向的国家。这场危机可能会暴露出他所建立的实则是一个漠视平民的社团主义国家。■



Pandemic trade-offs

A grim calculus

Covid-19 presents stark choices between life, death and the economy. They will probably get harder

IMAGINE HAVING two critically ill patients but just one ventilator. That is the choice which could confront hospital staff in New York, Paris and London in the coming weeks, just as it has in Lombardy and Madrid. Triage demands agonising decisions. Medics have to say who will be treated and who must go without: who might live and who will probably die.

The pandemic that is raging across the world heaps one such miserable choice upon another. Should medical resources go to covid-19 patients or those suffering from other diseases? Some unemployment and bankruptcy is a price worth paying, but how much? If extreme social distancing fails to stop the disease, how long should it persist?

The governor of New York, Andrew Cuomo, has declared that “We’re not going to put a dollar figure on human life.” It was meant as a rallying-cry from a courageous man whose state is overwhelmed. Yet by brushing trade-offs aside, Mr Cuomo was in fact advocating a choice—one that does not begin to reckon with the litany of consequences among his wider community. It sounds hard-hearted but a dollar figure on life, or at least some way of thinking systematically, is precisely what leaders will need if they are to see their way through the harrowing months to come. As in that hospital ward, trade-offs are unavoidable.

Their complexity is growing as more countries are stricken by covid-19. The tally of reported cases is now nearing 1.3m. America has logged over 300,000 cases and has seen nearly two times more deaths than China. On March 30th President Donald Trump warned of “three weeks like we’ve

never seen before”. The strain on America’s health system may not peak for some weeks. The presidential task-force has predicted that the pandemic will cost at least 100,000-240,000 American lives.

Just now the effort to fight the virus seems all-consuming. India declared a 21-day lockdown starting on March 24th. Having insisted that it was all but immune to a covid-19 outbreak, Russia has ordered a severe lockdown, with the threat of seven years’ prison for gross violations of the quarantine. Some 250m Americans have been told to stay at home. Each country is striking a different trade-off—and not all of them make sense.

In India the Modi government decided that its priority was speed. Perhaps as a result it has fatally bungled the shutdown. It did not think about migrant workers who have streamed out of the cities, spreading the disease among themselves and carrying it back to their villages. In addition, the lockdown will be harder to pull off than in rich countries, because the state’s capacity is more limited. India is aiming to slow its epidemic, delaying cases to when new treatments are available and its health-care system is better prepared. But hundreds of millions of Indians have few or no savings to fall back on and the state cannot afford to support them month after month. India has a young population, which may help. But it also has crowded slums where distancing and handwashing are hard. If the lockdown cannot be sustained, the disease will start to spread again.

Russia’s trade-off is different. Clear, trusted communications have helped ensure that people comply with health measures in countries like Singapore and Taiwan. But Vladimir Putin has been preoccupied with extending his rule and using covid-19 in his propaganda campaign against the West. Now that the virus has struck, he is more concerned with minimising political damage and suppressing information than leading his country out of a crisis. That trade-off suits Mr Putin, but not his people.

America is different, too. Like India, it has shut down its economy, but it is spending heavily to help save businesses from bankruptcy and to support the income of workers who are being laid off in devastating numbers.

For two weeks Mr Trump speculated that the cure might be worse than the “problem itself”. Putting a dollar figure on life shows he was wrong. Shutting the economy will cause huge economic damage. Models suggest that letting covid-19 burn through the population would do less, but lead to perhaps 1m extra deaths. You can make a full accounting, using the age-adjusted official value of each life saved. This suggests that attempting to mitigate the disease is worth \$60,000 to each American household. Some see Mr Trump’s formulation itself as mistaken. But that is a comforting delusion. There really is a trade-off, and for America today the cost of a shutdown is far outweighed by the lives saved. However, America is fortunate to be rich. If India’s lockdown fails to stop the spread of the disease its choice will, tragically, point the other way.

Wherever you look, covid-19 throws up a miasma of such trade-offs. When Florida and New York take different approaches, that favours innovation and programmes matched to local preferences. But it also risks the mistakes of one state spilling over into others. When China shuts its borders to foreigners almost completely, it stops imported infections but it also hobbles foreign businesses. A huge effort to make and distribute covid-19 vaccines will save lives, but it may affect programmes that protect children against measles and polio.

How should you think about these trade-offs? The first principle is to be systematic. The \$60,000 benefit to American households, as in all cost-of-life calculations, is not real cash but an accounting measure that helps compare very different things such as lives, jobs and contending moral and social values in a complex society. The bigger the crisis, the more important such measurements are. When one child is stuck down a well the desire to

help without limits will prevail—and so it should. But in a war or a pandemic leaders cannot escape the fact that every course of action will impose vast social and economic costs. To be responsible, you have to stack each against the other.

| *Hard-headed is not hard-hearted*

A second principle is to help those on the losing side of sensible trade-offs. Workers sacked in forced shutdowns deserve extra help; children who no longer get meals at schools need to be given food. Likewise, society must help the young after the pandemic has abated. Although the disease threatens them less severely, most of the burden will fall on them, both today and in the future, as countries pay off their extra borrowing.

A third principle is that countries must adapt. The balance of costs and benefits will change as the pandemic unfolds. Lockdowns buy time, an invaluable commodity. When they are lifted, covid-19 will spread again among people who are still susceptible. But societies can prepare in a way that they never did for the first wave, by equipping health systems with more beds, ventilators and staff. They can study new ways to treat the disease and recruit an army of testing and tracing teams to snuff out new clusters. All that lowers the cost of opening up the economy.

Perhaps, though, no new treatments will be found and test-and-trace will fail. By the summer, economies will have suffered double-digit drops in quarterly GDP. People will have endured months indoors, hurting both social cohesion and their mental health. Year-long lockdowns would cost America and the euro zone a third or so of GDP. Markets would tumble and investments be delayed. The capacity of the economy would wither as innovation stalled and skills decayed. Eventually, even if many people are dying, the cost of distancing could outweigh the benefits. That is a side to the trade-offs that nobody is yet ready to admit. ■



【首文】无处不在的取舍

冷酷计算

新冠肺炎迫使人们在生、死和经济之间做出艰难选择——很可能会越来越难【新冠报道】

想象这样的情景：有两名危重病人，但只有一台呼吸机。这就是未来几周纽约、巴黎和伦敦的医务人员可能面临的选择，就如同之前伦巴第和马德里的情形。分诊时就要做出非常痛苦的选择。医务人员必须决定谁可以获得治疗，谁不能收治——也就是选择谁有可能活，谁很可能死。

正在全球肆虐的这场大流行病把一个又一个这样的悲惨抉择堆叠在人们面前。医疗资源该用于新冠病人还是其他疾病的患者？一定程度的失业和破产是值得付出的代价，但该有多大？如果极端社交隔离的做法无法遏制疫情，这样的措施还应持续多久？

纽约州州长安德鲁·科莫（Andrew Cuomo）已宣称：“我们不会用钱衡量人命。”纽约州深陷疫情，这是勇敢的州长发出的团结呼号。然而，科莫没有权衡利弊，实际上就是在提倡一种选择，根本没考虑它会给更广泛社群带来的一系列后果。虽然用钱衡量人命听起来铁石心肠，但领导者如果想要熬过接下来几个月的艰难痛苦，恰恰将需要这么做，或者至少需要某种系统性的思维。就像在病房里，取舍将难以避免。

随着越来越多国家遭受疫情打击，这种取舍正变得愈加复杂。全球报告的病例总数已接近130万。美国报告的病例已经突破30万，死亡人数是中国的近三倍。3月30日，特朗普警告称，“未来三周会是我们前所未见的”。美国医疗系统承受的压力可能要在几周后才达到峰值。白宫新冠肺炎特别工作组预测，这场大流行病将至少夺去10万至24万美国人的性命。

近日各国似乎已全身心投入抗疫。印度宣布从3月24日开始实施为期21天的封城。俄罗斯之前坚称自家无疫情，现在也已下令实施严厉的封城措施，威胁对严重违反隔离措施者判处七年监禁。大约2.5亿美国人被要求

待在家中。每个国家都有不同的权衡取舍，并非所有都合情合理。

在印度，莫迪政府认定速度是要务。也许就因为这样，其停摆措施完全搞砸了。政府没想到已经涌出城市的外来务工者会相互传染，并把病毒带回自己的村庄。而且，相比富裕国家，印度较难成功实施封锁，因为它的政府能力更有限。印度的目标是减缓疫情传播速度，拖慢病例增长，直至新疗法出现且医疗体系有了更充分的准备。但几亿印度人积蓄无几，难以支撑，政府也无法负担月复一月地援助他们。印度的人口年轻，这也许有所帮助。但它也有许多拥挤的贫民窟，那里难以做到保持社交距离和勤洗手。如果封城无法持续，病毒又将再度传播起来。

俄罗斯的取舍不一样。在新加坡和台湾等地，政府发布的信息清晰可信，有助于确保人们遵守防疫措施。但普京则是一门心思要实现连任，还要利用疫情在宣传战中打击西方。现在疫情已在俄罗斯爆发，但比起带领国家摆脱危机，普京更关心的是尽可能减轻政治损害和压制信息。这种取舍符合普京而不是俄罗斯人民的利益。

美国也不同。跟印度一样，美国已经让经济停摆，但正在斥巨资救助企业免于破产，并向为数惊人的失业者提供收入支持。

之前两周，特朗普一直推测称对策可能比“问题本身”更糟糕。用金钱衡量生命后，显示他是错的。暂停经济会造成巨大的经济损失。模型表明，任由新冠肺炎在全体国民中传播造成的经济损失更小，但预计死亡人数可能会再增加100万。根据官方发布的被救回的每条生命的价值（按年龄调整），大家可以算个总账。计算表明，疫情减缓措施对每个美国家庭的平均价值是六万美元。有人认为特朗普的折算本身就是错的，但这不过是一种宽慰人心的错觉。这里头确实存在取舍，而就美国目前的情况而言，被挽救的生命价值远远超过经济停摆付出的代价。所幸美国是个富裕国家。同样选择封城的情况下，印度也许不能阻止疫情蔓延，美国却会艰难地获得成功。

放眼望去，病毒所到之处都掀起了这股艰难取舍的雾障。佛罗里达州和纽

约州采取了不同的应对思路，这有利于寻找符合本地需要的防疫创新和举措。但也存在风险：一个州的错误可能祸及其他州。中国几乎全面禁止外国人入境后，挡住了外来感染，但也牵绊了外国企业。大力研制和分发新冠肺炎疫苗将挽救生命，但也可能影响到儿童接种麻疹和小儿麻痹疫苗的计划。

该如何考量这些取舍？第一个原则是要有系统性。跟在所有生活成本计算中一样，平均每个美国家庭六万美元的价值不是真实的现金，而是一种会计指标，帮助人们比较一个复杂社会中非常不同的事物，如生命、工作，以及相互抵牾的道德和社会价值观等。危机越大，这种衡量就越重要。当一名小孩被困在井里，人们都会选择不惜一切代价把他救出，也理应如此。但在战争或大流行病中，领导者无法逃避这样一个事实：每一种行动方案都将造成巨大的社会和经济代价。要负起责任，就必须把一种方案与其他方案权衡比较。

| 冷静思考不是铁石心肠

第二个原则是要为在明智合理的取舍中被牺牲的一方提供援助。在停工令下遭裁员的劳动者应该得到额外援助；要为因停课无法在学校用餐的孩子提供食物。同样，在疫情消退后，社会也必须向年轻人提供帮助。尽管新冠肺炎对他们的威胁相对不那么严重，但各国要偿还因疫情而产生的额外债务，眼前和将来的大部分负担都会落在他们身上。

第三个原则是国家必须随机应变。随着疫情不断发展，成本与效益之间的平衡将发生变化。封城能赢得非常宝贵的时间。封城解除后，新冠肺炎将再次在依然易感的人群中传播。但通过给医疗系统配备更多病床、呼吸机和医护人员，各地社会可以做好准备，不像在第一波疫情时那样兵荒马乱。各国可以研究治疗这种疾病的新方法，招募大批人员组建检测和追踪工作组，以扼杀新的感染集群。所有这些都会降低重启经济的成本。

然而，也可能找不到新的治疗方法，检测和追踪也败下阵来。到今年夏天，各经济体的季度GDP将出现两位数的下降。届时人们已经忍受了几个月的闭门不出，社会凝聚力和他们的心理健康也因而受损。如果封城长达

一年，美国和欧元区的GDP将损失约三分之一。市场将暴跌，投资被延迟。随着创新停滞和技能衰退，经济产能将萎缩。最终，哪怕会有很多人死去，隔离措施可能还是弊大于利。目前还没有人准备好接受取舍中的这一面。 ■



Succession at JPMorgan Chase

Mission accomplished

Should Wall Street's most celebrated boss call it a day?

WHEN JAMIE DIMON took the reins at JPMorgan Chase in 2005 he had, at the relatively tender age of 49, already earned himself a reputation. In the 1990s he was the wunderkind sidekick to the imperial Sandy Weill, then boss of Citigroup, the world's pre-eminent bank. Still, while some peers described Mr Dimon as brilliant, charismatic, caring and dedicated, others complained he was abrasive, foul-mouthed and unpredictable. Plenty doubted he was well suited to such a large stage.

Mr Dimon has put paid to these doubters. JPMorgan weathered the financial crisis well and has since become the bank that all the others want to emulate. It is big, globally active, dominant in retail and investment banking, transparent, well capitalised and admirably profitable. Last year its return on equity was a handsome 15%. Its annual profits are now double the entire current market value of Deutsche Bank, once Europe's pretender to the global investment-banking throne.

However, another big question has remained unanswered: when Mr Dimon should leave and who will run the bank after he is gone. It has been cast in sharp relief by the recent news that Mr Dimon has undergone emergency surgery for an "aortic dissection", a rare heart condition. The bank says he is recovering well. But investors, the board, staff and regulators have had a reminder that one day JPMorgan will have to have a different leader.

Wall Street's biggest succession decision is tricky for several reasons. JPMorgan could benchmark itself against other banks: in 2018 the head of Goldman Sachs retired and a flurry of European banks have waved goodbye to their leaders in the past few months. But in all these cases the firms were

performing below their potential. Aged 63, Mr Dimon is no geriatric—77 CEOs who are older than him are serving at firms in the S&P 500 index of America's biggest companies. The most seasoned, Warren Buffett, is still, inadvisedly, clinging on at the age of 89.

Mr Dimon has served for longer than the typical American CEO, who lasts about a decade. Bob Iger, the boss of Disney, has just stood down after 15 years at the top. But tenure is not, in and of itself, a disqualification. There are 66 S&P 500 CEOs who have been in place longer than Mr Dimon. Reed Hastings has run Netflix for over two decades and few reckon he should press stop.

So how to make a decision? Two tests matter. The first is that Mr Dimon is not blocking the path of an entire generation of successors who might end up leaving or becoming disillusioned. Inevitably, one cohort has already departed. A JPMorgan diaspora now run financial firms all over the world, including Wells Fargo, Barclays and Standard Chartered. It would be a mistake to let another generation go, too. Mr Dimon has two co-presidents directly beneath him who are both aged about 60. Beneath them is a broader group of half-a-dozen potential successors, most of whom are in their 50s and still being battle-hardened.

The second test is the likely time horizon of the strategic threats and opportunities that the bank faces. These mainly arise from technology—the prospect that big tech firms might challenge the big banks, or that new payments firms win huge customer bases independently of the banks, as they already have in China, or that new digital currencies take the world by storm. These trends will play out over a decade or more—and no one, not even Mr Dimon, thinks that he will stay that long.

Both tests suggest that Mr Dimon should leave the stage sooner rather than later. A good option would be for him to do so at the end of next year. By

then the next generation of executives will have acquired the experience necessary to run the Western world's biggest bank at a time of technological tumult, while not being so frustrated that they quit. Even if JPMorgan and Mr Dimon follow this advice, they and the shareholders should reflect on another succession. March 2nd saw the death of Jack Welch, the former chief executive of General Electric (GE), and perhaps the most celebrated American boss of recent decades. He retired from GE in 2001 on a high, but the firm soon slipped into brutal decline, reflecting in part long-standing problems that became clear only once he had left. The best bosses face up to the reality that at some point someone else has to be in charge. But even then their legacy can only be assessed years after they have thanked their team, shed a tear and walked out the door with their head held high. ■



【首文】摩根大通接班

大功告成

华尔街最著名的老板该收工了吗？

杰米·戴蒙（Jamie Dimon）2005年执掌摩根大通时，不过49岁的他已经功成名就。上世纪90年代，在全球最杰出的花旗银行，他是至高无上的老板桑迪·威尔（Sandy Weill）身边少年得志的亲信。不过，虽然一些同行形容他才华横溢、魅力非凡、富有爱心和献身精神，另一些人却抱怨他为人粗鲁、满嘴脏话、难以捉摸。很多人怀疑他是否适合这么大的舞台。

戴蒙让质疑者闭了嘴。摩根大通安然度过了金融危机，并从此成为所有其他银行想要效仿的对象。它规模庞大，纵横全球，在零售银行和投资银行领域占据主导地位，透明度高，资本充足，利润非常可观。去年它的股本回报率是15%，相当不俗。现在它的年利润是德意志银行目前总市值的两倍，这家欧洲银行曾经觊觎过全球投资银行的王位。

但是，另一个大问题仍旧没有答案：戴蒙什么时候该离开，他走后谁来接任。最近戴蒙因患罕见的心脏疾病“主动脉夹层”接受了紧急手术，让这个问题愈发凸显。摩根大通表示他恢复得很好。但投资者、董事会、员工和监管机构都意识到，总有一天摩根大通将不得不换个领导人。

华尔街这一最重大的继任决策颇为棘手，有几个原因。摩根大通可以对照一下其他银行的情况：2018年高盛的掌门人退休，过去几个月一批欧洲银行也纷纷向它们的将领挥手告别。但所有这些案例中，企业在当时都没能发挥出自身潜力。63岁的戴蒙还算不上老人家——在代表美国大企业的标准普尔500指数成分股公司里，有77位CEO年纪比他大。资历最老的当属巴菲特，他以89岁高龄坚守岗位，虽然这并非明智之举。

美国CEO的任期通常在十年左右，戴蒙在位已经比这更久。迪士尼的老板鲍勃·伊格尔（Bob Iger）执掌公司15年，近期刚离任。但任期本身并不是必须退下来的原因。标普500公司中有66位CEO的任职时间比戴蒙长。

里德·黑斯廷斯（Reed Hastings）执掌奈飞（Netflix）已有20多年，也没什么人觉得他该就此打住。

那么该如何做决定呢？两项测试很重要。首先，戴蒙不能挡住整整一代继任者的道路，这些人最终可能离职或幻想破灭。不可避免的是，一些队友已经离开了。从摩根大通出去的人正在世界各地经营金融公司，包括富国银行、巴克莱银行和渣打银行。再让另一代人离开会是个错误。在戴蒙下一级的两位联席总裁都在60岁左右。在他们之下还有六位潜在继任者，其中多数50多岁，仍是久经沙场的厉害角色。

第二个测试是摩根大通面临的战略威胁和机遇可能的时间跨度。它们主要源自科技：大型科技公司可能会挑战大银行，或者独立于银行之外的新型支付公司可能会赢得庞大的客户群（就像它们已在中国做到的那样），又或者是新的数字货币席卷全球。这些趋势将在十年或更长的时间里见分晓，但没有人——包括戴蒙自己——认为他会留任那么久。

这两项测试都表明，戴蒙的谢幕宜早不宜迟。对他来说，明年年底是个不错的时间。到那时，下一代高管应该已经掌握了必要的经验，能够在科技带来的动荡中执掌这家西方世界最大的银行，同时又不会因为再也等不下去了而离开。即使摩根大通和戴蒙遵循这一建议，他们和股东也应该反思一下另一个继任案例。3月2日，通用电气前首席执行官、可能是近几十年来最著名的美国老板杰克·韦尔奇去世。2001年，他从处于鼎盛期的通用电气退休，但这家公司很快就陷入了严重的衰退，一定程度上反映出久已有之、却在他离开之后才清晰显现出来的问题。最好的老板会直面现实，知道到了某个时刻总得让其他人挑起担子来。但即便如此，要评估他们的遗产，也要等到他们感谢了自己的团队、流下一滴热泪、昂首走出公司大门的好几年之后。■



The Economist film

Vaping: what people are getting wrong

More than 40m people worldwide are vaping. But a youth vaping “epidemic” and a mysterious outbreak of lung disease in America has led to new restrictions.



经济学人视频

关于电子烟，我们有何误解？

全球有4000多万人使用电子烟。但电子烟在美国年轻人中导致的“流行病”和一种神秘肺部疾病的爆发，带来了新的监管与禁令。



Schumpeter

A dispatch from the home front

A locked-down world, as seen from the study of Unilever's boss

ON MARCH 13TH Alan Jope, boss of Unilever, a consumer-goods conglomerate that makes everything from Dove soap to Knorr soup, ordered the firm's 60,000 office workers in all countries bar China to work from home. The 56-year-old Scot took a train to Edinburgh where he joined his family. Sitting in his study, he recently spoke to Schumpeter via an online video-chat that he uses to run a business empire. In a world gone awry, it all felt rather normal. Mr Jope, in his habitual casual garb, looked relaxed. Despite the gravity of the covid-19 pandemic, remote working is "dead easy", he says; without commuting, he has more time to liaise with underlings around the world.

That is good news, and not just for Unilever. Since January the company has been on the front line of the covid-19 outbreak. As one of the world's biggest consumer-goods firms, it sells food, hygiene products and other more or less essential staples to 2.5bn customers in 190 countries. Without continued availability of its wares the pandemic's toll would almost certainly be even greater.

Listening to Mr Jope it becomes clear how many rules of business the pandemic has shattered. The impact on production, consumption and generation of profit is even greater than on office work. The nature of the top job, which he has held since January 2019, has changed, too. In the past the hallmark of a good boss was a strategic mind. The covid era is all about the here and now.

Like many a boss, Mr Jope thinks in categories. For his firm, the pandemic has come in three waves. It began with the lockdown in China. The

stoppages then spread to northern Italy, the rest of Europe and America. Now they have reached poor places such as the Philippines, India and Africa. He has four guiding principles: look after people; look after supply; look after demand; look after cash.

First, people. Unilever is trying to safeguard the physical and financial well-being of its 155,000-strong workforce. Besides sending office staff home, factories are operating in “Fort Knox mode” to prevent the spread of infection, he says. Sales teams are ordered to contact customers virtually. Unilever will maintain pay levels for up to three months for all who work for it either directly or, like cleaning and catering staff, through contractors.

Second, production. For Unilever, China and Italy have been laboratories. They offered valuable insights into dealing with lockdowns and “deep cleaning” of factories. When the authorities locked down Lombardy, they at first banned lorry transit. After companies warned of the risk this posed for the supply of food and basic necessities, the order was relaxed. Countries are realising how important it is to keep products moving across borders and within them, Mr Joze says. The firm is not too exposed to cross-border snags. Almost all its products are made from ingredients sourced in the country of production. It scarcely uses air freight, and seaports mostly remain open. Mr Joze says he has so far seen limited disruption at the base of the supply chain, among farmers or packaging firms (but concedes this may change if lockdowns last for months). The biggest bottleneck in many places, he says, is a shortage of lorry drivers, who are “critical”.

As for consumers, his third priority, they have been forced to shop less in all. Moreover, the sheer scale of panic buying in some places in recent weeks has led Unilever to turn monthly sales forecasts into weekly ones. Consumption patterns are not uniform. America and Europe have witnessed shelves stripped, mostly in big supermarkets. In developing countries people flock to neighbourhood shops. Demand is shifting online

just about everywhere, but internet shopping is “totally overwhelmed”.

Cash is the fourth concern. Unilever is in decent shape. Its debt is moderate, at less than two times EBITDA. It notched up €52bn (\$58bn) in sales last year. Most important at a time of a corporate cash crunch, it had €6.1bn in free cashflow. Like other consumer-goods giants Unilever bolstered it over the past decade by being robust with suppliers. It is not alone. The payables (roughly, what is owed to suppliers) of eight big consumer-goods multinationals, including Unilever, has risen from a median of 9% of sales in the 2000s to 16% last year, in part thanks to longer payment periods.

Now Mr Jope is giving some of it back. On March 24th the firm said it would extend €500m of cashflow relief to suppliers and customers, by speeding up payment to small and medium-sized vendors, and offering credit to small retailers that rely on Unilever. The chief executive says that if many other big companies pay their suppliers more quickly, it would considerably ease the financial strains felt by the small fry. Unilever's relief up and down its supply chain presents a big shift in a business model of wringing efficiencies through ultra-lean production and distribution. But it has little choice. Although sales of some products may get a boost from panic buying, overall Unilever will not benefit as self-isolating consumers shop less, he thinks.

Apart from changing Unilever's business, covid-19 is also reshaping its boss's role. For decades, CEOs have fancied themselves as grand strategists, like generals who believe strategy is to war what plot is to the play. Reputations were burnished with bold, cunning moves, such as mergers and acquisitions or spin-offs. The running of day-to-day operations, including supply chains and staff, were about as glamorous as stage management.

| *Strategic retreat*

No longer. Mr Jope says that right now strategy is not the main priority. His “operational brains”—the HR, supply-chain and operations chiefs—are more important than ever. His country heads are crucial to running businesses on the ground, including negotiations with panicky governments. Internal communication is critical. One day strategic opportunities will resurface. But right now is not the time for distractions. At least most of them: before saying goodbye he lets slip, slightly bashfully, that his next appointment is a virtual party organised by some of his younger employees. ■



熊彼特

从大后方发来的战报

从联合利华老板的书房看封锁的世界

上月13日，从多芬香皂到家乐汤料无所不包的消费品企业集团联合利华的老板乔安路（Alan Jope）下令，除在中国以外，公司在所有国家的六万名办公室职员都改为在家办公。这个56岁的苏格兰人乘火车到爱丁堡与家人团聚。近日，他坐在书房里与本专栏记者攀谈，用的是他用来管理商业帝国的网络视频。在乱成一团的世界里，这感觉已经再自然不过。乔安路和往常一样一身体闲打扮，看起来很放松。他说，虽然新冠肺炎大流行很严重，远程办公却“极容易”；因为无需通勤，他反而有了更多时间与世界各地的下属联络。

这是个好消息，而且不仅仅是对联合利华。自1月以来，该公司一直战斗在新冠肺炎疫情的前线。作为世界最大的消费品公司之一，联合利华向190个国家的25亿顾客销售食品、卫生用品，以及其他多少可算生活必需品的商品。没有这些产品的持续供应，这场大流行病造成的损伤几乎肯定会更加惨重。

从乔安路的讲述中可以明确一点：这场流行病已经粉碎了太多商业规则。对生产、消费和生成盈利的冲击甚至超过了对办公室工作的影响。他从2019年1月起担任公司CEO，如今这个职位的性质也发生了变化。以前，一个好老板的标志是战略思维。但在新冠病毒时代，处理好眼前的情况就是一切。

和许多老板一样，乔安路的思维很有条理。对他的公司而言，这场大流行病的冲击分为三波。首先是中国的封城。随后，意大利北部、欧洲其他地区和美洲相继停摆。现在又蔓延到了菲律宾、印度和非洲等贫穷地区。他有四个指导原则：照顾员工、照顾供应、照顾需求、照顾现金。

首先是员工。联合利华正努力保障其15.5万多名员工的身体和财务健康。

他说，除了让办公室职员回家工作外，工厂正以“诺克斯堡模式”运作以防病毒传播。销售团队被要求以虚拟方式联系客户。联合利华将在长达三个月的时间里保持所有员工的薪酬水平不变，包括直接雇员和通过承包商提供服务（如清洁和餐饮）的员工。

第二个重点是生产。对联合利华来说，中国和意大利充当了实验室。它们为应对封城和工厂的“深度清洁”提供了宝贵的洞见。当政府封锁伦巴第大区时，一开始是禁止卡车通行的。当一些企业警告这会威胁食品和基本必需品的供应后，禁令得以放宽。乔安路表示，各国正意识到保持产品跨境和在境内流动有多重要。联合利华受跨境障碍的影响不太大。该公司几乎所有产品都在生产国采购原料。它极少用到空运，而港口基本上都还保持开放。乔安路说，迄今为止他只在供应链的底层——农场或包装公司——发现有限的生产中断（但他承认，如果各地封锁持续几个月，情况可能就不一样了）。他说，许多地方最大的瓶颈是卡车司机不足，他们的角色“至关重要”。

至于他的第三个关照对象——消费者——则普遍被迫减少了购物。此外，最近几周在一些地方出现的恐慌性抢购潮来势汹汹，促使联合利华把每月销售预测改成了每周销售预测。消费模式也各不相同。美国和欧洲的货架被扫荡一空，主要发生在大型超市。而在发展中国家，人们则涌向社区里的商店。几乎所有地方的需求都在向线上转移，但网上购物“完全不堪重负”。

现金是第四个关切点。联合利华的状况不错。它的债务水平适中，不到EBITDA（息税折旧及摊销前利润）的两倍。去年它实现了520亿欧元（580亿美元）的销售额。最重要的是，在企业普遍现金紧张的情况下，它坐拥61亿欧元的自由现金流。和其他消费品巨头一样，联合利华在过去十年里以强势姿态对待供应商，以此加强了自己的现金流。这种做法并不少见。包括联合利华在内的八大消费品跨国公司的应付账款（基本上就是欠供应商的款项）占销售额比例的中位数从本世纪头十年的9%上升至去年的16%，部分原因是延长了付款期。

现在，乔安路正在做出一些回馈。3月24日，公司表示将加快向中小型供应商付款，并向依赖联合利华的小型零售商提供信贷，从而向供应商和客户提供总额五亿欧元的现金流救济。这位CEO表示，如果许多其他大公司也加快给供应商付款，会大大缓解小企业的财务困境。联合利华援助供应链上下游的举措表明，通过“超精益”生产和分销来压榨效率的商业模式发生了重大转变。但它别无选择。乔安路认为，尽管部分产品可能因恐慌性抢购而销量提升，但随着消费者自我隔离而减少购物，整体而言对联合利华不利。

除了改变联合利华的业务，新冠肺炎也在重塑其老板的角色。几十年来，CEO们一直把自己想象成伟大的战略家，就像将军们相信战略之于战争好比情节之于戏剧。他们以大胆、巧妙的谋略美化自己的名声，例如兼并、收购或分拆。而日常的运营，包括供应链和员工，则如同剧务一般乏味无趣。

| 战略撤退

俱往矣。乔安路表示，目前战略已不是头等要务。他的“运营大脑”——包括人力资源、供应链和运营负责人——比以往任何时候都更重要。他的地区主管们是在前线经营业务的关键，包括要和焦虑不安的地方政府谈判。内部沟通至关重要。总有一天，战略机遇会再次浮现。但现在不是为它们分心的时候——至少大部分都不能。在道别前，他略带羞涩地透露，他下一个约见是由一些年轻员工组织的虚拟派对。■



World trade

Trucks, queues and blues

If you thought the trade war was bad for cross-border commerce...

CONTAINER-SHIP navigators, box-ticking customs officials, logistics wizards, truck drivers and warehouse nightwatchmen: all are familiar with dealing with glitches involving international trade, from strikes to trade wars. But with forecasters predicting a slump in global GDP this year, even their most creative thinking cannot keep \$25trn of goods and services flowing around the world.

Trade is the conduit through which economic pain passes from one country to another. Even simple products rely on elaborate supply chains: a humble cup of coffee requires 29 firms to collaborate across 18 countries, according to one estimate. Shocks convulse in either direction. A port closure or customs delay can cripple production elsewhere. If consumers stop buying cars and phones, manufacturers and workers in distant lands feel the pinch.

When world output, at purchasing-power parity, fell by 0.1% in 2009, trade volumes collapsed by a whopping 13%. Quarterly volumes fell by even more (see chart). Weaker demand in America and the European Union rippled along trade routes to Canada, China, emerging Asia, Japan and Mexico. One study finds that 27% of the decline in American demand and 18% of that in the European Union was borne by foreign producers.

The shock coming this year threatens to be far more brutal. When one of the world's economic giants sneezes, the rest of the world catches cold. Now everyone is coughing. Factory closures are being exacerbated by a rise in trade barriers. And global demand is plummeting as households' incomes dry up and cash-strapped firms put their investment plans on ice.

At first the virus infected manufacturing in China, which typically supplies nearly 10% of the world's intermediate-goods trade. The dollar value of Chinese exports in January and February was 17% below what it was a year earlier (though American tariffs may also have contributed to the weakness). As delivery times stretched out for longer and longer, companies had to pause production for lack of components.

Now factories across Europe, North America and Asia must cope not only with uncertain supplies of parts from China but also with sick workers and a dizzying array of local and national shutdowns. Audrey Ross of Orchard International, a company based in Canada that trades products including mascara and bath sponges, says planning has become a nightmare. One customer in Germany is closed; another in France is open. Warehouses in America have shorter opening hours. Diversifying away from China had at first seemed like a sensible strategy. Now nowhere is safe.

To make matters worse, barriers to trade are going up. More than 50 governments have restricted exports of medical supplies, 33 of which acted after the beginning of March. Tourism has been crushed—it accounts for 8% of global services trade. Flight cancellations have seen the cost of air freight, much of which goes in the belly of passenger jets, soar. Vaughn Moore of AIT Worldwide Logistics, a freight-forwarding company, reports that rates have risen from \$2-3 per kilo to \$9-11, which for some goods is prohibitively expensive.

Land borders are becoming harder to cross too. Countries from America to Armenia have placed new restrictions on free movement. In almost all cases there are meant to be exceptions for people transporting goods. But haphazard implementation has led to queues that stretch for miles. On March 15th the Italian transport minister had to call her Hungarian counterpart to request that a blockade be removed. Restricted border crossings have in some cases made it hard for drivers to get to work.

“Everybody wants to do their own thing,” grumbles Umberto de Pretto of the International Road Transport Union. “If road transport stops the world stops.”

Bunged-up borders mean that it gets harder to refill empty supermarket shelves as people stockpile food, and to meet rocketing demand for medical equipment. Mario Aronovich, a customs broker in Mexico, remembers receiving calls when the crisis started about whether it was possible to export medical masks from Mexico to China. Now he is getting calls about trade in the opposite direction.

So just how big will the drop in overall trade be? In 2009 declining demand accounted for over two-thirds of the crash in trade, a far bigger share than the 15-20% caused by the credit crunch. The extent of the pandemic-induced slowdown in consumer spending and investment is already becoming clear. And it has already dented trade activity badly—a survey of factory bosses in March suggests sharp falls in export orders in advanced countries. Simon Macadam of Capital Economics, a consultancy, has pencilled in a 20% drop in trade volumes this year. That is bigger than in 2009. The drop in trade could be worse if the most pessimistic forecasts of jaw-dropping double-digit year-on-year declines in GDP in some rich countries over the next quarter or two come true.

A lesson from 2009 is that trade bounces back. Some of the precipitous drop then reflected companies drawing down their inventories; that reversed quickly enough when things returned to normal. Gloomier types point out the colossal uncertainty about when the rebound might come. Trade thrives on trust and predictability. Today, with supply chains buckling and borders closing, both are in short supply. ■



全球贸易

卡车、长队和蓝调

如果你之前认为贸易战对跨境贸易而言很糟糕.....

集装箱船领航员、海关官员、物流专家、卡车司机和仓库夜间值班人员：所有这些都擅长对付和国际贸易相关的麻烦，不论是罢工还是贸易战。但是，随着有关今年全球GDP大跌的预测浮现，即便是他们最有创意的想法也无法维持25万亿美元的商品和服务在世界各地继续流动。

贸易是经济痛苦从一国传到另一国的管道。就连很简单的产品也依赖复杂精密的供应链：据一项估计，一杯普通的咖啡需要18个国家的29家公司协作生产。冲击是双向的。港口关闭或海关延滞会让其他地方的生产瘫痪。如果消费者停止购买汽车和手机，远方的制造商和工人就会开始日子难过。

当以购买力平价计算的全球产出在2009年下降0.1%时，贸易额暴跌了13%。季度交易量跌幅还要更大（见图表）。美国和欧盟需求的减弱沿着贸易路线在加拿大、中国、亚洲新兴国家、日本和墨西哥激起涟漪。一项研究发现，美国需求下降中的27%以及欧盟需求下降的18%都是由外国生产商承受的。

今年来袭的冲击可能要残酷得多。世界经济巨人之一打个喷嚏，全世界都要感冒。现在每个人都在咳嗽。贸易壁垒的上升加剧了工厂关停。随着家庭收入枯竭，以及现金短缺的企业搁置投资计划，全球需求正直线下降。

一开始，新冠病毒感染了中国的制造业，这个部门通常供应了全球半成品贸易的近10%。1、2月中国出口的美元价值同比下降了17%（尽管美国征收的关税可能也是造成疲软的一个原因）。交货时间越拉越长，各地企业因为缺少零部件不得不暂停生产。

现在，欧洲、北美和亚洲的工厂不但要应对中国零部件供应的不稳定，还

要应对工人生病以及层出不穷的地方和全国性停工。总部位于加拿大的奥产国际（Orchard International）公司做睫毛膏和沐浴海绵等产品的贸易。该公司的奥黛丽·罗斯（Audrey Ross）说，做规划已经成了一场噩梦。德国的一个客户关门了，另一家在法国的还开着，美国的仓库上班时间缩短了。刚开始，把供应链从中国转移出去的多样化调整似乎是个明智的策略。现在，没有地方是安全的。

雪上加霜的是，贸易壁垒正在上升。50多个国家的政府已经限制了医疗用品的出口，其中33个是在3月初后采取了行动。旅游业遭到碾压，它占到全球服务贸易的8%。航班取消已经导致航空货运（大部分通过客机腹舱运送）的成本暴涨。货运代理公司AIT全球物流（AIT Worldwide Logistics）的沃恩·摩尔（Vaughn Moore）报告说，运费已从每公斤两三美元涨到9到11美元，对于某些商品来说这无法承受。

陆地边境也越来越难跨越。从美国到亚美尼亚的多个国家都对人员自由流动设置了新限制。在几乎所有情况中，运输货物的人员本应是例外。然而，由于实施方面的杂乱无章，等候过境的长队已经绵延几英里。3月15日，意大利运输部长不得不致电匈牙利运输部长要求解除一处封锁。在某些情况下，过境限制让驾驶员难以工作。“每个人都想做自己的事，”国际公路运输联盟（International Road Transport Union）的翁贝托·德普雷托（Umberto de Pretto）抱怨道，“如果公路运输停了，世界也停了。”

边境堵塞意味着，在人们囤积食物之时，被一扫而空的超市货架更难补货，对医疗设备飙升的需求也更难被满足。墨西哥海关报关员马里奥·阿罗诺维奇（Mario Aronovich）记得，危机刚开始时，他接到各种来电询问有没有可能从墨西哥出口医用口罩到中国，现在人们又在问他能不能把口罩从中国弄到墨西哥。

那么总体贸易的下降幅度到底会有多大？2009年时，贸易暴跌有超过三分之二是由需求下降引起的，远超过由信贷紧缩造成的15%到20%的比例。大流行病引发的消费者支出和投资放缓的程度正变得清晰。而这已经严重削弱了贸易活动：3月份对工厂老板的一项调查显示，发达国家的出口订

单急剧下降。咨询公司凯投宏观（Capital Economics）的西蒙·麦卡丹（Simon Macadam）预计今年贸易额将下降20%。这要大于2009年的跌幅。根据最悲观的预测，在接下来的一两个季度，某些富裕国家的GDP同比降幅将达到令人错愕的两位数。如果这变成现实，那么贸易下降的程度还会更糟。

从2009年得到的一个经验是贸易会反弹。当时的骤降一定程度上是对企业减少库存量的反映，而当局面恢复正常时这一点很快得到逆转。悲观人士指出这一次反弹何时可能到来存在巨大的不确定性。让贸易蓬勃发展的是信任和可预测性。如今，随着供应链垮塌和边境关闭，这两样东西都很紧缺。 ■



Business and the virus

Best in show

A severe economic shock will make an elite of mighty firms mightier still—and change the societies in which they operate

ACROSS THE rich world, governments and economists are scrambling to work out how costly virus-related lockdowns will be. Will the economy shrink by a tenth or a third? Is the slump going to last for three months, six or more? No one can say with any precision. A similarly unnerving and inexact exercise is happening in boardrooms as firms try to estimate by how much their cashflows will fall and whether they have the resources to survive.

Amid the chaos one thing, at least, is clear: a few powerful firms are set to gain more clout. Already some are a source of financial stability. It costs less to insure Johnson & Johnson's debt against default than Canada's. Apple's gross cash pile of \$207bn exceeds most countries' fiscal stimulus. Unilever is funnelling cash to its army of suppliers. In the long run this group of firms—call them the top dogs—may win market share by investing more heavily than, or buying, enfeebled rivals. The catch is that the post-pandemic world will put these corporate champions on a leash.

Downturns are capitalism's sorting mechanism, revealing weak business models and stretched balance-sheets. In the past three recessions the share prices of American firms in the top quartile of each of ten sectors rose by 6% on average, while those in the bottom quartile fell by 44%. The drop in sales and profits in 2020 will be much steeper, though hopefully shorter, than in a typical slowdown.

A few firms directly hit by travel and shopping bans have spelled out just how steep. On March 23rd Primark, a fashion retailer, said it was shutting

all 376 of its stores in 12 countries, forgoing over \$770m in sales per month. It expects to save only half its costs. For most firms the picture is murkier, and perhaps not quite as glum. Some factories are still running and white-collar firms operate remotely. So far companies have announced a flurry of cuts to dividends and share buy-backs. But few have said exactly how much cashflow they expect to burn. For most it will be a lot.

Who, then, are the top dogs? To get a sense of firms' resilience *The Economist* has examined the largest 800-odd listed American and European firms. We took their average score on four measures: the cost of insuring their debt against default, operating margins, cash buffers and leverage. Some medium-sized firms score well, but the strongest tend to be bigger, measured by valuation and profits. The 100 hardiest have a median enterprise value nearly twice that of the puniest 100, and median operating profits 17% higher. Their share prices have done better—or less badly—in the past month, falling by a median of 17%, compared with 36% for the 100 frailest.

Silicon Valley and Big Pharma dominate (see chart). Technology firms make up 48 of the top 100. The likes of Microsoft (10th), Apple (13th), Facebook (14th) and Alphabet (18th) operate with big cash buffers. Demand for some of their products is surging: Microsoft's team-working software, for example. Another 24 are health-care firms. Many have spare cash and a captive market of people in need of drugs. Plenty of the weaklings are in the ailing transport, retail and recreation industries (think Marks & Spencer or American Airlines).

Clear winners and losers are emerging within sectors, too. In tech, Amazon is adding 100,000 workers in America to meet e-commerce demand. Meanwhile SoftBank, a Japanese conglomerate which bet big on flaky startups (including smaller e-merchants), has been forced to announce \$41bn in divestments to raise cash, among them, perhaps, the sale of part

of its lucrative stake in Alibaba, China's biggest listed firm. In energy, the shares of giants such as ExxonMobil, Royal Dutch Shell and BP have outperformed smaller firms by a vast margin. Occidental Petroleum, an aggressive medium-sized company that has tried to acquire its way to the big league, now has a hefty \$40bn in debt. L'Oréal, a big French personal-care group, has done vastly better than Coty, an American rival. Even among beleaguered aircraft-makers a gap has opened up. On March 23rd Airbus, Europe's champion, said it had about \$32bn of liquid funds available. Debt investors view it as less risky than Boeing, which may seek a bail-out from the American government.

The top dogs' resilience should eventually translate into an enduring advantage, allowing them to win market share over time. Their cost of capital will be lower. Suppliers will favour them over feebler customers. With higher margins and bigger cash buffers, they will be able to afford higher investment even as other firms cut back. Some will pursue takeovers, encouraged by governments which put the survival of foundering firms (and jobs) ahead of antitrust concerns. As valuations fall and capital gets pricier, the ability of loss-making startups to nibble away at big firms' profits will recede for a while.

Not everything may go the top dogs' way. Calls for a new social contract may get louder after the virus passes, with firms pressed to offer vital products for lower prices and to give workers more security. Capitalism may become less Darwinian, as weak firms are propped up by bail-outs and subsidised loans. The amount earmarked for cheap business loans and guarantees by governments in America, Britain, France, Germany and Italy is at least \$4trn, or a fifth of their outstanding non-financial corporate debt. Some industries may temporarily be run as officially sanctioned cartels, colluding in order to stabilise prices and production. That will make it harder for strong firms to assert their advantage. Covid-19 won't only have lasting effects on society and people's behaviour. It will also alter the

structure of global business. ■



商业与病毒

全场最佳

一场严重的经济冲击将使精英巨头强者愈强，也将改变它们所处的社会【新冠报道】

整个富裕世界的政府和经济学家都在忙不迭地研究新冠病毒导致的封锁措施会带来多大损失。经济会萎缩十分之一还是三分之一？衰退会持续三个月、六个月还是更长时间？这些谁也说不准。董事会也上演着同样紧张而不精确的估算：公司现金流会减少多少？是否有足够的资源撑下去？

一片混乱之中，至少有一点是清晰的：少数大公司将获得更大的影响力。一些公司已经成为了金融稳定性的源头。强生公司的债务违约保险费比加拿大国债的还低。苹果公司的现金储备达2070亿美元，超过大多数国家财政刺激计划的规模。联合利华正向它的大批供应商注入资金。长远看来，这群“优胜者”可能会通过比它们疲弱的对手投资更多或者直接收购这些对手来赢得市场份额。问题在于，大流行病过后的世界也会给这些企业冠军们套上枷锁。

经济低迷期是资本主义的筛选机制，暴露出那些虚弱乏力的商业模式和捉襟见肘的资产负债表。在过去三次经济衰退中，十个行业里排名各自行业前四分位的美国公司的股价平均上涨了6%，排名最末四分位的股价下跌了44%。相比一般的经济衰退，2020年销售和利润下跌的幅度将大得多，虽然持续的时间有可能会短一些。

受旅行及购物禁令直接打击的一些公司已经显现出下跌之急剧。服饰零售商Primark3月23日表示正在关闭分布在12个国家的所有376家店铺，舍弃了每月超过7.7亿美元的销售额。它预计这只能节省一半的成本。对大多数公司而言，前景没有那么明朗，但或许也没有那么惨淡。一些工厂仍在运作，以脑力劳动为主的公司转为远程运营。目前为止，已有一连串公司宣布削减股息和股票回购。但很少有公司讲清楚预期会烧掉多少现金流。对大多数公司来说这会是个大数字。

那么，谁是优胜者？为了解企业的抗冲击能力，本刊调查了约800家欧美最大的上市公司。我们从四个方面给它们算出了平均得分：债务违约保险价格、营业利润、缓冲现金、杠杆。一些中型企业表现不俗，但最强的一般还是更大型的企业（规模大小以估值和利润衡量）。最有韧性的100家企业的价值中位数几乎是最脆弱的100家的两倍，前者的营业利润中位数比后者高17%。过去一个月里，前者的股价表现也更好（或者说相对而言没那么糟糕），跌幅中位数为17%，而后者为36%。

硅谷和医药巨头称霸其中（见图表）。100家最强韧的企业里有48家是科技公司。微软（第10位）、苹果（第13位）、Facebook（第14位）和Alphabet（第18位）等公司拥有大量缓冲现金。对它们的某些产品的需求激增，例如微软的协同办公软件。还有24家是医疗公司，它们中许多拥有储备资金，而且垄断了一些药品的市场。脆弱的企业多来自经营艰难的运输、零售和休闲娱乐业——想想玛莎百货（Marks & Spencer）或美国航空（American Airlines）。

各个行业内部也开始胜负分明。在科技行业，亚马逊正在美国增聘十万名员工以满足电子商务的需求。而另一边，大笔押注不靠谱创业公司（包括小型电商）的日本企业集团软银被迫宣布将出售410亿美元的资产以筹集现金，其中可能包括它在中国最大的上市公司阿里巴巴所持有的获利丰厚的股份的一部分。在能源领域，埃克森美孚、荷兰皇家壳牌和BP等巨头的股票表现大大优于较小的公司。中型企业西方石油公司（Occidental Petroleum）原本试图通过收购来打入巨头行列，志在必得，如今却负债高达400亿美元。法国大型个人护理用品集团欧莱雅的表现远胜过美国竞争对手科蒂（Coty）。即使惨淡经营的飞机制造商之间也拉开了差距。3月23日，欧洲巨头空中客车表示拥有约320亿美元的流动资金。债券投资者认为它的风险要低于波音，后者可能会寻求美国政府纾困。

优胜者的韧性最终将转化为持久的优势，让它们能逐渐赢得更大的市场份额。它们的资金成本将变得更低。供应商会偏爱这些大公司，而非其他较弱的客户。凭借更高的利润率和更充裕的缓冲现金，在其他公司撤退之时，这些大公司也能负担较大的投资。其中一些公司会在政府的鼓励下开

展收购，毕竟政府会认为现在保住一些濒临绝境的公司（还有职位）比反垄断更重要。随着估值下降及资本变得更昂贵，亏损的创业公司对大公司利润的蚕食将在一段时间内偃旗息鼓。

但并非一切都会有利于这些优胜者。疫情过后，要求建立新的社会契约的呼声也许会越来越高，迫使企业以较低价格提供重要产品并为员工提供更大保障。随着纾困措施和补贴贷款支撑起弱小企业，资本主义可能变得不那么倾向优胜劣汰。美国、英国、法国、德国和意大利政府划拨用于廉价商业贷款和担保的资金至少达到四万亿美元，占非金融企业未偿债务的五分之一。一些行业可能会暂时以官方许可的卡特尔形式运作，形成垄断联盟以稳定价格和生产。这将使大公司更难发挥优势。新冠肺炎不仅会对社会和人们的行为产生持久影响，还将改变全球商业的结构。■



Neuroscience

Fly atlas

The biggest, most detailed map yet made of brain cells and the connections between them has now been released

AT THE BEGINNING of the 20th century Santiago Ramón y Cajal, a Spanish neuroscientist, became known for his exquisite drawings of the branching, treelike cells of the brain and spinal cord. In 1906 he was awarded a Nobel prize for this work, which gave the world its first glimpse into the structure of these neurons, and an inkling of how they are arranged in an animal's central nervous system.

A century later Cajal's legacy—supercharged by modern microscopy, heavy-duty robotics and a dollop of machine learning—is thriving. The objective now is to create connectomes. These are three-dimensional maps of all the neurons in entire brains, and how those neurons link together. Earlier this year saw the publication of an important step on the road to a complete brain connectome: a map of about a quarter of a fruit fly's cerebral capacity.

That map, of what its cartographers refer to as the fly's hemibrain—a set of around 25,000 neurons in the centre of the organ—has been more than a decade in the making. It is the brainchild of Gerry Rubin, a biologist who was also responsible for mapping the fruit fly's genome as a proof of principle for the Human Genome Project. Dr Rubin is now boss of the Janelia Research Campus in Virginia, a part of the Howard Hughes Medical Institute that is dedicated to neuroscience. The hemibrain connectome is the first phase of the campus's FlyEM project, to map the fruit fly's entire brain, which contains around 100,000 neurons. That is a drop in the ocean compared with the 85bn in a human brain, or even the 70m in a mouse brain. But, like the fly's role in the Human Genome Project, it will be a proof of principle.

| *Flying high*

Each of the hemibrain's neurons is connected to hundreds of others through junctions called synapses, for a total of more than 20m synapses. These neurons and synapses form circuits that are responsible for a fly's ability to learn, navigate, sleep and tell the time of day. The only full connectome created so far is that of *C. elegans*, a nematode worm which has either 302 or 385 neurons in its nervous system, depending on whether it is hermaphrodite or male (there are no purely female *C. elegans*). The neurons in *C. elegans* have around 7,000 synapses between them. Mapping the fly hemibrain is thus a big step forward.

Elucidating the connectome of *C. elegans* involved techniques Cajal himself would have recognised. The researchers who did it sliced their worms into thin sections using diamond knives, stained the slices to show the cells within them up more clearly, and then took electron-microscope pictures of the result. Identifying neurons and synapses within the thousands of images thus obtained was a task for expert human eyes.

Dr Rubin and his crew have automated things. One of the teams on the campus has, for example, developed a way to speed up the slicing and imaging part of the operation. This technique, which works like an atomic-scale sandblaster, fires a beam of gallium ions at a sample of brain tissue. That etches off a layer of the tissue a few nanometres thick from the sample's surface. A scanning electron microscope (SEM) then takes a picture of the newly exposed surface. That done, the gallium beam etches away another few nanometres and the process is repeated until the whole sample has been studied.

The microscopes involved have been built especially for FlyEM. They sit on air-filled pads to minimise vibrations that might ruin the images, and the room containing them rests on its own concrete slab, to separate it from the remainder of the laboratory. Moreover, while run-of-the-mill SEMs

usually operate for hours at a time at most, the FlyEM machines are designed to operate continuously for months.

The result is millions of high-resolution images that have been stitched together to create 3D representations of the fruit fly hemibrain (see above for a picture of the olfactory pathway). The next step was to label the neurons and synapses within. Doing that manually, in the way used for *C. elegans*, would have taken centuries, according to Stephen Plaza, the project's manager. Clearly this was a non-starter. So he turned to Google for help.

Computer vision has improved enormously in recent years and is routinely used to scan through hundreds of hours of CCTV or satellite images to identify objects of interest to the authorities. Modern artificial-intelligence (AI) algorithms perform better than people at classifying images and, between 2015 and 2018, doubled their performance in object segmentation, a trickier task that involves picking multiple objects from a single image. At Janelia's behest, Google trained one of its AI algorithms to recognise neurons and synapses within the FlyEM images. As this algorithm scrolled through the pictures, it also attempted to trace the fibrous protuberances called dendrites and axons that connect one neuron to another.

To start with, the researchers trained the AI on pictures that had already been marked up by human experts. As it churned through further images, human proofreaders checked its decisions and fed errors back to it, so that it could improve its understanding of what neurons look like in different contexts. As the AI got better, the manual workload lessened and the speed with which images were correctly annotated shot up. With the AI's help, Dr Plaza and his team of 50 proofreaders cut the time required for the annotation down from centuries to a couple of years.

| *For all mankind*

The FlyEM data released this week are available to all neuroscientists, professional or amateur, to use as they see fit. Anyone with an internet connection can look up lists of neurons that are connected to each other and see 3D diagrams of what each of those cells, with its myriad dendritic and axonal branches, looks like.

At Janelia, several groups are already mining these data to glean insights. Vivek Jayaraman's team, for example, studies how a fruit fly's brain helps the insect first to understand its orientation in space and then to employ that information to help it navigate. Until now Dr Jayaraman has worked with theoretical models of which parts of the brain might talk to each other. The hemibrain map has shown him the actual physical connections between the neurons involved. He, Dr Rubin and other researchers at Janelia will publish their insights over the coming months.

With the hemibrain complete, FlyEM's researchers expect to finish the rest of the fruit fly connectome within the next two years, and thus to gain further insights into fly neurology. But other consequences of the project are crucial, too. The advances in automation and machine learning that are being made through it will be as valuable as the biological insights. And, as the technology gets better, connectome reconstructions will happen faster, allowing the mapping of bigger brains in larger numbers.

In the future, the aim is to obtain connectomes for several strains of mouse and, eventually, several people too. Looking at the differences in wiring between typical and atypical brains might shed light on conditions such as schizophrenia and autism. Looking at the differences between human brains and those of other species may help explain just what it is that makes humans neurologically special.

Dr Rubin estimates that assembling a mouse connectome would cost

around \$500m (more than ten times what FlyEM will have cost when finished). He is confident such a project could be started within ten years. A human-brain connectome would be orders of magnitude more difficult. But not, he reckons, impossible. In 1990, at the beginning of the Human Genome Project, he recalls that many scientists thought sequencing animal genomes would always be too expensive and difficult. Those detractors said that biologists should choose between mouse and human, since it would probably be impossible to do both. “And now”, he points out, “we have projects where we’re going to do 10,000 human-genome sequences.” ■



神经科学

果蝇脑图谱

迄今为止最大、最详细的脑细胞及其连接体图谱发布

二十世纪初，西班牙神经学家圣地亚哥·拉蒙·卡哈尔（Santiago Ramón y Cajal）以绘制精细的大脑和脊髓的树状细胞分支图而闻名。1906年，他凭此获得了诺贝尔奖。世人通过他的画第一次领略了这些神经元的结构，并初步了解到它们在动物中枢神经系统中的排列方式。

一个世纪以后，在最新的显微镜技术、高工作量机器人技术，以及些许机器学习的助力下，卡哈尔的遗产正在发扬光大。当前的目标是创建出“连接组”，也就是展现整个大脑中所有神经元及其连接方式的三维图谱。今年稍早时，研究人员在通向完整的脑连接组的道路上迈出了重要一步：发布了约四分之一果蝇大脑的图谱。

绘制者把这个图谱称为果蝇半脑图，包含了果蝇大脑中心的一组约2.5万个神经元。这项工作耗时十多年，是生物学家杰里·鲁宾（Gerry Rubin）的心血之作。他此前还负责绘制果蝇的基因组，为人类基因组计划提供原理验证。他目前是美国弗吉尼亚州珍妮亚研究所（Janelia Research Campus）的所长，该研究所隶属于专门研究神经科学的霍华德·休斯医学研究院（Howard Hughes Medical Institute）。果蝇半脑连接组是该研究所FlyEM项目的第一阶段，这个项目将绘制出果蝇的整个大脑，包含约10万个神经元。这与人类大脑的850亿个神经元相比简直是九牛一毛——就连小鼠大脑也有7千万个神经元。但是，就像果蝇在人类基因组计划中的作用一样，它将提供原理验证。

| 高飞

果蝇半脑里的每个神经元都通过被称作“突触”的连接体与成百上千个其他神经元相连接。总共有2000多万个突触。这些神经元和突触形成了回路，负责果蝇的学习、导航、睡眠和判断时间等能力。迄今为止，人类创建的唯一完整的连接组是秀丽隐杆线虫的图谱，这种线虫的神经系统中有

302或385个神经元——数量取决于它是雌雄同体还是雄性（没有纯雌性的秀丽隐杆线虫）。连接秀丽隐杆线虫神经元的突触总共有7000个左右。因此，绘制果蝇半脑图是向前迈进了一大步。

描绘秀丽隐杆线虫连接组所采用的方法，即便卡哈尔本人也认得出。研究人员用金刚石刀具将线虫切成薄片，将切片染色，让其中的细胞更清楚地显现出来，然后用电子显微镜对处理好的切片拍照，由此获得成千上万张图像。而要从中识别神经元和突触则要靠专业人员的肉眼。

鲁宾和他的团队则把流程自动化了。例如，研究所的一个团队发明了一种方法来加快操作过程中切片和拍照的速度。这项技术的工作原理仿佛一台原子级别的喷砂机，向脑组织样本发射镓离子束。这会从样本表面削掉几纳米厚的一层组织。然后扫描电子显微镜（SEM）对新暴露出来的表面拍照。之后，镓离子束再削掉几个纳米厚的组织，如此不断重复，直到整个样本研究完毕。

他们使用的显微镜是为FlyEM项目特制的。它们被放置在充气垫上，从而可以最大限度地减少可能有损成像的震动。放置这些显微镜的房间建在单独的混凝土板上，与实验室的其他部分隔开。此外，普通的扫描电子显微镜通常一次最多只能运行几个小时，而FlyEM所用的可以连续运行几个月。

研究人员将最终得到的几百万张高分辨率的图像拼接在一起，就形成了果蝇半脑的三维图（上图为嗅觉通路部分）。接下来的工作是将其中的神经元和突触标记出来。项目主管斯蒂芬·普拉萨（Stephen Plaza）表示，如果采用像秀丽隐杆线虫项目那样的手工操作，这一步可能需要几个世纪才能完成。这显然行不通。于是他向谷歌求助。

近年来，计算机视觉技术突飞猛进，它通常被用来浏览数百小时的闭路电视或卫星图像，以识别官方部门感兴趣的目标。现代人工智能（AI）算法的图像分类能力优于人类。2015到2018年间，它们在目标图像分割方面的性能提高了一倍。目标图像分割涉及从单张图像中提取多个目标，是一项

更复杂的任务。应珍妮亚研究所的请求，谷歌训练了一个AI算法来识别FlyEM图像中的神经元和突触。算法在图片上全面扫描的同时，还尝试追踪连接神经元的被称作树突和轴突的纤维突起。

首先，研究人员用已由专业人员标记过的照片来训练AI。在AI处理更多图像的过程中，校对人员会检查它的判断结果，并将错误反馈给它，这样它就能更好地了解神经元在不同环境中的样子。随着AI的进步，人工工作量减少了，正确标记图像的速度也大幅提高。有了AI的帮助，普拉萨和他50人的校对团队将标记时间从几个世纪缩短到了几年。

| 为全人类

任何专业或非专业的神经科学家都可以根据自己的需要使用此次发布的FlyEM数据。任何人都能上网查阅相互连接的神经元列表，并查看每个细胞及其大量树突和轴突的3D示意图。

珍妮亚研究所的几个团队已经在挖掘这些数据以获取洞见。例如，维韦克·亚拉曼（Vivek Jayaraman）的小组正在研究果蝇的大脑如何帮助它先了解自己的方位，然后利用方位信息为自己导航。亚拉曼过去一直在研究果蝇大脑的某些部分互相交流的理论模型，如今半脑图向他展示了相关神经元之间的实际连接情况。亚拉曼、鲁宾以及珍妮亚研究所的其他研究人员将在未来几个月发表他们的见解。

半脑图完成后，FlyEM的研究人员期望在未来两年内完成果蝇连接组的其他部分，进而对果蝇的神经系统有更深入的了解。但该项目带来的其他成果也至关重要。在其中使用的自动化和机器学习所取得的进展将和生物学上的成果一样有价值。而且，随着技术的进步，重构连接组的速度会加快，也就可以绘制更多、更大的大脑。

未来的目标是获得几种不同品种的小鼠的脑连接组，最终还要获得若干人脑的连接组。研究典型和非典型大脑之间的神经线路的差异，可能让人进一步认识精神分裂症和自闭症等病症。而研究人类和其他物种大脑的差异可能有助于解释究竟是什么让人类的神经系统与众不同。

鲁宾估计，构建小鼠的脑连接组大约需要耗费五亿美元（是FlyEM完成时预计花费的10倍以上）。他很有信心这样一个项目能在十年内启动。构建人类大脑连接组的难度则要高几个数量级，但他认为并非不可能。他回忆道，1990年人类基因组计划开始时，许多科学家认为给动物基因组测序始终都会太贵、太难。这些反对者认为，生物学家应该在老鼠和人类之间做选择，因为两者或许不可能同时进行。“而如今，”他指出，“我们已经有了要对一万个人类基因组测序的项目了。”■



Luxury cast-offs

Not for sale

Luxury groups ponder ways to get rid of their unsold inventory

EVERY FROCK sold by the likes of Gucci or Givenchy is billed as a must-have that season. But, it turns out, some are more must-have than others. For all the hype they generate, even leading fashion brands struggle to shift much more than half their wares at full price. Whom to sell to once fickle fashionistas have moved on to the next trend? The luxury world is desperately searching for new ways to find a worthy closet for this unwanted inventory.

Dealing with “end-of-season” merchandise is a particularly thorny problem for luxury brands. Offering discounts to offload ageing wares is a time-tested trick among retailers. But cutting prices to clear the shelves is a bad look for labels whose *raison d’être* is to exude exclusivity.

Chic brands used to bin last year’s garb quietly rather than sell them cheap. That changed after July 2018, when Burberry, a British purveyor of upscale macs, faced a furore as it disclosed having destroyed \$38m of bling (it claimed incinerating them was a way of generating energy). France will ban the practice entirely by 2023.

Luxury groups are loth to reduce production, given that goods can be sold for ten times what they cost to make. But putting up “Sale!!!” signs is considered uncouth. Plus, says Luca Solca of Bernstein, a broker, “you have to weigh cash made from discounted sales with the damage done to the value of the brand.” Prada, a posh Italian label, said last year it would end all in-store discounts.

Some brands’ offerings are so timeless—a Hermès handbag, say—that

seasonality is not an issue. Others manage to get rid of old stuff by offering discreet “sample sales” to staff and their friends. Many of the duds used to end up on the internet, sold cheaply on sites like Yoox and Saksoff5th.com (though labels now see more potential to sell online at full price).

None of this will be enough to get rid of an outmoded collection—or diminish the pile of unsold items that analysts expect as a result of the coronavirus, which will force Chinese travellers to cancel shopping trips. To really shift stocks, brands now look to outdoor malls that group together “factory outlets”. The likes of Bicester Village, an hour’s ride from central London, resemble what a Chinese tourist thinks a quaint European village ought to look like, crossed with an airport shopping concourse. The shops are full of the stuff famous brands could not sell at full price elsewhere. Goods typically sell for 70% of high-street prices.

The concept is booming. Out of an estimated €281bn in personal-luxury sales last year, €37bn were in such physical off-price stores, according to Bain, a consultancy. The figure has shot up by 85% in five years. But using the outlets for anything beyond liquidating inventory—for example by stocking them with cheaper, second-tier collections—is a way to dent a brand’s cachet permanently, warns Mr Solca. Best to keep only the most questionable styles and weirdest sizes in stock, and to push a brand’s real aficionados to Regent Street or Avenue Montaigne.

Two things may come to the rescue of exasperated inventory liquidators. The first is the rise of second-hand-clothes sales online: expect to see many “used” frocks on offer that are in fact brand new. The second is “up-cycling”, when an unsold dress gets trimmed, combined and dyed into a new fabulous outfit. For luxury brands, these two trends are unmissable. ■



奢侈废品

非特卖品

奢侈品集团思索清空库存的方法

古驰或纪梵希之类的品牌把它们的每条裙子都标榜为当季必买。但从结果看，有些裙子比另一些更难舍弃。尽管吹得天花乱坠，最顶尖的那些时尚品牌也很难以全价卖出大部分产品。一旦口味多变的时尚达人们转向下一个潮流，又该把东西卖给谁呢？奢侈品行业正在绞尽脑汁地寻找新方法，为这些没人要的库存找一个与它们相称的衣橱。

处理“季末”商品对奢侈品牌来说尤其棘手。通过打折来清理掉过季商品已是零售商们久经考验的一招。但有些品牌存在的理由就是彰显“独享”，靠降价来清空货架只会让它们掉价。

时尚品牌过去常会把上一年的服装悄悄扔掉，而不是低价出售。2018年7月，生产高档风衣的英国公司博柏利透漏自己销毁了价值3800万美元的高档服饰，激起了公愤（该品牌声称把它们烧掉是生成能源的一种方式），此后情况发生了变化。法国将在2023年之前完全禁止这种做法。

奢侈品的售价可能会是生产成本的十倍，所以奢侈品集团不愿减产。但是张贴“特价！！！”标识会被认为很粗俗。此外，经纪公司盛博的卢卡·索尔卡（Luca Solca）说，“打折销售能赚到些钱，但也会损害品牌价值，你必须在两者间做权衡。”意大利奢侈品牌普拉达去年表示将终止所有门店折扣活动。

一些品牌的产品永远不会过时（比如爱马仕手袋），因此季节性不是个问题。其他品牌谨慎地面向员工及他们的朋友做“样品特卖”，以处理掉旧货。过去，许多衣服最终都被放到了网上，在Yoox和SaksOff5th.com之类的网站上廉价出售（不过品牌现在认为在网上全价销售的机会变大了）。

这些都不足以清空过时商品。此外，分析师预计中国游客会因为新冠病毒

被迫取消购物游，由此产生的大量积压商品也很难靠这些手段消化掉。为了能真正出清库存，各大品牌现在把目光投向集中了多家“工厂直销店”的户外购物中心。比斯特购物村（Bicester Village）离伦敦市中心只有一个小时的车程，与它类似的购物村既像中国游客心目中的古雅的欧洲村庄，也像机场购物中心。店铺里摆满了那些著名品牌无法在别处以正价销售的东西。售价通常为传统商业街的70%。

这个概念正在蓬勃发展。根据咨询公司贝恩（Bain）的数据，去年个人奢侈品销售额估计为2810亿欧元，其中有370亿欧元来自此类实体折扣店。这个数字在五年内飙升了85%。但索尔卡警告称，利用工厂直销店做清库存以外的任何事（例如把它们和更便宜的二线品牌商品放在一起卖）都会永久地损害品牌声望。最好只在这些店里销售最有问题的款式和最古怪的尺寸，并将品牌的“真爱粉”推向摄政街或蒙田大道。

有两件事可能会拯救那些为了清库存而焦头烂额的人。第一个是二手服装在线销售的兴起：等着看许多实际上根本没穿过的“旧”衣服上线发售吧。第二个是“升级再造”，把未售出的衣服修剪、组合并染色，改造成新的漂亮衣服。对于奢侈品牌来说，这两种趋势不容错过。■



Remote advertising

Hoarding cash

Admen have a clever new way to trick sports fans

WHEN FERNANDO MARÇAL scored a risible own goal in a match against Paris Saint-Germain on February 9th, his Lyon football team's supporters watching on television screens prayed their eyes had deceived them. And deceive them they did—just not in the way that would answer their prayers. The advertising hoardings they saw around the pitch's perimeter were not those seen by Lyon fans unlucky enough to witness Mr Marçal's howler in person at the stadium. The televised versions were conjured up virtually.

Virtual advertising works by placing invisible infrared signals in signs to distinguish them from other objects in the foreground. Images can then be superimposed onto them in a live TV broadcast. Viewers in Tianjin might see the logo of a local bank behind the penalty area, while those in Tijuana are tempted by a Mexican beer.

Football clubs are understandably keen. Commercial income, made up mostly of sponsorships and advertising, earned Europe's top 20 teams €3.6bn (\$3.9bn) last year. Allowing companies to tailor their pitch-side messages to specific audiences could boost this by 40%, reckons the boss of one sports-marketing company.

In January Real Madrid appointed IMG, a sports-management company, to sell this unreal estate on its behalf. Teams elsewhere in Europe have begun to use the technology in recent seasons. So, too, have top-flight ice-hockey and basketball leagues in North America.

Tailoring ads to all tastes has limits. Too many sponsors may hurt a team's brand, says Jean-Paul Petranca of the Boston Consulting Group. Manchester

United, which raked in £173m (\$224m) in sponsorships last year, has been mocked in the past for endorsing everything from bedding to instant noodles.

Still, virtual hoardings are here to stay. In the future, says James Gambrell, boss of Supponor, a supplier of the technology, sponsors could target an audience based on its demographic profile or the device or platform of choice (owners of Apple's gadgets are generally better-off than those using Android devices).

For the time being, it can help clubs keep controversial partners while placating an irate public. In February British bookmakers, which bankroll half of the teams in the Premier League, announced that they are considering withdrawing from advertising on the side of the pitch after vocal criticism from anti-gambling campaigners. In France Lovebet, a big gambling company that sponsors Paris Saint-Germain, uses virtual advertising to reach viewers in Asia, where placing bets is legal and popular, but not in Europe, where it is restricted in some markets. This can spare clubs plenty of jurisdictional headaches—if not blushes for blunders like Mr Marçal's. ■



远程广告

场边淘金

广告人有个巧妙的新方法迷惑体育迷

在2月9日对阵巴黎圣日耳曼的比赛中，里昂的费尔南多·马萨尔（Fernando Marçal）踢进了一个可笑的乌龙球。在电视上看到这一幕的里昂球迷祈祷自己看到的不是真的。他们看到的确实不是真的，只不过不像他们祈祷的那样。他们看到的球场广告牌和那些不幸在体育场里亲眼目睹马萨尔离奇失误的里昂球迷看到的不一样。电视屏幕上的广告牌是虚拟的。

虚拟广告的工作原理是在标识中放入不可见的红外信号，使之与前景中的其他物体区分开来，这样就可以在电视直播中把图像叠加在标识上。天津的观众可能会看到罚球区后面是一家本地银行的标志，而提华纳（Tijuana）的观众则会被一款墨西哥啤酒吸引。

足球俱乐部自然热衷于此。欧洲20强球队去年的商业收入为36亿欧元（39亿美元），主要由赞助和广告收入构成。一家体育营销公司的老板认为，如果允许俱乐部根据特定的受众调整它们的场边广告信息，这个数字或许可提升40%。

今年1月，皇家马德里委托体育管理公司IMG替自己销售这块虚拟地产。欧洲其他球队在最近几个赛季已经启用了这项技术。北美的顶级冰球和篮球联赛也是如此。

定制广告以符合各种口味有其限度。波士顿咨询集团的让-保罗·拜德航卡（Jean-Paul Petranca）认为，赞助商太多可能有损一支球队的品牌形象。曼联去年大赚1.73亿英镑（2.24亿美元）的赞助费，过去该队曾因代言从床上用品到方便面等各种商品而被嘲笑。

尽管如此，虚拟广告牌已被广为接受。虚拟广告技术供应商Supponor的

老板詹姆斯·盖姆布瑞尔（James Gambrell）说，将来赞助商可以根据人口特征或者所使用的设备或平台来锁定目标受众（苹果设备的用户通常比安卓设备的用户更富裕）。

就目前来看，该技术可以帮助俱乐部留住有争议的合作伙伴，同时安抚愤怒的公众。2月，为英超半数球队提供赞助的一众英国博彩公司宣布，在反赌球人士发出严厉批评后，它们正考虑停止投放球场围栏广告。赞助巴黎圣日耳曼的大型法国博彩公司洛夫贝特（Lovebet）正利用虚拟广告覆盖亚洲观众而放弃欧洲观众。在亚洲投注是合法的，而且还很流行，但在欧洲某些市场上投注受到限制。这虽然不能让俱乐部免于因马萨尔这样的失误而蒙羞，但可以避免许多让人头疼的司法问题。■



Metabolites and you

Shed-loads of chemicals

People leave molecular wakes that may give away their secrets

GENES CAN tell tales about you, from who your ancestors were to how likely you are to develop a range of diseases. And it seems probable that in the future they will tell more: your personality type, perhaps, or your intelligence. For these reasons, many countries have laws limiting what use employers and insurance companies can make of such information. America, for example, has the Genetic Information Nondiscrimination Act, which makes it illegal for health insurers and employers to use genetic information to discriminate against customers and employees.

There is much, however, that genes cannot reveal. They are blind to what you eat, how you exercise, how safe the place you live in is, how you unwind at the end of the day and which god you worship. Just as well, you might think, considering how easy it is to obtain samples of DNA from saliva, sweat or hair, and how cheap it is becoming to analyse such samples. But it is not just DNA that people scatter to the wind as they go about their business. They shed a whole range of other chemicals as well, in their breath, their urine, their faeces and their sweat. Collectively, and somewhat inaccurately, these molecules are referred to as metabolites. Some truly are the products of metabolic activity within people's bodies. Others are substances an individual has come into contact with, or consumed or inhaled. All, though, carry information of one sort or another.

| *Blood, tears, sweat and toil*

Until recently this did not matter much, for two reasons. One was that, in practice, taking samples for analysis required either voluntary collaboration or legal duress. It could not be done clandestinely. The other

was that interpreting the complicated patterns of metabolites is hard. But both of these obstacles are now being overcome.

The most common way of analysing metabolite content is gas chromatography-mass spectrometry. This technique sorts molecules by their weight, producing a pattern of peaks that correspond to different substances. But the same weight can be shared by many molecules, so the results may be ambiguous. Nor, even if a molecule can be identified unambiguously, is its wider significance always obvious to a particular investigator.

There are, however, a lot of information sources out there, in the form of publicly available metabolite databases. And last year a team led by Pieter Dorrestein of University of California, San Diego, invented a way, which they call a metabolite search engine, of linking them up so that a sample can be compared simultaneously with the contents of all of them.

The databases themselves are getting better, too. According to Dr Dorrestein, researchers in the field were able, as recently as four years ago, to identify only 2% of the metabolites found in samples. Today, that has increased to 6% and is climbing quickly. “It is reasonable”, he says, “to assume that in another four years we will be able to annotate 20% of the molecular signatures that we encounter, based on the advances that are being made.”

Another area of progress is the type, size and state of preservation of samples that can be interrogated. No longer are blood, urine or breath required. Sweat, tears, saliva and even dental plaque will do. A study just published by Feliciano Priego-Capote at University of Cordoba, in Spain, for example, shows it is possible to extract much meaningful information from even a dried-up drop of sweat—indeed, Dr Priego-Capote is able to find in dried sweat substances that are undetectable at the moment in fresh

perspiration.

Such information can reveal a lot. Your god? Regular exposure to burning incense, and thus frequent visits to a church that uses it, will be detectable from the chemicals in the smoke. Not a Christian? Kosher and halal diets are detectable by the absence of metabolites from certain foodstuffs those diets forbid. Your out-of-office activities? Habits like drinking, smoking and narcotic use are visible as numerous chemicals—not merely the active pharmaceuticals which produce the relevant high or low. Your exercise levels? These are flagged up by lower than normal levels of things like leucine, glycerol and phenylalanine. Your local environment? Breathing in polluted air has a marked impact on the profile of your metabolites. Your general health? Illnesses ranging from Parkinson's disease (altered levels of tyrosine and tryptophan) to diabetes (sugars and sphingomyelin) leave abundant metabolic traces. "The day is coming soon", observes Cecil Lewis, a molecular anthropologist at University of Oklahoma, who is studying the matter, "when it will be possible to swab a person's desk, steering wheel or phone and determine a wide range of incredibly private things about them."

| *Swabbing the decks*

In contrast with DNA, the use to which knowledge of metabolites might be put has little legal restriction. Dr Lewis, and others like him, worry about the consequences of this. At the moment, sampling for alcohol or illegal drug use, say, has to be overt, because it involves a blood, urine or breath test. That is true regardless of who is collecting the sample, whether it be the police or an employer. This also keeps purposes clear. A firm might feel it has the right to test employees for drug use, and the law might support that. But techniques like Dr Priego-Capote's make it easier, as Dr Lewis observes, to sample clandestinely, and bring a temptation to push back the boundaries of what is being searched for. They would, for example, allow companies to detect, if they chose to look, such private matters as whether

an employee was taking antidepressants.

Metabolite data, even the sort obtained openly, will also be of interest to medical-insurance companies, who may insist on the provision of samples as a condition of the provision of cover. They, too, might take an interest in matters of diet and exercise, penalising those who do not conform to prescribed healthy regimes.

The police may be tempted to push the boundaries as well. The fourth amendment to America's constitution protects against unwarranted searches and seizure of evidence. This means it is hard to force someone to give a sample. But if obtaining such merely requires taking a swab of a surface in a public place—perhaps a keyboard someone has just used—the amendment is unlikely to apply.

That is not necessarily wrong, if it means more criminals are caught and convicted. But it needs to be thought about carefully, because many metabolites are sticky. Cocaine is a case in point. Studies have shown that as many as two-thirds of the dollar bills in circulation in America carry traces of this substance, which might thus end up on the fingertips of the innocent, as well as the guilty.

Perversely, this might even help someone who really had taken the drug. The law in many jurisdictions permits employers to fire employees for unlawful conduct, even if it happens outside the workplace. But as Michelle Terry of WKS Law in Los Angeles, observes, given how sticky research has shown cocaine metabolites to be, it is hard to guess how the courts would rule if someone lost their job for testing positive, yet claimed never knowingly to have touched the stuff.

Correction: In “No small matter” (February 1st) we suggested that Charles Lieber's research at Harvard was connected with Elon Musk's brain-

machine interface project. In fact Neuralink, Mr Musk's firm, is completely separate from Dr Lieber's endeavours. ■



代谢物与你

海量化学物质

你的分子“尾流”可能会泄露你的秘密

基因可以泄露你的隐私，包括你的祖先是谁，你患各种疾病的几率多大等等。而且未来可能还会泄露更多信息，比如你的性格类型，或者智力水平。正因如此，很多国家都制定了相关法律，限制雇主和保险公司对遗传信息的使用。例如，美国的《遗传信息反歧视法案》（Genetic Information Nondiscrimination Act）规定，医疗保险公司和雇主利用遗传信息区别对待客户和雇员是非法行为。

然而，还是有很多信息无法通过基因获知。基因无法透露你吃了什么，怎样锻炼身体，居住地是否安全，一天下来如何放松自己，以及你信奉哪位神明等等。你可能会觉得，幸好如此，因为要从唾液、汗液或毛发中获取DNA样本简直易如反掌，而且分析这些样本的成本也日益降低。但是，人们在日常活动时，散播到空气中的可不只有DNA。他们还会通过呼吸、尿液、粪便及汗液等排出其他各种化学物质。这些分子被统称为代谢物（尽管可能不太准确）。它们有些确实是人体代谢活动的产物，其他一些则是人们接触、消耗或吸入的物质。不过，所有这些物质都承载着这样或那样的信息。

| 血、泪和汗

以前这些物质一直无关紧要，但近来情况不同了，原因有二。首先，在实际操作中，采集用于分析的样本要么需要人们自愿配合，要么需要依法强制执行，无法暗中进行。其次，代谢物结构复杂，要分辨清楚并非易事。而现在，这两个关卡都在被攻克。

分析代谢物成分最常见的方法是气相色谱-质谱法。这种方法根据质量对分子分类，产生一个图谱，其中的各色谱峰与不同的物质相对应。但因为很多分子的质量相同，所以结果可能并不明确。即便分子能被明确地识别出来，某一位研究人员也不总能从中看出更多意义。

不过，信息来源已有很多，以代谢物数据库的形式开放给公众。去年，加州大学圣迭戈分校的皮耶特·德伦斯坦（Pieter Dorrestein）领导的研究小组发明了一种他们称之为“代谢物搜索引擎”的方法，将这些数据库连接起来，从而可以将一个样本与所有数据库中的所有样本同时加以比对。

数据库本身也在不断完善。德伦斯坦表示，就在四年前，该领域的研究人员还只能识别出样本中2%的代谢物，如今已经增长到6%，而且正在迅速攀升。他说：“基于目前取得的进展，我们可以合理地认为，再过四年就能识别出所遇到的分子标记物的20%。”

另外，可分析样本在种类、数量和保存状态等方面都有了进展。样本不再局限于血液、尿液或呼出的气体。汗液、泪水、唾液，甚至牙菌斑都可以。例如，西班牙科尔多瓦大学（University of Cordoba）的费利西亚诺·普里戈-卡波特（Feliciano Priego-Capote）刚刚发表的一项研究表明，即使是一滴干了的汗液，也可能从中提取出很多有意义的信息。普里戈-卡波特甚至能从干掉的汗液中发现在刚排出状态下检测不到的物质。

这类信息可以揭示很多东西。你信奉哪位神明？通过探测烟尘中的化学物质，能知道你定期接触焚香，进而知道你经常去使用这种焚香的教堂。你不是基督徒？犹太教和伊斯兰教禁忌的某些食物会让你缺乏某些代谢物，由此可知你是按这些教派的教规饮食。你下班后干了什么？大量化学物质泄露了饮酒、吸烟或吸食毒品的习惯，而不仅仅是带来相应快感或低落情绪的有效药物。你的运动量够不够？亮氨酸、三元醇和苯丙氨酸等物质低于正常水平，就该引起注意了。你居住地的环境怎样？吸入被污染的空气会对你的代谢物档案产生显著影响。你的健康状况大体上如何？各种疾病都会留下大量的代谢痕迹：帕金森病会改变酪氨酸和色氨酸指标，糖尿病会改变血糖和鞘磷脂指标。“很快就会有这么一天，”在俄克拉荷马大学研究这一课题的分子人类学家塞西尔·刘易斯（Cecil Lewis）表示，“用棉签抹一下某个人的办公桌、方向盘或手机，就可能得到关于他方方面面的极为私密的信息。”

相比DNA，对代谢物数据的可能用途还没有什么法律限制。刘易斯和他的同行们都担心这会带来什么后果。比如，由于涉及血液、尿液和呼吸检测，目前对饮酒或服用违禁药物的采样必须公开进行。不管收集样本的是警察还是雇主都一样。这也让采样的目的清楚明白。公司可能认为自己有权检测员工是否吸毒，而法律可能支持它这样做。然而正如刘易斯所说，像普里戈-卡波特研发的那些技术让暗中采样变得更加容易，会诱使一些人扩大搜寻的信息范围。例如，如果公司真要调查员工是否服用抗抑郁药之类的隐私，这些技术就会派上用场。

代谢物数据——即使是公开获得的那一类——也会让医疗保险公司感兴趣。它们可能会坚持让客户提供样本，作为投保的必要条件。它们也会关注客户饮食和锻炼的情况，对那些不遵循规定的健康方案的人另眼相待。

警方也可能忍不住要越界执法。美国宪法第四修正案保护公民免受无端的搜查和取证。这意味着很难强迫他人提供样本。但是，如果只需在公共场所擦拭一下某个物体的表面——或许是刚用过的键盘，那么修正案就不大管用了。

如果这样做能抓到更多罪犯并给他们定罪，倒也未必是件坏事。但还是需要考虑周全，因为很多代谢物是有黏性的。可卡因就是这样。研究表明，在美国，流通中的美钞有多达三分之二都沾有些许可卡因，所以指尖沾了可卡因的既可能是罪犯，也可能是无辜的人。

这就可能事与愿违，反倒帮了那些真正的瘾君子。许多司法辖区的法律允许雇主解雇有非法行为的员工，即使这种行为发生在工作场所之外。但是，正如洛杉矶WKS律师事务所（WKS Law）的米歇尔·特里（Michelle Terry）所言，由于研究表明可卡因代谢物的黏性很强，如果有人因为检测结果呈阳性而失业，而他本人却声称从未有意接触过可卡因，很难想象法院会如何判决。

更正：在2月1日的《纳米非小事》（No small matter）中，我们提到查尔

斯·李波在哈佛的研究与伊隆·马斯克的脑机接口项目有关。而事实上，马斯克的Neuralink公司与李波的研究毫不相干。■



Derivatives

Fare play

Airbus wants to help airlines hedge ticket prices. Will that fly?

THERE IS NOTHING that maddens online shoppers more than seeing air fares rocket just as they are about to click “buy”. Yet price turbulence may be an even bigger headache for airlines. Whereas carriers have some control over fares, these can be buffeted by surges in supply or demand, caused, say, by economic slumps or political rows. Over the past five years, ticket prices on a given date (net of taxes and fees) have varied by an average of 7% in Asia and 16% in Europe. Even in North America, where airlines have more pricing power, volatility hovers around 7%. Most carriers have to wait until less than 90 days before take-off for 90% of their ticket revenues. So they are hard to forecast—a big problem, as airlines often commit billions of dollars years in advance to buy planes.

Fortunately for them Airbus, the world’s largest planemaker, has a fix. On January 20th it launched Skytra, a London-based exchange through which airlines can access futures, options or swaps to hedge against big swings in ticket prices. Those derivatives contracts will be based on indices that track daily changes in the price of travel (measured as a cost per passenger per km). Airlines can buy these through banks and brokers that join the exchange. Skytra expects to get the thumbs-up from British regulators in the summer.

If the new tool helps carriers stabilise earnings, it would also reassure Airbus, which is sitting on an order backlog of 7,482 aircraft—nine years’ worth of production. Nineteen airlines folded last year; with better risk management the number might have been lower. Boeing, Airbus’s rival, has seen hundreds of its 737 MAX planes grounded after two crashes. Uncertainty over when they will fly again makes hedging all the more

attractive. More data and greater processing power have also helped make hedging easier, says Elise Weber, one of Skytra's founders.

Sceptics say the platform could struggle to take off. Airlines have not been voracious users of derivatives. Some do not even hedge fuel prices, their biggest cost: only 40% of the kerosene set to be consumed in the next year is hedged. Few Asian and Middle Eastern carriers buy hedges because they do not really understand them, says an executive at a rival exchange. More complex derivatives that reference ticket prices could flummox them.

For the market to work, the airlines need counterparties. These could include businesses that buy blocks of plane tickets, such as travel agents or hotel chains, suggests Matthew Tringham, a co-founder of Skytra. But few make use of simpler existing hedges against swings in weather or currency. And few would feel able to forecast ticket prices better than the airlines themselves. Low demand would limit liquidity and make trading dear. That could deter banks and brokers from acting as market makers, further sapping liquidity.

At least Skytra is well-equipped. On January 23rd it said it had chosen Nasdaq, the world's second-largest stock exchange, as its technology provider. Mark Howarth, its boss, has worked at London's stock exchange and Chi-X, an Asian venue. That will cheer City types who question Airbus's markets nous. Airlines and travel groups may take longer to get on board.





衍生品

票价游戏

空客想要帮助航空公司对冲机票价格。行得通吗？

最让网购人士抓狂的事莫过于刚要点击“购买”就看到机票价格飞涨。但价格波动也许更让航空公司头痛。虽然航空公司对票价有一定的控制权，但经济下滑或政治纷争等因素导致的供应或需求激增可能会冲击票价。过去五年中，特定某天的机票价格（不含税费）在亚洲的平均波动率为7%，在欧洲为16%。即便在航空公司拥有更大定价权的北美，波动率也徘徊在7%左右。大多数航空公司要等到离起飞日90天内才能获得机票收入的90%。因此，要预测收入很难。而这是一个大问题，因为航空公司经常要提前几年投入数十亿美元购买飞机。

好在世界上最大的飞机制造商空中客车找到了解决方法。1月20日，它推出了位于伦敦的交易所Skytra，航空公司可以通过它开展期货、期权或掉期交易，以对冲机票价格的大幅波动。这些衍生品合约将以跟踪航空旅行价格（以客公里价格衡量）每日变化的指数为基础。航空公司可通过加入交易所的银行和经纪商购买它们。Skytra预期在今年夏天会得到英国监管机构的批准。

如果这件新工具能够帮助航空公司稳定收益，那也能让空客安心——该公司已经积压了7482架飞机的订单，相当于九年的产量。去年有19家航空公司倒闭。如果当初风险管理做得更好些，倒闭的公司说不定会少一点。空客的竞争对手波音在两次坠机事故后已有数百架737 MAX飞机被禁飞，何时能解禁还不得而知，这就更加大了对冲的吸引力。Skytra的创始人之一艾莉斯·韦伯（Elise Weber）说，数据增多以及处理能力增强也让对冲变得更容易。

怀疑人士认为这个交易平台可能难以成功。航空公司一向对衍生品不大积极。有些甚至对占成本最大头的燃料价格都没有做对冲：明年预计将消耗的航空煤油只有40%被做了对冲。竞争对手交易所的一位高管表示，没什

么亚洲和中东的航空公司购买对冲产品，因为它们不太懂这些。更复杂的机票价格衍生品可能会让它们更加茫然无措。

这个市场要正常运转，航空公司就需要交易对手。Skytra的联合创始人马修·特林汉姆（Matthew Tringham）指出，交易对手可能包括旅行社或连锁酒店等大量购买机票的企业。但是，这些企业目前就很少利用更简单的、现有的对冲工具来应对天气变化或汇率波动，更没有几家会自认为能在预测机票价格方面比航空公司做得更好。需求低迷会限制流动性，导致交易价格高昂。这可能会让银行和经纪公司打消充当做市商的念头，进一步削弱流动性。

至少Skytra做了周全的准备。1月23日，该交易所表示已选择全球第二大证券交易所纳斯达克作为其技术供应商。其老板马克·霍华斯（Mark Howarth）曾在伦敦的证券交易所和亚洲的交易所Chi-X工作。这将让伦敦金融城那类质疑空客有足够市场专业知识的人满意。但要让航空公司和旅行社“登机”，可能需要更长的时间。 ■



Free exchange

From V to victory

Economies can recover quickly from massive slumps in GDP—but not always

IT WILL BE some time—years most likely—before the full extent of the economic blow from covid-19 can be estimated with any confidence. As ever more of the global economy enters a prolonged shutdown, it seems increasingly clear that the world is facing a drop in output unprecedented in its breadth and intensity. Some analysts see in the growing economic disruptions and market panic the first stirrings of an economic collapse more serious than the global financial crisis of 2007-09. Joachim Fels, an economist at PIMCO, an investment fund, recently warned that in the absence of sufficiently aggressive action from governments the world could face a market meltdown and ensuing depression. All downturns create discomfort, but the pain of a slump—even a very steep one—depends greatly on how long it lasts. History suggests that rapid rebounds from enormous output losses are possible, but not by any means guaranteed.

Some economies, perhaps those of Singapore or even South Korea, could find a footing by the second half of the year, sufficient to offset some of the production lost during the first half. But the probability that others could experience extreme declines in GDP in 2020—perhaps as large as 10%—grows by the day. Falls of that magnitude are not especially unusual in developing economies, where growth is highly volatile. (To take just one example, there have been ten years since 1980 in which real GDP in Libya has fallen by at least 10%, between which plunges the economy has experienced annual growth spurts of as much as 125%.) In industrialised countries swings of that scale are exceedingly rare. An analysis of data gathered by the World Bank reveals that since 1960, across rich countries, there have been only 13 instances in which an economy experienced an

annual decline in GDP of at least 5%, only three cases in which output fell by at least 7% in one year (Finland in 2009, and Greece in 2011 and 2012), and none in which output dropped by more than 10%. In the rich world, clusters of large decreases in GDP appear on the heels of the 1973 oil crisis, during the Asian financial crisis of 1997-98, and as part of the global financial crisis and its aftermath.

A longer perspective reinforces the rarity of such events. Economic historians at the University of Groningen, in the Netherlands, maintain a cross-country set of GDP data stretching far into the past. Since 1870, across 18 industrialised economies, there have been only 47 instances in which a country experienced an annual decline in output of more than 10%. Most are associated with world wars and the Depression; of the 47 large output declines, 42 occurred between 1914 and 1945 (see chart).

How do countries fare after suffering such economic blows? Recoveries are occasionally quite rapid. At the end of the world wars, a few economies experienced near-immediate bursts of growth—partly, but not always, because of rebuilding. The beleaguered Italian economy grew by about 35% in 1946. By 1949 it had already recovered all the ground it lost during the war and then some. The German economy shrank by a staggering 66% from 1944 to 1946, then grew at an annual average rate of 12% over the subsequent decade. In other cases rebounds are less robust. In 1924 real output in both Germany and Austria remained below the levels before 1914. Across the period from 1870, it took an average of five years for output in countries that experienced declines in GDP of more than 10% to regain their peak (see chart).

Importantly, this reflects the fact that the main causes of economic contraction—world wars—persisted and disrupted activity for several years. French output fell by more than 10% per year in 1940, 1941, 1942 and 1944, for example. Yet focusing on more recent experience, and on smaller

initial output declines of just 5%, does not dramatically change the picture. Among the rich economies which experienced annual drops in GDP of more than 5% since 1960, output took an average of four years to return to its previous level. Again, there are examples of immediate, robust recovery. By 1999, for instance, real GDP in South Korea had already risen well above the peak reached in early 1997, before the Asian financial crisis struck. Recoveries from the global financial crisis, in contrast, have been more sluggish. The Italian economy entered the covid-19 crisis having failed to regain the level of real output it achieved in 2008.

| *Catch the trade winds*

Any lessons from these experiences should be applied to the world's current situation with care. A dangerous pandemic working its way across a highly integrated global economy is an unprecedented event. Still, a few historical patterns are worth noting. First, and most obviously, the duration of the economic pain depends on how much goes wrong as a result of the initial shock. Germany and Austria fared worse than other first-world-war combatants because they lost the war and their empires, and suffered state collapse and hyperinflation. If countries today can survive massive output declines without sustaining much institutional damage, that bodes well for the pace of recovery.

Second, large drops in output often accompany a fracturing of global trade networks. The success with which those trade ties are restored matters for the robustness of the economic rebound. Western Europe enjoyed explosive growth in the years after the second world war, thanks in part to efforts to knit trade back together—a very different outcome from that following the first. Similarly, the world must hope that trade recovers quickly when the pandemic ebbs.

And third, it is important to get macroeconomic policy right. The global financial crisis, and the euro-area debt woes which followed, did not kill

millions of people or destroy valuable infrastructure, but the sluggish recovery that followed left Europe both economically and politically vulnerable to new shocks.

Even the mildest brush with the coronavirus could prove economically destructive if governments are reluctant to provide enough stimulus. The world should be able to bounce back to growth once covid-19 is brought under control. It has only to avoid the errors of history. ■



自由交流

谷底反弹

经济体能从GDP暴跌中迅速复苏——但并非总能如此【新冠报道】

要能比较确信地估算新冠肺炎冲击经济的程度，还需要些时间——很可能是几年。随着全球经济越来越多的部分陷入长期停摆，看起来渐趋明显的一点是，世界正面临一次广度和强度都前所未有的产出下跌。一些分析人士从不断扩大的经济混乱和市场恐慌中看到苗头，认为一场比2007至2009年全球金融危机更严重的经济崩溃正在发生。太平洋投资管理公司（PIMCO）的经济学家约阿希姆·费尔斯（Joachim Fels）最近警告称，如果各国政府不采取足够积极的行动，全球可能面临市场崩溃，进而陷入萧条。每次经济衰退都会带来不适，但经济下滑（即使是断崖式下滑）引发的痛苦很大程度上取决于它持续的时间。历史表明，经济从巨大的产出损失中迅速反弹是可能的，但绝非必然。

有些经济体——可能是新加坡，甚至韩国——可能会在今年下半年稳下来，弥补上半年一部分的产出损失。而其他经济体在2020年出现GDP急剧下跌（可能高达10%）的可能性与日俱增。这种跌幅在经济增长非常不稳定的发展中国家并不是多么罕见。这里仅举一个例子，自1980年以来，利比亚的实际GDP共有十年发生了至少10%的下跌，而在这些急跌之间又有一些爆发式增长的年份，最高年增速达到125%。而工业化国家极少有这样的大起大落。分析世界银行收集的数据可以看出，自1960年以来，在富裕国家中，GDP年跌幅至少5%的仅发生过13例；年跌幅至少7%的仅3例，分别是2009年的芬兰，以及2011年和2012年的希腊；年跌幅超过10%的一次都没发生过。富裕国家几次集中的GDP大幅下滑分别发生在1973年石油危机之后、1997至1998年亚洲金融危机期间，以及全球金融危机期间及之后。

再往前追溯进一步证实了这类情形的罕见。荷兰格罗宁根大学

（University of Groningen）的经济历史学家维护的一组跨国GDP数据可以上溯到很久以前。自1870年以来，在18个工业化经济体中，年产出下降超

过10%的只有47例，且它们大多与两次世界大战和大萧条有关——47例中有42例发生在1914至1945年间（见图表）。

国家在经济遭受如此重创之后情况如何？有时也有很快复苏的例子。两次世界大战几乎刚一结束，少数国家的经济就出现了爆发式增长——这有一部分是因为重建，但也并非总是如此。饱受战争之苦的意大利经济在1946年增长了约35%。到1949年，它已经收复了战争期间的所有失地，甚至有所扩张。德国经济在1944年到1946年间萎缩高达66%，在随后的十年里以年均12%的速度增长。而在其他例子里，反弹就没有这么强劲了。1924年，德国和奥地利的实际产出都仍低于1914年前的水平。1870年以来，GDP下降超过10%的国家平均需要五年时间才能恢复到之前的水平（见图表）。

重要的是，这反映了作为经济萎缩主因的世界大战持续数年、破坏经济活动数年的事实。例如，法国的年产出在1940、1941、1942和1944年下降都超过10%。然而，若只关注较近的历史以及初始跌幅较小（仅为5%）的情况，结果也没有显著的差异。自1960年以来，GDP年跌幅超过5%的富裕经济体，其产出平均需要四年才能恢复到先前的水平。依然有一些迅速、强劲复苏的例子。例如，韩国的实际GDP到1999年就已经大大高于它在1997年初亚洲金融危机来袭前达到的峰值。相比之下，从全球金融危机中复苏就没那么快了。在遭遇新冠危机之前，意大利的实际产出仍然没能恢复到2008年的水平。

| 抓住贸易风

把从所有这些经历中得出的任何教训应用到世界当前的局势上都要审慎。一场危险的大流行病在高度一体化的全球经济中蔓延，这是史无前例的事件。尽管如此，一些历史模式还是值得注意。首先，也是最显而易见的，经济疼痛持续的时间取决于最初的冲击造成的破坏有多大。德国和奥地利在一战后的情况比其他参战国更糟糕，因为它们输掉了战争，失去了帝国，遭受了政权垮台和恶性通胀。如果现在各国能够挺过产出大幅下降的难关而不遭受很多制度性破坏，对于经济复苏的速度会是个好兆头。

其次，产出大幅下降往往伴随着全球贸易网的断裂。能否成功修复这些贸易关系对经济反弹的强健度有重大影响。二战后的数年里，西欧经济实现了爆炸式的增长，部分原因是各国努力重建了贸易网——这样的结果与一战后的大不相同。同样地，世界必须寄望于这场流行病减退时贸易能迅速恢复。

第三，实施正确的宏观经济政策很重要。全球金融危机以及之后的欧元区债务危机并没有造成数百万人丧生或毁坏重大基础设施。但随后的复苏乏力使得欧洲在面对新的冲击时，在经济和政治上都很脆弱。

如果各国政府不愿采取足够的经济刺激措施，那么即便只是轻微沾染冠状病毒也可能严重毁坏经济。一旦新冠肺炎得到控制，世界经济应该能够重振旗鼓。它需要做的只是避免重蹈覆辙。 ■



Finland

Prescribing tablets

Finns turn to technology to help frail old people live at home

IN A GREY office building on the outskirts of Helsinki, a chatty social worker is meeting six elderly people from around town for lunch—via tablets propped on their kitchen tables. For the next half-hour she talks to them about their day and reminds them to have something to drink, because dehydration is particularly dangerous for older people (making them more prone to falls, among other things). Glasses of milk and water are duly raised.

The virtual lunch group is part of Helsinki's remote-care programme for its elderly. While many countries with bulging elderly populations are building new care homes, Finland is not planning to do so and, instead, is looking after people in their own homes for longer—even those with dementia who live alone.

The guiding principle in Finland is that for anyone, no matter what their age, "home is best", says Anna-Liisa Lyytinen from Helsinki's social-services department. Nurses and care workers drop in, often several times a day, to help with meals, bathing, medication, or just to check that everything is all right.

Such a painstaking service will be harder to provide as Finland ages. In the next ten years the number of residents older than 75 is expected to increase by around half, as people live longer and the baby-boomers become octogenarians.

Finland's answer to this challenge is technology—unsurprising in a country that claims to have the biggest number of digital health startups per person.

At a recent international health-tech fair in Helsinki many, if not most, of the offerings at the Finnish pavilion had to do with helping frail elderly people to live independently. That involves two challenges: making sure that care workers know immediately when something goes wrong (an old person falls over, for example) and slowing the decline of elderly minds and bodies.

In Helsinki's municipal home-care programme, about 4,000 frail people are equipped with various safety gadgets. These include wristbands with GPS, a fall detector, an alarm button and a phone line linked to care workers, who monitor the wearer's location on their computer screens. Some people who have dementia have sensors on their front doors, which send alerts to the care team if they go out. Most of them are too infirm to walk about much, so they rarely leave their homes, says Hanna Hamalainen, a former manager at the programme. When they do go out, she says, it is usually to drop in on friends nearby. But if they venture out in the middle of the night or stray too far from home, care workers are dispatched to find them.

Technology cannot replace care workers, but it can help. The most common reason for a home visit by a social worker in Helsinki is to check that Grandma is taking her medicine. A pill-dispensing robot in her home can do that. Each holds a two-week supply of multiple drugs, chimes a reminder when it is time to take them and dispenses the right combination. For one in five people who try them the robots don't work, usually because Grandma is reluctant to take lots of pills or has advanced dementia. But for the rest, they have cut medication-related visits by nurses from 30 to just four a month.

| *Here's looking at you*

The idea of frail old folk living alone perhaps worries Finnish people less than many others; Finns pride themselves on their rugged self-reliance. A

welcome pack for foreign journalists includes a book of cartoons depicting “Finnish nightmares”, such as having to say “hello” to a neighbour. Social isolation, however, is a big problem for the elderly because it leads to faster cognitive and physical decline. To deal with that, Helsinki runs virtual get-togethers for its homebound elderly that include quizzes, chair exercise classes, sing-alongs, book clubs and a religious discussion led by a priest. These should be regarded as extras, though. A degree of personal interaction, not just the virtual kind, is surely necessary even for Finns.

The biggest challenge for both humans and gadgets is to spot problems early. Some Finnish towns are testing technology to unobtrusively track the daily activity patterns of people who live alone. Local tech companies, including MariCare Oy and Benete, have developed systems that use a network of motion sensors to gather data on things like how much a person moves about, visits the bathroom or opens the fridge. Care workers use dashboard summaries of such data to prioritise whom to visit and what to check for. A jump in bathroom visits, for example, may be a sign of a urinary-tract infection. Not opening the fridge as much is a hint that memory problems may be getting worse.

Gizmos sometimes misfire. Wristbands give out the wrong co-ordinates, triggering false alarms. A sensor may fail because Grandpa draped a towel over it. Some elderly folk forget to charge their tablets. Such problems can be fixed. But even so, the share of contacts that home-care workers in Helsinki make virtually is not expected to rise much from its current 8% (out of 250,000 visits a month).

The biggest gain from technology may be that it makes it easier to keep old people fit enough to remain in their own homes for longer. This is much cheaper than an institution, and usually nicer, too.

A 65-year-old Finn can expect to live another 20 years, among the longest

life expectancy in Europe. But Finland is in the bottom half of EU countries when it comes to how many of those years are spent in good health, thanks to a fatty diet and a relative lack of exercise, perhaps because the winters are so long. Not every problem has a technological fix. ■



芬兰

平板处方

芬兰人用科技协助病弱老人在家生活

在赫尔辛基郊区一幢灰色的写字楼里，一位健谈的社工正与该市的六位老人共进午餐——通过支在餐桌上的平板电脑。在接下来的半小时里，她和老人聊家常，也提醒他们喝点东西，因为脱水对老人而言尤其危险（比如加大摔跤的风险）。老人会按她的提醒喝水或牛奶。

这个虚拟午餐小组是赫尔辛基针对老年人设立的远程护理项目的一部分。许多老龄人口庞大的国家正在兴建更多养老院，芬兰却反其道而行，设法协助老人在自己家中生活更长时间，甚至是那些罹患痴呆的独居老人。

赫尔辛基社会服务部的安娜-莉莎·莱蒂宁（Anna-Liisa Lyytinen）表示，芬兰的指导原则是，无论什么年纪，对每个人而言“家都是最好的”。护士和护工往往每天家访多次，帮助需要照顾的人用餐、洗浴、用药，或者只是来看看是否一切正常。

但随着芬兰社会日益老龄化，提供这种耗时耗力的上门服务会变得越来越难。人们的寿命更长了，加上婴儿潮一代成为耄耋老人，预计未来十年芬兰75岁以上的居民人数将增加一半左右。

面对这种挑战，芬兰的对策是科技。这不足为奇，既然这个国家声称人均拥有最多数字健康创业公司。在赫尔辛基近期举行的一场国际健康科技展上，芬兰展馆的许多（如果不是大部分）产品都与协助衰弱老人独立生活相关。其中涉及两大挑战：确保发生问题时（如老人摔倒）护理人员能即刻收到通知；减缓老人的身心衰退。

赫尔辛基市政府的家庭护理项目为约4000名病弱人士配备了各种安全小设备，包括GPS手环、摔倒检测器、报警按钮、护理人员电话专线。护理人员在电脑屏幕上监控佩戴这些仪器的人所在的位置。一些痴呆症患者的

房屋大门上装有传感器，在探测到他们出门时会向护理小组发送警报。该项目的前主管汉娜·哈马莱宁（Hanna Hamalainen）表示，这些老人多数身体虚弱，不能多走动，所以很少离家。她说，他们外出通常就是到附近的朋友家里坐坐。但如果他们半夜出门或离家太远，系统会派护理人员去找人。

科技不能代替护理人员，但可以协助他们的工作。在赫尔辛基，社工家访最常见的原因是检查老人有否遵医嘱服药。在老人家里配备一台配药机器人就可以做到这一点了。每台配药机器人可提供两周用量的多种药物，会按时提醒老人该吃药了，并递给他们正确的药物组合。在对这种机器人的试用中，没有发挥作用的情况占五分之一，通常是因为老人家不愿服用大把药片或患有晚期痴呆症。但对于其他人，机器人把护士为检查服药而登门的次数从每月30次减少到了仅仅四次。

| 看着你

在让衰弱老人独自生活这一点上，芬兰人不像其他国家的人们那么担心——毕竟芬兰人一向以他们坚定质朴的独立自主精神为荣。来芬兰的外国记者收到的欢迎礼包里就有一本漫画，描绘了诸如不得和邻居打招呼等“芬兰人的噩梦”。然而，社交孤立对于老人来说是个大问题，因为这会加快认知能力和身体机能的衰退。为应对这个问题，赫尔辛基市政府为不便出门的老人举办虚拟聚会，其中包含益智问答、椅子锻炼课、唱歌、读书会以及由牧师主持的宗教讨论会等。不过这些应被视为辅助性活动。一定程度的面对面社交——而不仅仅是虚拟互动——是绝对必要的，即便对芬兰人也一样。

无论是人还是电子设备，最大的挑战都是要尽早发现问题。一些芬兰城镇正在测试能无声无息地追踪独居老人日常活动模式的技术。包括MariCare Oy和Benete在内的当地科技公司已经开发出系统，利用运动传感器网络收集数据，显示个人在家中移动、上厕所或打开冰箱的频率。护理人员根据这类数据的汇总来确定优先家访的对象和要检查的事项。例如，上厕所次数明显增加可能是尿路感染的迹象。打开冰箱次数减少显示患者记忆力衰退可能加重。

小电子设备有时也会失灵。比如手环会发送错误的位置信息，引发误报。传感器可能因为老爷爷在上面搭了条毛巾而失灵。一些老人会忘记给平板电脑充电。这些问题是可以解决的。但即便如此，预计赫尔辛基的家居护理人员虚拟访问老人的比例并不会提升太多——目前占每月25万次家访的8%。

科技带来的最大好处也许是能更方便地协助老人维持健康，让他们能在自己的家里生活更久。这比入住养老机构便宜得多，而且通常也更舒适。

一名65岁的芬兰人预计还能再活20年——他们的预期寿命在整个欧洲排在最前列。但要统计这其中有多少年是在良好的健康状态下度过的，芬兰又落到了欧盟国家中的后半区。这也许是因为这里的冬季过长，芬兰人饮食中脂肪比重大，又相对缺乏运动。并非每个问题都可以靠科技解决。 ■



Bioengineering

Robots that come alive

A team of researchers makes bots from living cells

ROBOTS COME in all shapes and sizes. Some are humanoid. Others resemble animals. Many are just a jumble of arms slaving away on a production line. But one thing all robots have in common is that they are mechanical, not biological devices. They are built from materials like metal and plastic, and stuffed with electronics. No more, though—for a group of researchers in America have worked out how to use unmodified biological cells to create new sorts of organisms that might do a variety of jobs, and might even be made to reproduce themselves.

There are several ways to tinker with living organisms. Selective breeding and, more recently, genetic engineering permit the production of novel plants and animals for agriculture and horticulture, and as pets. Souped-up bugs for industrial processes can also be made in these ways. Researchers are working, too, on growing isolated animal organs for testing drugs and eventually, perhaps, for transplant surgery.

What Joshua Bongard of the University of Vermont and Michael Levin of Tufts University in Massachusetts have come up with is different. As they report in the *Proceedings of the National Academy of Sciences*, they and their colleagues have designed organic robots from their cellular components, and then set about realising those designs by joining together specific types of stem cells taken from a well-studied species of African frog, *Xenopus laevis*. The result (pictured) is close to matching the biological definition of an organism, in that it is capable of behaving autonomously and contains cell types that are specialised to perform different roles.

Though only a millimetre or so across, the artificial organisms Dr Bongard and Dr Levin have invented, which they call xenobots, can move and perform simple tasks, such as pushing pellets along in a dish. That may not sound much, but the process could, they reckon, be scaled up and made to do useful things. Bots derived from a person's own cells might, for instance, be injected into the bloodstream to remove plaque from artery walls or to identify cancer. More generally, swarms of them could be built to seek out and digest toxic waste in the environment, including microscopic bits of plastic in the sea.

To design their bots Dr Bongard and Dr Levin employed a computer program called an evolutionary algorithm. This worked by creating virtual representations of thousands of arrangements of cells that might achieve a particular task. It then tested those arrangements, using what is known about the biophysics of *Xenopus* cells, for suitability to perform the task in question, picked the most promising versions to form the basis for thousands more cellular arrangements, and then repeated the process until something properly fit for purpose emerged. That done, it was merely a matter of building the pattern which the algorithm had arrived at out of actual *Xenopus* cells, using microsurgical techniques to shape groups of cells in the way the pattern dictated.

The demonstration bots Dr Bongard and Dr Levin have made use two types of stem cell. Some are so-called pluripotent cells taken from early-stage embryos. These embryonic cells retain wide powers to turn into other cell types. The others are cardiac progenitor cells, a more specialised type of stem cell already destined to generate heart muscle.

Placed in a dish, bots made in this way were able to propel themselves along the dish surface via contractions of the heart-muscle cells within them. Besides pushing single pellets, groups of bots put into a dish together were able to work collectively, moving around in circles and

gathering the pellets into neat piles.

Exactly how that happens is not yet clear. “It is possible”, says Dr Bongard, “that the cells are signalling to one another in a way we’re not aware of.” That possibility, and many other questions, will be the subject of further research. The team are also trying to work out how cells can be motivated to build complex, functioning bodies. Such knowledge, says Dr Levin, would be immensely useful in regenerative medicine, which seeks to repair organs and build body parts for transplant.

| *Go forth and multiply?*

For xenobots to have a practical future, though, someone will have to find a less fiddly way of making them. At present, it takes a microsurgeon hours to handcraft each individual bot, peering down a microscope and using tiny tweezers to do so. One way the process might be automated is by employing three-dimensional printing to build up the necessary layers of cells.

The new organisms could also do with upgrading in certain ways. At present, for example, they have short lives—a couple of weeks at most. This is because they do not have any apparatus for feeding themselves. In one sense that is a good thing, for it soothes fears about safety. If a bot should escape it would expire at the end of its allotted time and, being made simply of frog cells, would be biodegradable and non-toxic. But because longer-lived bots would be more useful, the researchers are looking at ways to extend their creations’ lives.

A more controversial suggestion is to equip xenobots with reproductive systems—perhaps as simple as allowing them to divide themselves in two, in the way that flatworms can. This would help any application that required a swarm of the critters.

It might also, though, raise concerns about escapees establishing themselves in the wild. All this, says Dr Bongard, means it will be necessary to work with policymakers to decide how the production of future life forms, as useful as they might be, might be regulated. ■



生物工程

活体机器人

一个研究团队用活体细胞制造机器人

机器人的形态和大小各异。有的类似人形，有的模仿动物，还有许多不过是在生产线上苦干的一堆机器臂。但所有机器人都有一个共同点，那就是它们都是机械，而不是生物性设备。它们由金属和塑料等材料制成，塞满了各种电子器件。不过现在不一样了。美国一个研究团队设法使用未经修改的生物细胞创造出了新型有机体，它们或许能执行多种工作，甚至还可以让它们自我繁殖。

现在已经有一些办法来改造有机体。利用选择性育种以及近年的基因工程可以生产出新型的动植物，用于农业、园艺，以及做宠物。用这些方法也可生产出工业用途的增强型昆虫。研究人员还致力于培育离体的动物器官，可用于药物测试，最终甚至还可用于移植手术。

佛蒙特大学的约书亚·邦加德（Joshua Bongard）和马萨诸塞州塔夫茨大学的迈克尔·莱文（Michael Levin）想到的办法与众不同。他们在《美国科学院院报》（*Proceedings of the National Academy of Sciences*）上发表文章称，他们和同事用细胞组件设计出了有机机器人，并着手将特定类型的干细胞组合起来实现这些设计。这些细胞取自一个经充分研究的物种——非洲爪蟾（*Xenopus laevis*）。其成果（如图）已经接近符合生物学上有机体的定义，因为它具备自主行为的能力，并包含专门执行不同功能的各类细胞。

邦加德和莱文管他们发明的人工有机体叫“xenobot”，虽然直径只有一毫米左右，却能移动并执行简单的任务，例如在培养皿里推动颗粒。这听起来可能没什么，但他们认为可以将这个过程放大，从而完成有用的工作。例如，可以从人的自体细胞培育出机器人，然后再注射到血液中去清除动脉血管壁上的斑块或者识别癌症。在更广泛的应用场景中，它们可以被批量制造出来，在环境中寻找并消化有毒废物，包括海洋中的塑料微粒。

为了设计这种机器人，两位研究员使用了一种名为进化算法的计算机程序。这个程序创建出成千上万种细胞排列方式的虚拟呈现，它们有潜力完成某种任务。然后利用已知的非洲爪蟾细胞的生物物理知识测试这些排列，确定它们是否适合执行目标任务，再从中挑选出最有希望的方案。接下来，以此方案为基础，继续创建成千上万新的细胞排列方案。不断重复这个过程，直至得到符合目标用途的方案。完成这些之后，就只需要使用显微外科技术，把成批的活体爪蟾细胞按照这个最终方案组装起来。

他们的演示机器人使用了两种干细胞。一种是从早期胚胎中提取的，名叫多能干细胞。这些胚胎细胞保留了转化为其他细胞的广泛能力。另一种是心脏祖细胞，这种干细胞比较特殊，专门负责生成心肌。

把用这种方法制造的机器人放在培养皿中，它们能利用自己体内的心肌细胞的收缩推动自己贴着培养皿的表面前行。除了能推动单个颗粒外，如果将一群机器人放入培养皿中，它们还可以集体工作，四处绕圈移动，将颗粒整齐地堆在一起。

这种现象的原理还不清楚。“有可能细胞以一种我们不知道的方式互相传递信号。”邦加德说。这种可能性以及其他许多问题将成为进一步研究的课题。该团队还在试图了解是什么促使细胞构建出复杂的功能体。莱文表示，这种知识对再生医学极有价值，再生医学的目标就是修复器官以及制造出供移植所用的身体“部件”。

| 迈步向前，生生不息？

不过，要想让xenobot未来能有切实的用武之地，就必须找到一种不那么繁琐的制造方法。目前这种机器人全靠手工制作，由显微外科医生在显微镜下操作微型镊子进行，每制造一个机器人都需要好几个小时。要实现生产自动化，一种可能的方式是采用3D打印技术来叠加所需的各层细胞。

这种新的有机体可能也需要某种形式的升级。例如，目前它们的寿命很短，最多只有两三个星期。这是因为它们完全没有摄取食物的器官。某种意义上这也是件好事，因为缓解了人们对安全的担忧。万一有机器人逃

逸，它也会在有限的时间内寿终正寝，而且它只是用青蛙细胞制成，完全可以生物降解，也没有毒性。但寿命长的机器人会更有价值，因此研究人员正在寻找延长它们寿命的方法。

更具争议性的提议是给xenobot配备生殖系统——或许只需让它们像扁形虫那样将自己一分为二。这对于需要用到一大批这种小生物的应用会有帮助。

不过，这也可能引发对其逃离后在野外繁殖的担忧。邦加德说，尽管应用前景广阔，但这一切都意味着必须与政策制定者合作，共同决定如何监管这些未来生命形式的生产。 ■



Cardiology

The heart's digital twin

How virtual copies of patients' hearts could help doctors diagnose and treat cardiac disease

IF YOU TRAVEL on a modern airliner, the chances are that each of the jet engines powering it will have a virtual copy residing in a computer on the ground. This copy, known as a digital twin, will be updated constantly with information from sensors that measure the engine's performance and check for signs of wear and tear. Digital twins allow engineers to service engines as and when needed, rather than sticking to rigid schedules, and let them carry out preventive maintenance by fixing things before they break. Their use is increasingly common—not only in aerospace, but also in carmaking, construction and factory planning. If an international team of researchers have their way, similar twins will soon keep an eye on another important piece of equipment, the human heart.

Building a digital twin of a patient's heart would first require that person to don a variety of sensors. The data from these would then be turned by specialised software into a computer simulation of the pumping organ. This simulation would show detailed information about how the heart is working, and the way blood is flowing within it. And, in the same way that digital twins in industry are employed by engineers, virtual hearts could be used by doctors to help with their diagnoses and to determine what treatments might be necessary. A twin could then keep track of how a patient responded to those treatments.

| *Heart of the matter*

The idea of creating digital heart-twins comes from a cardiac-research programme called ECHOES, led by Frank Rademakers of University Hospitals Leuven, in Belgium. Several European and American research

groups are involved, including the Universities of Sheffield and Bristol in Britain and, in America, Harvard and Stanford, along with firms such as ANSYS, a computer-simulation company, and GE, which makes jet engines and medical devices.

An important part of ECHOES is the development of miniaturised sensors that will allow people to wear the monitoring equipment throughout their daily lives, rather than just in a clinic or a doctor's surgery, says Tim Chico of the University of Sheffield, who leads the British arm of the project. This will permit heart function to be simulated in a variety of circumstances, including walking, sleeping and climbing stairs, rather than just for the brief period when a patient is undergoing clinical examination. Although some portable cardiac devices are already available—small electrocardiographs worn on a belt, for example, with leads that attach to a patient's chest to trace the rhythm and electrical activity of the heart—these tend to be used for just a couple of days. Digital twins would draw data from a broader suite of sensors, and for longer.

Some of the monitoring could be done by existing or adapted consumer products, such as health apps on smartphones and fitness trackers, adds Dr Chico. Other sensors, with more sophisticated capabilities, are being developed by ECHOES' members. These include a wearable ultrasound scanner which Jan d'hooge and his colleagues at the University of Leuven are working on. An ultrasound scanner is a device that employs high-frequency sound waves to create images of parts of the inside of the body. The idea, says Dr D'hooge, is that both the transmitters which produce the ultrasonic pulses and the receivers which pick up the returning echoes can be woven into textiles used to make items of clothing, such as vests. He is optimistic that it will thus be possible to create garments capable of conducting heart scans, and that these might be washable.

All this would help cardiologists like Dr Chico a lot. It is often hard for

patients to describe their symptoms fully, and hospital tests might not reveal a complete picture—especially as people tend to be under stress when those examinations are carried out. To start with, the data used to model and update a digital heart-twin will be recorded by the collection device and uploaded therefrom at intervals. Eventually, though, it should be possible for them to be transmitted directly to a medical centre, just as data from a jet engine are transmitted to an engineering base.

While wearable heart scanners are several years away, some elements needed to build digital heart-twins are close to deployment. Rod Hose, a former aerospace engineer who is now an expert in medical modelling at the University of Sheffield, led a recent project called EurValve, which developed a system to help doctors treat people with heart-valve disease. EurValve gathered a variety of data about patients' conditions from scans and other hospital tests, and combined these with other information acquired from those patients when they were at home, via health-tracking watches produced by Philips, a Dutch technology group. The EurValve system, which the researchers hope will soon be put into clinical practice, can model the severity of disease and predict the outcome of heart-valve-replacement surgery.

A digital twin of the whole heart will allow simulation of the treatment of a particular individual for many other conditions, as well. That will give a clearer idea, in a particular case, of the likely outcome of an intervention. It might show, for instance, what type of operation is best suited to a patient's condition, or if drugs and regular check ups are more appropriate.

As more and more patients have their heart twins analysed, machine learning, a form of artificial intelligence that is good at pattern recognition, will be used to study the outputs. This should make the system yet more accurate, and help with unusual and rare cases that a cardiologist might not have seen before. Just as pilots can relax knowing that a digital twin is

keeping an eye on their engines, doctors will benefit from a new depth of knowledge about how their patients' hearts are working. ■



心脏病学

心脏的数字孪生体

病患心脏的虚拟副本将帮助医生诊断和治疗心脏病

如果你乘坐现代客机出行，为它提供动力的每个喷气发动机可能都会有一个虚拟副本，驻守在地面上的一台计算机中。这个副本被称作“数字孪生体”，会根据传感器传递的信息不断更新，这些传感器测量发动机的性能，检查磨损的迹象。有了数字孪生体，工程师就不用遵照严格的时间表去检修发动机，而可以在有需要时再维修，还可以做预防性维护，在发生故障前就纠正问题。它们的应用越来越普遍——除航空航天外还用在了汽车制造、建筑和工厂规划等领域。如果一个国际研究小组能如愿以偿，类似的数字孪生体还将很快被用来密切关注另一种重要的“设备”：人类的心脏。

要为患者的心脏创建一个数字孪生体，首先需要让这个人戴上各种各样的传感器。之后，专门的软件会把来自传感器的数据转换成心脏的计算机模拟。这个模拟会详细展示心脏的工作状态以及血液在其中的流动。而且，就像工程师在工业领域对数字孪生体的运用那样，医生或许也可借助虚拟心脏的帮助来做出诊断，并确定哪些治疗可能是必要的。数字孪生体后续还可以跟踪患者对这些治疗手段的反应。

| 问题的核心

创建数字心脏孪生体的想法来自心脏研究项目“回声”（ECHOES），由比利时鲁汶大学医学中心的弗兰克·雷德梅克斯（Frank Rademakers）领导。参与者有欧洲和美国的若干研究小组，包括英国的谢菲尔德大学和布里斯托大学、美国的哈佛大学和斯坦福大学，以及计算机模拟公司ANSYS和喷气发动机及医疗设备制造商通用电气等企业。

谢菲尔德大学的蒂姆·奇科（Tim Chico）负责该项目的英国分支。他说“回声”项目的一个重要内容是开发微型传感器，让人们能在日常生活中始终佩戴监测设备，而不是只在诊所或医生的诊室内佩戴。这样就可以在患

者行走、睡觉和爬楼梯等各种情况下模拟心脏的功能，而不局限于他们接受临床检查的短暂时间内。尽管现在已有一些便携式的心脏检测设备（例如装在腰带上的小型心电图仪，通过贴在患者胸部的导线追踪心律和心脏电活动），它们往往只能使用几天。数字孪生体会从一套更多样的传感器中获取数据，工作的时间也更久。

奇科补充说，部分监测工作可由现有的或改造过的消费产品来完成，比如健身追踪器和智能手机上的健康应用。“回声”项目的成员正在开发其他功能更先进复杂的传感器。其中一种是简·德胡奇（Jan D’hooge）和他在鲁汶大学的同事正在研发的可穿戴超声波扫描仪。超声波扫描仪利用高频声波来生成体内器官的图像。德胡奇说，他们的想法是，也许可以把产生超声波脉冲的发射器和接收回波的接收器织进布料里，再做成衣服，比如背心。他乐观地认为，这样就可能制造出能够进行心脏扫描的服装，而且这些衣服说不定还可以清洗。

这一切将会对奇科这样的心脏病专家大有助益。患者通常难以全面地描述自己的症状，医院的检查也可能无法揭示完整的情况——特别是人们在接受检查时往往会感到紧张。首先，用于模拟和更新心脏数字双胞胎的数据将由采集设备记录，并定期上传。不过最终这些数据应该可以直接传送至医疗中心，就像把喷气发动机的数据传送到工程基地一样。

虽然可穿戴式心脏扫描仪还要几年才能问世，但构建心脏数字孪生体所需的部分元素已经接近部署阶段。曾经是一名航天工程师、现在是谢菲尔德大学的医学建模专家的罗德·霍斯（Rod Hose）近期领导的EurValve项目开发了一个系统，可协助医生治疗心脏瓣膜疾病。EurValve从扫描结果和其他医院测试中收集关于患者病情的多种数据，并将它们与这些患者在家中通过荷兰科技集团飞利浦生产的健康跟踪手表获得的其他信息结合起来。EurValve系统能够对病情严重性建模，并预测心脏瓣膜替换手术的结果。研究人员希望它能很快被应用于临床实践。

此外，通过整个心脏的数字孪生体模拟还可以模拟对特定个体所患的其他多种疾病的治疗。医生将会更清晰地了解在某个病例身上实施某种干预手

段可能产生的结果。例如，数字孪生体也许能显示哪种手术最适合患者的病情，还是说药物和定期检查更合适。

随着越来越多患者的心脏孪生体接受分析，机器学习这种擅长模式识别的人工智能将会被用来研究分析结果。这应该会让这个系统变得更精确，还可以帮助心脏科医生诊治他们也许从没见过的不寻常和罕见病例。飞行员可以放松许多，因为知道有个数字孪生体正盯着引擎。同样，更深入地了解患者心脏的工作状况也会让医生获益。 ■



Hedge funds

The country home of capital

Why the financial elite are moving out of their former haven

IT IS A small town with a big reputation. Greenwich, Connecticut, with a population of 60,000, has long been home to titans of finance and industry. A century ago Edmund C. Converse, the first president of Bankers Trust, Zalmon Gilbert Simmons, a mattress magnate, and two Rockefellers lived there. Among today's residents are Ray Dalio of Bridgewater, the world's most successful hedge fund, and Indra Nooyi, the former boss of Pepsi. It has one of America's greatest concentrations of wealth. As measured by the income of the top 1% of residents, Connecticut is America's richest state. The metro area (Bridgeport-Stamford-Norwalk) and county (Fairfield) containing Greenwich come second and fourth on the same measure.

You might think a decade in which rich Americans became richer would have been kind to Greenwich. Not so. The 2007-08 financial crisis and hedge funds' fading fortunes depleted the state's coffers. In response it raised taxes, triggering an exodus that has lessons for the rest of America about the risks of relying on low taxes to lure wealthy residents. And as Americans cool on small-town living, Greenwich is a reminder that even the most privileged enclave is not immune to national trends.

A century ago Greenwich's selling points included the absence of mosquitoes and malaria. It has always been beautiful, too, with a white-sand beach and verdant surrounding hills—and convenient for New York. The super-rich drawn by such delights built homes to match. In the early 1900s a Rockefeller built a 64-room mansion in the Georgian style. Other residents built replicas of Warwick Castle and the Petit Trianon at Versailles. One had a Tudor cottage dismantled, shipped from Britain and put together again.

But Greenwich would never have become a powerhouse of 20th-century finance without low taxes. Until 1991 Connecticut levied no tax on personal incomes at all. The hedge-fund types attracted to Greenwich propelled its property market to even greater excess. Paul Tudor Jones II, who founded a hedge fund in the town in 1980, modelled his mansion on Thomas Jefferson's Monticello estate—with the addition of a 25-car garage. In 1998 Steven Cohen, the founder of SAC Capital Advisors, bought a house for an unheard-of \$14.8m in cash. In 1999 Eddie Lampert of ESL Investments bought a \$21m beachfront estate, only to tear it down and rebuild it.

Some financiers decided to skip the commute and make Greenwich their business base as well. It was the home of Long-Term Capital Management from its founding in 1994 to its implosion in 1998. By the early 2000s a third of its commercial property was occupied by hedge funds, and rents on Greenwich Avenue rivalled those on Park Avenue.

Then came the crash, which wiped out many fund managers. To plug the hole in state finances, Connecticut increased income taxes three times. It then discovered the truth of the adage “easy come, easy go”. In 2017 Mr Tudor Jones sold his hedge fund's Greenwich campus, trimmed staff and moved to nearby Stamford. Others moved to Florida, which still has no income tax—and no estate tax. Mr Lampert moved his fund and family to Miami in 2012. Most of Wexford Capital's staff moved to Palm Beach in 2014. Mr Tudor Jones now lives in Palm Beach and has an office there.

In the past decade Greenwich has also been at the sharp end of a national trend: as cities have become safer and nicer, Americans have become less keen on mid-sized towns. Its housing mix exacerbates the problem. Today's homebuyers prefer walkable neighbourhoods and are willing to trade space for location. Even the richest have cooled on vast back-country estates.

Leaving Greenwich has therefore often meant accepting a low offer.

Thomas Peterffy, the founder of Interactive Brokers, saw his 80-acre estate languish unsold for years after he left for Florida in 2015. Initially priced at \$65m, it eventually sold for \$21m. “You can’t give away a house in Greenwich,” Barry Sternlicht of Starwood Capital complained—somewhat hyperbolically—when he moved to Florida in 2016.

Between 2015 and 2016 Connecticut lost more than 20,000 residents—including 2,050 earning more than \$200,000 per year. The state’s taxable-income base shrank by 1.6% as a result, according to Marc Fitch at the Yankee Institute for Public Policy, a conservative think-tank. Its higher income taxes have bitten harder since 2018, when President Donald Trump limited state and local tax deductions from income taxable at the federal level to \$10,000 a year.

Greenwich offers two lessons for policymakers to ponder. The first is that low taxes can help create a business hub that, once established, survives when they are raised. It is still home to enough hedge funds that their clients visit frequently—a good enough reason for hedge funds to be in town. Of the \$3.6trn-worth of capital managed by hedge funds globally, \$340bn is managed in and around Greenwich.

The town’s industry grandees are trying to amplify these network effects. Bruce McGuire, the president of the Connecticut Hedge Fund Association, helped launch the Greenwich Economic Forum in 2018. Among the speakers were Mr Dalio, Mr Tudor Jones and Mohamed El Erian, a former chief executive of PIMCO. Last year’s event drew investors representing more than \$5trn-worth of capital.

Indeed, Greenwich has become a commuter destination in its own right. In 2018 the number of inward commuters started to exceed those commuting out. AQR Capital Management, which manages \$185bn in assets, employs many of them. Take the Metro-North from Grand Central and you cannot

miss its offices—a vast black glass box that looms over the tracks.

But the second policy lesson is that low taxes cut both ways. Some of those who found it easy to move in will also find it easy to move on. If Florida ever needs to raise taxes, it may find the same.

| *Greenwich and pleasant land*

Meanwhile, Greenwich's non-fiscal charms remain. "It is a wonderful place to live and raise a family," says Mr Dalio. In 2018 house prices stabilised in many neighbourhoods, and transactions started to pick up. Last November Tom Brady, an American footballer, and his wife, Gisele Bündchen, a Brazilian supermodel, bought a house there. Hedge funds' heyday may be over, but their country home lives on. ■



对冲基金

资本的乡村之家

为什么金融精英们正在搬离昔日的避风港

康涅狄格州的格林威治虽然只是个六万人口的小镇，却声名在外。长期以来这里都是金融和实业巨头的聚居地。一个世纪以前，信孚银行（Bankers Trust）的首任总裁埃德蒙·康弗斯（Edmund C. Converse）、床垫大王扎尔蒙·吉尔伯特·席梦思（Zalmon Gilbert Simmons）和两名洛克菲勒家族的成员都曾居住于此。如今这里的住户包括世界最成功的对冲基金公司桥水（Bridgewater）的雷伊·达利欧（Ray Dalio）和百事的前老板卢英德（Indra Nooyi）。这里是美国财富集中度最高的地方之一。如果以排名前1%的居民收入来衡量，康涅狄格州是美国最富有的州。以同样的标准衡量，格林威治所在的布里奇波特-斯坦福德-诺沃克和费尔菲尔德则分别是美国第二富有的都会区和第四富有的县。

你可能以为，美国富人变得更富的十年对格林威治来说应该是件好事。并非如此。2007到2008年的金融危机以及对冲基金公司的财富缩水导致康州的财政枯竭。州政府于是提高了税收，引发大批人员外流。这给美国其他地区上了一课，即靠低税收来吸引富人定居是有风险的。随着美国人不再那么向往小镇生活，格林威治的经历也提醒人们，在全国性的趋势面前，即使是最优越的飞地也难以幸免。

一个世纪前，格林威治的卖点之一是没有蚊子和疟疾。这里的风景一贯优美——沙滩洁白，青山环绕。从这里去纽约也很方便。被这些亮点吸引而来的超级富豪们建造了与美景交相映衬的住宅。20世纪初，洛克菲勒家族的一位成员建造了一座有64个房间的乔治亚风格的宅邸。其他住户建造的房屋中，有的仿照英国华威城堡（Warwick Castle），有的仿照凡尔赛宫苑的小特里阿农宫（Petit Trianon）。还有一座都铎式的小别墅是在英国拆卸后运到这里重新组装起来的。

但如果没有低税收，格林威治永远不会成为20世纪的金融重镇。在1991年

之前，康州完全没有个人所得税。被吸引到格林威治的对冲基金人员进一步推高了当地房地产市场的泡沫。1980年，保罗·都铎·琼斯二世（Paul Tudor Jones II）在这里创办了一家对冲基金公司，他模仿托马斯·杰斐逊的蒙蒂塞洛庄园（Monticello）建造了自己的宅邸——还多了一个可停放25辆汽车的车库。1998年，SAC资本顾问公司（SAC Capital Advisors）的创始人史蒂文·科恩（Steven Cohen）以空前的1480万美元现金买下了这里的一栋房屋。1999年，ESL投资公司（ESL Investments）的埃迪·兰伯特（Eddie Lampert）花2100万美元买下一处滨海宅邸，结果竟把它拆掉重建。

一些金融家为免于通勤之苦，把自己的业务总部也设在了格林威治。长期资本管理公司（Long-Term Capital Management）从1994年成立到1998年崩塌，一直将总部设在这里。到本世纪初，格林威治三分之一的商业地产都为对冲基金公司所用，格林威治大道的租金与纽约公园大道（Park Avenue）不相上下。

然后金融危机来了，许多基金经理丢了工作。为填补财政缺口，康州三次上调了所得税。“来得容易去得快”这句谚语随即在康州得到了印证。2017年，都铎·琼斯卖掉了他的对冲基金公司在格林威治的房产，裁减员工，搬到了附近的斯坦福德（Stamford）。也有人搬去了仍然没有所得税和遗产税的佛罗里达州。2012年，兰伯特把公司和家迁至迈阿密。2014年，韦克斯福德资本（Wexford Capital）的大部分员工都搬到了佛罗里达州的棕榈滩（Palm Beach）。都铎·琼斯现在住在棕榈滩，并在那里设立了办公室。

过去十年，格林威治还受到一股全国性趋势的迎头冲击：随着城市变得更安全和宜居，美国人已不再那么热衷于中型城镇。格林威治不同收入阶层混居的模式也加剧了这一问题。如今购房者更喜欢适于步行的街区，宁愿空间小一点，也要位置好一些。就连首富们也对位置偏远的大宅失去了兴趣。

如此一来，搬离格林威治常常意味着要低价卖掉房屋。盈透证券

（Interactive Brokers）的创始人托马斯·彼得菲（Thomas Peterffy）2015年搬去了佛罗里达，那之后的好几年里他在格林威治占地80英亩的房产都无人问津。起初开价6500万美元，最后以2100万美元卖出。喜达屋资本（Starwood Capital）的巴里·史特里克（Barry Sternlicht）2016年搬到佛罗里达时不无夸张地抱怨道：“在格林威治，房子白送都没人要。”

从2015年到2016年，从康州搬走的居民超过两万人，其中有2050人年收入超过20万美元。保守派智库扬基公共政策研究所（Yankee Institute for Public Policy）的马克·费奇（Marc Fitch）表示，受此影响，康州应税收入的税基缩减了1.6%。自2018年起，特朗普将联邦所得税应税收入中州和地方所得税的抵扣上限设定为每年一万美元，康州高所得税的不良影响就更大了。

格林威治为政策制定者提供了两个值得深思的启示。其一，低税收有助于创建一个商业中心，这个商业中心一旦建立，即使税收提高也能维持下来。格林威治仍然有很多对冲基金公司，吸引它们的客户频频造访——这足以让对冲基金公司落户于此。全球对冲基金公司管理的3.6万亿美元的资本中，有3400亿美元由在格林威治及其周边地区的基金管理。

格林威治的行业巨头正试图扩大这些网络效应。2018年，康州对冲基金协会（Connecticut Hedge Fund Association）主席布鲁斯·麦奎尔（Bruce McGuire）帮助发起了格林威治经济论坛（Greenwich Economic Forum）。演讲者包括达利欧、都铎·琼斯，以及太平洋投资管理公司（PIMCO）的前CEO穆罕默德·埃尔·埃里安（Mohamed El Erian）。去年论坛吸引来的投资者管理着超过五万亿美元的资本。

事实上，格林威治已经凭借其自身特质成为了通勤者的目的地。2018年，到这里上班的人开始超过去外面上班的人。他们当中有很多就职于管理着1850亿美元资产的AQR资本管理公司（AQR Capital Management）。从纽约中央车站搭乘大都会北方铁路（Metro-North）的火车，你不会错过这家公司的办公楼——铁路旁赫然耸立的一个巨大的黑色玻璃盒。

但第二个政策启示是低税收是把双刃剑。一些公司发现搬来容易，搬走也不难。如果佛罗里达哪天真需要增税，可能会面临同样的后果。

| 格林威治，宜居之地

与此同时，格林威治与财政无关的魅力依然留存。“这是个生活和居家的好地方。”达利欧说。2018年，许多街区的房价趋于稳定，交易量开始回升。去年11月，美国橄榄球运动员汤姆·布雷迪（Tom Brady）和妻子、巴西超模吉赛尔·邦辰（Gisele Bündchen）在此买下一栋房屋。对冲基金公司的鼎盛期可能已经过去，但它们的乡村之家继续存在。■



The post-virus economy

Back to work

But not back to normal

IN GOOD TIMES Gu Changshi's job is to persuade companies to invest in Lingang, a wind-swept free-trade zone on the edge of Shanghai, abutting the Pacific Ocean. But over the past two months, as China has battled covid-19, his job has been to ensure basic survival, both physical and corporate. First his agency requisitioned two hotels to quarantine anyone coming to Lingang from virus-hit regions. Then it started offering conditional cash grants to beleaguered companies located there. "There is no fixed limit to the subsidies," he says, his hands spreading wide.

When China went into lockdown in late January, economists thought that its growth trajectory would be V-shaped. There would be a sharp slowdown, followed by a swift rebound as soon as the virus was under control, as happened with China's outbreak of SARS in 2003. They were right about the slowdown. Hundreds of millions of people stayed inside for weeks on end. Factories, offices, restaurants and shops closed, in scenes now being replayed around the world. Most analysts think that China's economy shrank in the first three months of 2020, perhaps by as much as 10%. The last time it contracted was more than four decades ago, at the end of the Cultural Revolution, according to official data.

The prediction of a quick, strong recovery is more debatable. With barely any new cases of covid-19 now being detected, the government is trying to restore normal life. At four separate meetings of the ruling Politburo since late February, leaders have declared that they want to restart the economy. But doing so is far from simple when the pandemic is still raging elsewhere.

Reviving growth involves boosting both supply and demand. Officials schooled in Marxist theory, which emphasises production rather than consumption, have naturally turned first to the former, ie, to ensuring that goods are made. The main problem has been a dearth of blue-collar workers, many of whom went to their hometowns for the spring festival just before the lockdown and have not yet returned. Production hubs along the coast have chartered trains and buses to bring them back.

Officials boast that things are almost normal again. Fully 98% of all listed companies have resumed work, says the securities regulator. Around the country 89% of big investment projects, from airport expansions to the laying of gas pipelines, are also under way, according to a planning commission. “Roaring Chinese factories in full swing”, Xinhua, a state news agency, proclaimed on March 21st.

The reality is less exuberant. When any measure becomes an official target, it is susceptible to distortion—a phenomenon known as Goodhart’s law. It has been amply demonstrated in China over the years. In this case an obsession with the “work resumption rate” has invited fiddling. Some low-level officials have told firms to embellish their recoveries, reports *Caixin*, a magazine. To prevent such trickery, the central authorities started checking electricity data. The logical next step? Some companies were told to consume more power by turning on idle equipment.

Measures aimed at preventing another surge of covid-19 have added to the complexities of manufacturing in China. The German manager of an optical-wire factory in Jiangsu province has divided his workers into ten separate units to minimise the risk of cross-infections. The units are kept apart from each other in the factory, the canteen and their dormitories. Such measures are necessary but cumbersome, he says. Firms are also wary of sending staff around the country because some places still impose 14-day quarantines on outsiders. Travel between cities, whether by plane,

train or car, is at less than half its normal level (see lower chart). Video calls only help so much when a creaking furnace needs fixing.

Nevertheless, on the supply side, the overall picture is encouraging. Large companies report that they are fully operational. Foxconn, which makes most of Apple's iPhones in China, has said that it will resume normal production by the end of March. Even many smaller companies are in good shape. Sean Xie, the general manager in China of Lenze, a German automation company, says that all 260 of its employees had returned to its factory in Shanghai as of March 20th, apart from a couple still stuck in Wuhan, the centre of the outbreak of covid-19 (Wuhan plans to lift its lockdown on April 8th).

Resuscitating demand is proving more difficult. It involves two things that are harder for the government to manage: global growth and public anxiety about the disease. Officials had hoped that factories, once up and running, would be able to tap into strong demand abroad. The relentless march of the virus around the world has put paid to that. "All the wheels started spinning very quickly here, but the orders aren't there," says a chemicals executive who oversees a factory in the city of Wuxi.

China can take some solace in the fact that it relies less on exports than it did during the global financial crisis of 2007-09. But domestic consumption is now far more central to the economy than exports ever were, and it is much curtailed. Retail sales plunged, unsurprisingly, when just about everyone was cooped up at home. People now can move more freely, but many still avoid large crowds. Shops and restaurants are quiet. Covid-19 has cut people's incomes, so few seem willing to splurge yet on big-ticket items. Queues outside Apple stores—open in China but closed everywhere else—are deceptive. Apple strictly limits the number of customers to ensure a safe distance between them.

A good proxy for the state of consumption in China is urban traffic. Some thus welcome the return of traffic jams: congestion has reached about 90% of its normal level (see chart). But a closer look is less comforting. Some people who used to take subways to work are using cars instead, to limit contact with others. Passenger numbers on subways are down by roughly two-thirds in big cities. Unusually, there is no road congestion at the weekend. The occupancy rate of a posh international hotel chain is in the single digits, says the company's boss in China. Bao Wenjun, who owns a restaurant in Shanghai selling cheap and tasty noodles, says that his revenues are down by nearly three-quarters.

| *Hey small spender*

For consumption to recover, people must feel confident. They do not. Most provinces have reduced their emergency-alert levels. Even Hubei, the worst-hit, has started to let people (other than residents of Wuhan, the capital) travel elsewhere. But anxiety abounds. Except in a few remote regions, schools are into their second month of closure. Only about 500 of the country's 11,000 cinemas have re-opened. The government has tightened border controls because many travellers—723 at last count—have tested positive for the virus after arriving from abroad.

In the past China has often been quick to unleash stimulus measures to counteract economic slowdowns. Its spending splurge in response to the global financial crisis was crucial to the world's recovery. This time China has been uncharacteristically restrained. Britain has pledged to make loans to firms worth 15% of GDP and America is working on a support package worth nearly 10% of its output. But China's fiscal measures—mainly tax and fee cuts—so far add up to little more than 1% of its GDP. Whereas America has slashed its interest rates to zero, China has barely trimmed its own.

What explains the frugality? One reason is that China has no need to

replicate some of the other countries' actions. Take the struggling airline industry. The American programme includes \$58bn in aid for it. Britain may take direct stakes in its airlines. The Chinese government already owns the country's biggest airlines. State-owned firms account for about three-quarters of corporate debt in China. The government need not spell out that it stands behind them. Investors know that. Whereas corporate-bond prices have fallen sharply in the West—reflecting concerns about firms' solvency—they have only inched down in China. In the Lingang free-trade zone, Mr Gu goes out of his way to note that the official subsidies are mainly aimed at private businesses, which have a harder time obtaining loans than state firms do.

For officials the most worrying trend is a sharp rise in joblessness. The unemployment rate in urban areas jumped nearly a full percentage point to 6.2% in February, the highest on record. And this rate fails to capture the tens of millions of migrants who are still in their hometowns, waiting for the economy to perk up before returning to cities for work. So the government is cautiously rolling out some stimulus. On March 20th it pledged to increase financial support for the unemployed.

More help may be on the way. The government has given provinces more leeway to raise funds for such things as infrastructure and buildings. Spending of this kind has been a cornerstone of China's past stimulus packages. But now it is proceeding gingerly. It fears that unleashing more of it could push up debt levels, which are already dangerously high. Most crucially, for all their talk about restarting the economy, China's leaders are wary of letting growth rip until they are certain that a boom in business will not also bring a resurgence of covid-19. "We want to reduce risk to the absolute minimum and will not count the cost of that," says Mr Gu. The economic rebound can wait. ■



病毒后经济

复工

但并未复常【新冠报道】

年景好的时候，顾长石的工作是说服各种企业投资临港，这个海风吹拂的自由贸易区位于上海的边缘，毗邻太平洋。但过去的两个月中，中国一直在抗击新冠肺炎，他的任务变成了保证人员和公司的基本生存。他任职的机构先是征用了两家酒店，用于隔离任何从疫区来到临港的人，然后开始向自贸区内陷入困境的公司提供有条件的现金补助。“补贴没有固定的限额。”他张开双手比划着说。

当中国在1月下旬进入封锁状态时，经济学家认为其增长轨迹将呈V字形。先是会急剧放缓，一旦病毒得到控制便会迅速反弹，就像2003年SARS在中国爆发时那样。放缓的部分他们是说对了。几亿人在家里一待就是好几个星期。工厂、办公室、餐馆和商店都关门了，这些景象目前正在世界各地重演。多数分析师认为中国的经济在2020年前三个月萎缩，幅度或许高达10%。根据官方数据，上一次收缩还是在40多年前文化大革命结束时。

关于迅速、强劲的复苏的预测则更具争议性。由于几乎没有发现任何新冠肺炎的新发病例，政府正试图让生活恢复正常。自2月下旬以来，领导人已经在四次政治局会议上宣布希望重启经济，但当大流行病仍在其他地方肆虐时，要做到这一点绝非易事。

恢复增长既要增加供应又要提振需求。马克思主义理论学派的官员强调生产而不是消费，自然会先考虑前者，即确保商品被生产出来。主要问题是缺少蓝领工人，其中许多人在封锁之前回老家过年，还没有返工。沿海的生产中心包下火车和大巴把他们带回来。

官员们夸口说一切几乎又恢复正常了。证券监管机构说，所有上市公司中有98%已经复工。一个计划委员会称，从机场扩建到天然气管道铺设，全国89%的大型投资项目都已开工。国家通讯社新华社3月21日宣称“机器轰

鸣的中国工厂全力开工”。

现实并没有那么生机勃勃。任何措施一旦成为官方目标，就很容易发生扭曲，这种现象被称为古德哈特定律。多年来，这种现象在中国得到了充分展现。在眼下这个例子里，对“复工率”的痴迷诱使人们做了手脚。据《财新》杂志报道，一些地方官员已要求企业粉饰复工率。为防范这种伎俩，中央开始检查用电数据。合理的下一步是什么？有些企业被告知让设备空转来消耗更多电。

预防新冠肺炎卷土重来的措施让中国制造业的重启愈发复杂。江苏省一家光缆厂的德国经理将他的工人分为十个独立的分队，以最大程度地减少交叉感染的风险。这些分队在工厂、食堂及宿舍都是相互隔开的。他说，这些措施是必要的，但十分繁琐。企业对于把员工派往全国各地也心存警惕，因为某些地方仍然对外来者实行14天隔离。不论是乘飞机、火车还是汽车，城市间通行量仍不到正常水平的一半（见下图）。如果有一个吱嘎作响的暖炉需要修理，视频通话的作用有限。

尽管如此，在供给方面，总体情况还是令人鼓舞的。大企业报告说它们已经全面投入运营。在中国生产了大部分苹果iPhone的富士康表示将在3月底前恢复正常生产。甚至许多小公司也状况良好。德国自动化公司伦茨（Lenze）的中国区总经理谢卫东表示，截至3月20日，除了一对夫妇仍留在新冠肺炎疫情中心武汉（武汉计划于4月8日解除封锁）外，该公司的260名员工已全部返回上海工厂。

事实证明需求的复苏更加困难。这涉及到政府更难管理的两件事：全球经济增长，以及公众对疾病的忧虑。官员们曾希望工厂一旦复工，便能够抓住国外强劲的需求。但病毒在世界各地的狂飙猛进让这种希望破灭了。无锡市一家工厂的一位化学品主管说，“这里的一切都迅速开始运转，但是没有订单。”

中国可以稍感慰藉的是，与2007到2009年全球金融危机时相比，它对出口的依赖已经减少。但如今国内消费对经济的重要性远远超过任何时期的

出口，而这一块大幅收缩。毫不意外，当几乎每个人都被困在家里时，零售额急剧下跌。人们现在可以自由行动，但许多人仍然避开人群。商店和餐馆门可罗雀。新冠肺炎减少了人们的收入，所以似乎还很少有人愿意在大件上一掷千金。苹果门店（在中国开张但在其他地方都关闭）外排队等候的队伍具有欺骗性。苹果严格限制店内顾客人数，以确保人与人之间的安全距离。

城市交通是中国消费状况的一个好指标，因此一些人很高兴交通又开始拥挤：道路拥堵已达到正常水平的约90%（见图表）。但仔细观察一下就没有这么乐观了。一些本来坐地铁通勤的人改用汽车，以减少与他人接触。在大城市中，地铁上的乘客人数大约少了三分之二。和往常不同的是，周末路上一点都不堵。一家豪华国际连锁酒店的中国区老板说，入住率是个位数。包文军（音译）在上海开着一家价廉味美的面馆，他说自己的收入下降了近四分之三。

| 嘿，小气鬼

消费要恢复，人们必须有信心。但他们没有。大多数省份都已经降低了紧急响应的等级。即使是受灾最严重的湖北也开始允许人们（省会武汉的居民除外）去外地。但焦虑非常普遍。除少数偏远地区外，学校已进入停课的第二个月。全国11,000家电影院中只有大约500家重新开放。政府加强了边境管制，因为许多旅客（最新统计为累计723名）从国外入境后病毒检测呈阳性。

中国过去常常迅速采取刺激措施来应对经济放缓，其为全球金融危机投入的巨额资金对世界的复苏至关重要。但这一次，中国一反常态地表现克制。英国承诺向企业贷款的额度占到了GDP的15%，而美国正在制定占GDP近10%的一揽子支持计划。但到目前为止，中国的财政措施（主要是税费减免）加起来仅占GDP的1%。美国已将利率大幅削减至零，而中国几乎没有降息。

如此节俭又是为何？原因之一是中国无需复制其他国家的某些举措。以陷入困境的航空业为例，美国的计划包括580亿美元针对该行业的援助，而

英国可能会直接持有其航空公司的股份。中国政府已经拥有该国最大的航空公司。国有企业约占中国公司债务的四分之三。政府无需清楚说明自己站在它们背后，投资者知道这一点。西方国家的公司债券价格骤降（反映出对企业偿付能力的担忧），而在中国只是稍有下跌。在临港自由贸易区，顾长石特别强调官方补贴主要针对私营企业，它们比国有企业更难获得贷款。

对于官员而言，最令人担忧的趋势是失业率急剧上升。2月，城市地区的失业率跃升了近一个百分点，至6.2%，创历史新高。而这尚未统计数千万仍然滞留家乡，等待经济回升之后返城工作的流动人口。因此，政府正在谨慎地推出一些刺激措施。3月20日，它承诺增加对失业者的经济援助。

可能还会有更多救助措施出台。政府已经给了各省更多的余地来筹集资金，用于基础设施和建筑等。此类支出过去一直是中国经济刺激方案的基石。但现在它小心翼翼地推进，担心进一步释放这类支出会推高已经相当危险的债务水平。最重要的是，尽管把重启经济挂在嘴边，中国领导人对于尽快促进经济增长态度谨慎，直到他们确信商业繁荣不会同时带来疫情反弹。“我们希望将风险降到绝对最低，不计代价。”顾长石说。经济复苏还可以等。■



Buttonwood

Capitulation

A fictional fund manager on the agonies of stock-picking in a falling market

I SUSPECT THAT this not a common feeling, but part of me is excited about the crash in stock prices. It is the part of me with a personal-account portfolio. I have long-term financial goals. I want to hold equity risk, even as others run from it. If I can buy streams of cash flows at lower prices, I am happy. But another part of me, the professional who invests on behalf of others, is anxious. I try to fuse these two selves. It is not easy.

In my lifetime there have been three bear markets in which the value of shares in aggregate has fallen by half. Perhaps this episode will be as bad—or worse. I don't know. I can say this, though. For a long-term investor who doesn't have to worry about perfect timing, there should be opportunities to buy good stocks at attractive prices. As a private investor, I can wait for risky bets eventually to pay off. My clients may not be so patient.

Nobody knows how this pandemic will play out. Lots of people claim to know, of course. A few of them will be right, by luck or judgment. That's a matter for the scientists and for economists, too. The biggest insight I have gleaned from economics is that asset prices are set at the margin. The stock price on the screen is the one at which the most desperate seller and the bravest buyer are willing to do business. When the ranks of the first group overwhelm the second, the result is a rout—or capitulation, in market-speak.

Every recession is unique. This one has the impact of a natural disaster or a nuclear accident. But every recession is also the same. You can never be sure how deep it will be, how long it will last and what scars it will leave.

China has just experienced its sharpest downturn in a century. That is scary. But 2008 was scary. The dotcom bust was scary. I was a baby in 1974, but my old boss tells me that was scary. True, this is a different kind of scary. I call my parents every day to check how they are. I didn't do that in 2008. (I wasn't trading stocks in pyjamas on a weekday either.) This could be a savage recession. But it will be like other recessions in that there will be a recovery.

In the meantime, stock prices can keep falling. I understand why people are selling. A lot are forced to. They may have borrowed to buy stocks and had their loans called by nervous lenders. Fund managers that promised low volatility must cut their equity risk. But capitulation is more than this. It is the dumping of stocks that have already fallen a long way. Retail investors are prone to it. But why would any professional do it? Well, sometimes you sell your duds so you don't have to talk about them anymore—to the firm's risk manager or to your clients. Owning a stock that goes to zero is too horrible to contemplate. So you sell. And sometimes you sell things that as a private investor you would hold onto or double-down on. Clients want you to take risk. But they don't like what risk-taking looks like when it doesn't work. Try explaining, after the fact, why you bought a stock two weeks before the firm went bankrupt, because you judged that, should it survive or be rescued, you stood to make ten times your money.

I am lucky. I have been in the top-quartile of stockpickers. So I have earned the trust to make risky bets in a falling market. A good portfolio in a recession is not necessarily a good portfolio for when the economy recovers. I know that at some point I am going to have to change tack. I would have to be a genius to time this shift perfectly. And I am not a genius. The best I can hope for is not to get it too badly wrong.

My instinct is to be contrarian, to buy what others now hate. Some industries, such as oil, are outside my comfort zone. The politics of OPEC

are too messy for me to fathom. But I have an eye on mining companies with attractive dividend yields and low debt. If China's economy rebounds, they will benefit. And, yes, I am absolutely looking at airlines. A national champion or two is bound to be saved. In the right situation, I might make a lot of money for clients. Dislocation on this scale will take out the weaker players in every industry. The best companies will emerge even stronger. I hope I pick the right ones.

There will come a time when the market surveys the whole panorama—bad businesses cleared out; interest rates even lower; fiscal policy in the pipeline; cheaper stocks—and changes direction. I have to be ready for that. The S&P 500 is America's capital stock. It will survive (or most of it will). People will want to fly, stay in hotels and go to restaurants and coffee bars again. I have to keep that in mind always. I feel queasy. But this is the game I have chosen to be in. ■



梧桐

投降式抛售

来听一听我们虚构的一位基金经理讲述在下行的市场中选股的苦恼【新冠报道】

我猜这种感受不是很普遍，但股票价格暴跌让我感到兴奋。兴奋的是有个人账户投资组合的那个我。我有长期的财务目标。别人都在抛售股票逃避风险，而我还是想持有。如果能以较低的价格获得滚滚现金流，我就很开心。但另一个我——帮别人投资的那个专业人士——就很焦虑。我试着融合这两个我，但这并不容易。

股票总价值跌去一半的熊市我这辈子遇到过三次。这一次也许会同样糟糕，甚至更糟。我也不知道。但我可以承认我不知道。对于一个不需要操心完美时机的长期投资者来说，应该有机会以诱人的价格买进好股票。作为一名私人投资者，我可以等着高风险的押注最终获得回报。而我的客户可能没这个耐心。

没有人知道这场大流行病将如何结束。当然，很多人说自己知道。他们中的少数人会是对的，靠运气，或者靠判断力。这是科学家的问题，也是经济学家的问题。我从经济学中获得的最大洞见是，资产价格是由边际决定的。屏幕上的股票价格是最绝望的卖家和最勇敢的买家愿意交易的价格。当第一类人的数量压过第二类人时，就出现了崩溃，用市场行话说就是投降式抛售。

每次衰退都是独一无二的。这一次的影响堪比自然灾害或核事故。但每次衰退又都是一样的。你永远不知道它会有多严重，持续多久，留下怎样的伤疤。中国刚刚经历了一个世纪以来最严重的经济衰退。这很可怕。但2008年也很可怕。互联网泡沫破裂也很可怕。1974年时我还是个婴儿，但据我的老上司说那时候也很可怕。的确，这次的可怕不一样。我每天都给我父母打电话问他们好不好，2008年时我可没这么做。（那时候我也没在工作日穿着睡衣交易股票。）这可能会是一次非常严重的衰退。但和其他衰退一样，总会有复苏的一天。

与此同时，股价可能会继续下跌。我理解人们为何抛售。很多人是被迫的。他们可能是借钱买股票，然后被紧张兮兮的贷方追债。承诺低波动性的基金经理必须降低股票风险。但投降式抛售不止如此。投降式抛售是抛掉已经跌了很长一阵子的股票。散户往往会这么做。但为什么还有专业人士也这样呢？这个嘛，有时候你把手上亏损的股票卖了，就不必再跟公司的风险经理或你的客户谈论它们了。持有一只跌至零的股票太可怕了，想都不敢想。所以就卖了。而有时候卖掉的股票是你作为散户会持有甚至加倍下注的。客户希望你冒险，但冒险不成功时，他们就不喜欢了。你想想，事后该怎么解释你在某家公司破产前两周买了它家的股票，因为你判定要是它能撑下来或被救，就可以赚十倍的钱。

我挺幸运。我一直是排在前四分之一的股票高手。所以我赢得了信任，能在市场下跌时做高风险押注。经济衰退时表现好的投资组合在经济复苏时不一定好。我知道到某个时刻我必须改变策略。我得是个天才才能完美地把握转向的时机。而我不是天才。我能期望的最好结果就是别弄得太糟。

我的直觉是反向操作，买别人现在讨厌的股票。有些行业在我的舒适区之外，比如石油。欧佩克的勾心斗角太混乱了，我理解不了。但我在留意股息收益率诱人、债务较低的矿业公司。如果中国经济反弹，它们会从中受益。还有，没错，我绝对会考虑航空公司。一两家国家龙头航空公司肯定会被保下来。条件合适时，我说不定能给客户赚不少钱。这么大规模的混乱会让每个行业的弱者出局。最好的公司会更加强大。希望我能选对。

总有一天，市场会纵览全局，看到糟糕的企业被清理出局、利率甚至更低了、财政政策正在酝酿，有更便宜的股票。然后市场就会改变方向。我必须为此做好准备。标普500指数公司是美国的股本，它们会存活下来（或者其中大部分会）。人们还是会想要坐飞机、住酒店、下馆子、泡咖啡厅。我必须时刻牢记这一点。我有点心神不宁。但这是我选择参与的游戏。■



Air transport

Flight risk

Most airlines are running on empty

NO INDUSTRY HAS been more battered by covid-19 than air transport. With people wary of confined spaces—and country after country imposing travel bans—passenger numbers have nosedived, and with them airline revenues. The estimate of \$113bn in lost sales, which the International Air Transport Association (IATA) made on March 5th, already looks rosy. The trade body says that the world's carriers may need \$200bn in state aid to stay aloft.

Plenty were stalling before the pandemic. Of the 120 airline companies ranked by IATA only around 30 made money in 2017 and 2018. Last year the biggest half-dozen in Europe earned the bulk of the \$7bn in profits there, calculates Citigroup, a bank. Many firms had borrowed heavily to buy planes which the virus has grounded. The 90-odd that are in the red have on average six times as much net debt (adjusted for aircraft leases) as EBITDAR (a measure of airline profits). In January the typical carrier had enough cash to cover between 50% and 80% of short-term liabilities and about two months of revenues, IATA says (see chart). Three-quarters could not cover costs beyond three months—if that.

Big companies have secured generous credit lines from banks. IAG, which owns British Airways, can tap €1.9bn (\$2.1bn) in revolving credit. EasyJet, a British low-cost carrier, has \$500m available. Most firms, especially in Europe and Asia, nevertheless have no choice but to cut flights and sack staff. Cancellations in America are a bit less savage while planes are still permitted to crisscross its air space; Southwest has cut just one in five flights. If revenues fall by 35% in 2020, Delta, Southwest and United should end the year with “adequate” liquidity, says JPMorgan Chase, another bank—as long as demand begins to bounce back.

China offers hope that it might. The first to be infected, its airlines are lifting off again. In mid-February capacity was down by 71% compared with a year ago, says OAG, a data firm. In the first week of March it was 43% lower, as people returned to the skies lured by cheap fares. Combined with government handouts to carriers, which are mostly state-owned, this may tide them over. Airline bosses elsewhere are banking on similar luck—and largesse. ■



航空运输

飞行风险

大多数航空公司都快没油了【新冠报道】

在所有行业中，航空运输业受新冠肺炎的打击最重。人们担心密闭空间不安全，再加上一个又一个国家先后实施旅行禁令，旅客人数急转直下，航空公司的收入也随之俯冲。国际航空运输协会（IATA）3月5日估计销售损失达1130亿美元，现在看来已是过于乐观。IATA表示，全球的航空公司可能需要2000亿美元的国家援助才能维持下去。

很多航空公司在遭遇这场大流行病之前就已经失速。2017年和2018年，在IATA给120家航空公司的排名中，只有约30家公司盈利。花旗银行估计，去年欧洲的航空公司总利润为70亿美元，其中最大的六家占了大头。许多公司大量借钱购置飞机，结果却因病毒而停飞。IATA排名中处于亏损的90多家公司的净债务（经飞机租赁费调整后）平均是EBITDAR（税息折旧摊销及租金前利润，一项衡量航空公司利润的标准）的六倍。IATA表示，在1月时，一般航空公司有足够的现金来偿付短期债务的50%至80%，现金流量约为两个月的收入（见图表）；四分之三的公司没有足够的现金支付三个月以上的成本——如果它们能撑那么久的话。

大公司已经从银行获得了慷慨的信贷额度。拥有英国航空公司的国际航空集团（IAG）可以动用19亿欧元（21亿美元）的循环信贷。英国廉价航空公司易捷（EasyJet）有5亿美元的信贷可用。但大多数航空公司，尤其是欧洲和亚洲的公司，除了削减航班和裁员外别无选择。美国没有完全禁飞国内国际航班，航班取消的情况没有那么惨烈。西南航空仅停飞了五分之一的航班。另一家银行摩根大通表示，如果达美航空、西南航空和美联航2020年收入下降35%，那么到年底它们还将有“充足”的流动性——只要需求开始反弹。

中国的情况带来了反弹的希望。在最先受到“感染”之后，中国的航空公司又开始起飞。数据公司OAG表示，2月中旬中国的航空业运力同比下降了

71%。3月第一周，受低廉票价的吸引，乘坐飞机的人数开始增加，运力同比降幅43%。加上政府向大多属国有的航空公司提供援助，也许能让它们渡过难关。其他地方的航空公司老板们也都指望有同样的运气和慷慨的救助。 ■



Bartleby

Embracing the suck

Managers earn their money in a crisis

WHEN THINGS are going well, it is pretty easy being a business leader. The economy is booming, orders are rolling in and there are no tricky decisions to make about staff or budgets. It is still possible to screw things up, but a rising tide tends to lift all yachts.

It is in a crisis that corporate helmsmen show their mettle. Employees will be uncertain and will look to the leader for direction. Sometimes, as with the covid-19 pandemic, the problem will be something few bosses can reasonably have anticipated. Now they are expected to chart a steady course in days.

In the political arena the obvious examples of successful crisis leadership are Franklin Roosevelt and Winston Churchill. Both were somewhat erratic decision-makers. But they made up for it by being excellent communicators. Their styles diverged, but the public had little difficulty in understanding their core message. Roosevelt made clear that he was willing to try any combination of new ideas in an attempt to end the depression; Churchill was unambiguous about the need for Britain to resist Nazi Germany, whatever the cost.

Corporate leaders should resist the temptation to give Churchillian speeches. But they have something to learn from the calm authority of Roosevelt's "fireside chats". As chief executive you have to communicate a message to two different audiences: your workforce and your customers. That message should demonstrate that the company has a plan to deal with the virus. This may involve staff working from home (to prevent the spread of infection) or changes in the supply chain (to maintain production). Both

staff and customers will also need reassuring that the company has sufficient financial resources to survive the economic downturn.

Jefferies, an investment bank, has just provided a fine example. In a joint letter, the chief executive, Rich Handler, and the president, Brian Friedman, stressed that “topmost on our minds is the safety of our employees and our clients” before adding that the firm “is flush with capital at both the operating business level and our parent company”. Other firms may not be so lucky. But silence on such matters would be dangerous.

For the broader strategy, tips can be gleaned from the National Defence University (NDU), an American military college. In 2006 it produced a useful—and prescient—report called “Weathering the Storm: Leading Your Organisation Through a Pandemic”. It advised leaders to analyse the tasks required for an organisation to continue operating and prioritise them. To ensure essential functions can be performed, employees should be trained in different disciplines. That way they can cover for colleagues who become sick.

It helps to have done this in advance, of course. But even firms that dithered can—besides making amends now—adopt the right tone. How you handle crisis communication is, the NDU says, “critical”. It can matter as much as having the right message.

This point is amplified by Shawn Engbrecht, a former US Army ranger who now runs a personal-protection company. He has written a highly entertaining, if idiosyncratic, book entitled “Invisible Leadership”. “As a leader,” he cautions, “you can promise everything to the many until you are unable to deliver even a little to the few.” In the end, “Failure to tell the truth rapidly erodes trust and confidence in higher command.”

In a crisis, Mr Engbrecht advocates “embracing the suck”. This means

accepting where you are at a given moment: “Wishing, hoping and praying the problem away does not work so don’t waste your time with coulda, shoulda or woulda.” In short, no sugarcoating. If everyone on staff realises there is a problem, they will not be reassured by an executive blithely promising that it may go away.

A good manager must take time to listen to staff concerns and answer their questions. That may require a bit of patience. In Mr Engbrecht’s words, “the quieter you become, the more you can hear”. Mass meetings may not be appropriate at a time of a highly infectious disease. But an online town-hall gathering would be salutary.

Have a clear message, keep calm and be transparent: all obvious stuff, crisis or no crisis. Another kind of leadership may be more painful. Executives at airlines like Qantas and United have agreed to take pay cuts (or forgo their salaries entirely) until the pandemic passes. Good leaders show they face at least some of the same dangers as their troops. ■



巴托比

拥抱逆境

管理者在危机中彰显价值【新冠报道】

顺风顺水之时，做个商业领袖很容易。经济形势大好，订单滚滚而来，员工或预算方面也没有难做的决定。虽然还是有可能出问题，但水涨船高，险滩易过。

企业掌舵人的能耐是在危机中展现的。无所适从的员工会指望领头人指明方向。有时候会出现没有几个老板会合理预见到的麻烦，新冠肺炎大流行就是如此。现在，人们期望他们在几天之内就指出一条阳关大道。

在政界，成功展现了危机领导力的突出例子是罗斯福和丘吉尔。这两位制定决策时都有些让人捉摸不定，但好在都非常善于沟通。他们虽风格迥异，但公众可以毫不费力地理解他们传达的核心信息。罗斯福明确表示，为结束大萧条，他愿意尝试各种新想法的组合。丘吉尔毫不含糊地指出，英国要不惜一切代价抵抗纳粹德国。

企业领导者应忍住想发表丘吉尔式演讲的念头。但他们可以从罗斯福“炉边谈话”那种平静的权威中学到一二。作为CEO，需要向两类不同的受众传达信息：员工和客户。这条信息应表明公司已有应对病毒的计划，这可能涉及让员工在家工作（以防病毒传播）或调整供应链（以维持生产）。员工和客户还需要知道公司拥有足够的财务资源扛过经济衰退期，这样他们才能安心。

投资银行杰富瑞（Jefferies）刚刚提供了一个好的示例。CEO里奇·汉德勒（Rich Handler）和总裁布莱恩·弗里德曼（Brian Friedman）在一封联名信中强调，“在我们心中，员工和客户的安全是最重要的”，然后补充说，公司“在运营层面和母公司方面都资金充足”。其他公司可能没那么幸运。但是，在此类问题上保持沉默是危险的。

至于更广泛的策略，可以向美国国防大学（NDU）取经。2006年，NDU撰写了一份有用的（且颇有先见之明的）报告，名为《经受考验：带领组织渡过大流行病》（Weathering the Storm: Leading Your Organisation Through a Pandemic）。这份报告建议领导者分析维持组织运营所需完成的任务，并确定优先顺序。为了确保基本职能的正常执行，员工应接受跨部门培训。这样，如果有同事感染，其他人就可以顶上。

能提前做好准备当然有利。但即使是慢了一步的公司也可以在亡羊补牢的同时采用正确的调门。NDU的报告称，开展危机沟通的方式“至关重要”，可能与传达正确的信息同等重要。

曾是美国陆军突击队员、现在经营一家私人保镖公司的肖恩·恩格布雷希特（Shawn Engbrecht）强调了这一点。他写过一本很有趣、有点另类的书《隐形领导力》（Invisible Leadership）。他在书中警告说：“领导者可以向很多人夸下海口，直到某天无法对哪怕很少人兑现一点点。”最终，“不说实话会迅速削弱下级对上级的信任和信心。”

在危机中，恩格布雷希特主张“拥抱烂事”。也就是说，接受你在特定时刻的处境：“许愿、盼望或祈祷问题会消失是没有用的，因此不要浪费时间去悔不当初。”简而言之，不要掩饰问题。如果每个员工都意识到有麻烦，那么不论高管如何语调轻快地打包票一切都会好起来，他们都不会安心。

一个好的管理者必须花时间倾听员工的疑虑，并回答他们的问题。这可能需要一点耐心。用恩格布雷希特的话说，就是“你越安静，听到的越多”。在一种高传染性的疾病大流行之际，可能不适宜召开大规模会议，但在线举行全员大会还是有益的。

准备好清晰的信息，保持冷静和透明。这些都是明摆着的选择，不管有没有危机。另一类领导者可能更痛苦些。澳航和美联航等航空公司的高管已同意减薪或完全放弃薪水直至疫情结束。好的领导者会展现出自己是和下属共患难，哪怕只是一部分。■



Business and the pandemic

Covid carnage

Much of global commerce has ground to a halt. Some firms will never restart

“THE COVID-19 pandemic is having a significant impact around the world,” warned Fred Smith, boss of FedEx, at his firm’s earnings conference on March 17th. That is putting it mildly. The express-delivery giant announced that it was slashing its delivery capacity and, for the first time ever, refused to give earnings guidance. While economists debate whether this recession will be short-lived or sustained, bosses the world over already see mayhem. The virus has destroyed \$23trn in global market value since mid-February.

As governments curb citizens’ activities—including much of commerce—in an effort to save lives, the ranks of corporate casualties are swelling. Fewer people are taking planes, hailing rides, eating out, staying in hotels, going to cinemas or gathering just about anywhere. Most American and European sports leagues have been suspended. Formula 1 motor-racing has ground to a standstill. Apple and Nike have closed most of their stores outside of China. Carmakers including Ford, Toyota and Volkswagen are shutting factories in Europe and America.

The bloodletting will continue. Scott Stringer, New York’s finance chief, predicts that the city’s hotels will be two-thirds empty until the end of June. Its restaurants and bars, ordered shut, could see sales drop by 80%. The American Hotel and Lodging Association fears a blow exceeding the impact of September 11th 2001 and the “Great Recession” of 2008 combined. Morgan Stanley, a bank, reckons retail foot traffic may plunge by 60% in coming weeks, as more American cities follow many European ones into lockdown.

Many companies will pull through. Governments are rushing in to ensure

as many as possible do. Britain last week unveiled a £330bn (\$382bn) package of loan guarantees and other support for businesses. America's Federal Reserve earlier said it would create a new funding facility to provide liquidity to American issuers of commercial paper. President Donald Trump has called for \$1trn in economic stimulus.

Even so, some firms will not make it. It is too early to say for sure who the corporate fatalities will be. To get a sense of which are most at risk, liquidity and business model are a good place to start.

Take liquidity first. American firms account for 55% of global non-financial debt maturing until the end of 2024, and 62% of debt rated junk, according to S&P Global, a rating agency. Non-financial firms in America will see \$394bn in investment-grade debt and \$87bn in junk debt fall due this year; the figures for next year are \$461bn and \$195bn. Potential trouble spots include construction (with nearly \$30bn in junk debt due by the end of 2021), media and entertainment (\$35bn), and energy and utilities (\$56bn).

Oil companies in particular have been clobbered by the steep fall in the price of crude, which sank to \$25 a barrel on March 18th, the lowest level in nearly two decades. Morgan Stanley calculates that the median exploration and production firm needs an oil price of \$51 a barrel to break even. Saudi Aramco, the world's mightiest oil colossus, said it might cut capital spending by up to a quarter this year. America's ExxonMobil echoed that it will make "significant" cuts.

Oilmen are not the only ones trying to preserve cash. Many companies are sending workers on leave or worse. Norwegian Air Shuttle, an airline, is temporarily laying off 90% of its 10,000 employees. Marriott International, the world's largest hotel chain, said on March 17th that it will have to let go of tens of thousands of workers.

Companies are rushing to tap credit lines secured with their bankers. AB InBev, the world's biggest brewer, is drawing down its \$9bn revolving credit. Boeing, a troubled aerospace giant, has accessed \$13.8bn. Carnival Cruise Line hopes to stay afloat thanks to a \$3bn lifeline. Bloomberg, a financial-data firm, reckons that if firms in five big sectors (health care, energy, transport, leisure and mining) drew down 70% of their credit lines, and the rest tapped 30% of theirs, America's biggest banks would be on the hook for \$700bn.

Companies' second vulnerability besides a liquidity crunch arises from their business models. Some tried and tested ones suddenly look rather fragile in the age of pandemic. If Apple does not sell a new iPhone it may still convince consumers to buy one later. Revenues from a restaurant meal not eaten or a forgone trip to the cinema are lost for ever.

That is bad news for industries like the arts, which depend on a few big, one-off events—at least in countries like Britain, where state-funding of the arts is less lavish than in France, Germany or Gulf sheikhdoms. Art Basel Hong Kong was cancelled last month. The main Art Basel fair in Switzerland, which is due to open on June 18th, may also not go ahead. Galleries that depend on such fairs, as many do, could see as much as 80% of their sales evaporate.

No surprise, then, that the coronavirus is provoking some soul-searching, especially in conservative industries. On March 20th Art Basel Hong Kong will launch online “viewing rooms” with more than 231 galleries—over 90% of the original exhibitor line-up. They will offer over 2,000 artworks worth a total of \$270m. The crisis is also breaking down Hollywood bosses' stubborn attachment to the old-fashioned model of distributing films in theatres. Universal Pictures is making some movies available at home on the same day as their theatrical release. “The Invisible Man” and “Emma” can now be streamed online. Disney has released its popular “Frozen 2” on

its newish Disney+ streaming service well ahead of schedule.

Some companies may not only survive the pandemic but thrive, either now or once it recedes. Supermarkets are struggling to keep up with demand from panic buying. Kimberly Clark and other peddlers of toilet paper, which many people are frantically stockpiling, are riding high, too. So are purveyors of cleaning products such as Clorox and Purell.

This boomlet will probably not last. Early panic will inevitably die down. Other industries may prosper for longer. By forcing many people to work, shop and amuse themselves at home, the crisis may give a permanent boost to online companies. Zoom, Microsoft Teams, Slack, WeChat Work and other corporate-messaging services are experiencing a surge in demand. Data from Sensor Tower, an analytics firm, suggests that weekly new users of such apps leapt from 1.4m in early January to 6.7m in early March. A survey in Britain for Barclaycard, a payments firm, points to year-on-year growth of 12% in subscription entertainment services like Netflix in the four weeks to February 21st, and of nearly 9% growth in food takeaway and delivery spending. Amazon is hiring 100,000 new distribution workers in America to meet demand for internet shopping.

Bricks-and-mortar firms that have invested in online offerings are also cashing in. A survey of American shoppers conducted on March 13th by Gordon Haskett, a research firm, found that one in three bought food online in the previous week. Among the 41% doing so for the first time, over half chose Walmart, with its convenient grocery pickup and delivery service. In Britain Tesco and Sainsbury may be outpacing Aldi and Lidl, European discount chains that have invested less online.

And, of course, any firm that comes up with a vaccine or treatment for covid-19 can expect a bonanza. Amid the market meltdown the share price of Gilead, a biotechnology firm working on a coronavirus drug, is up by

20% this year.

One lasting consequence of the pandemic will almost certainly be further concentration of corporate power in the hands of a few superstar firms. The current airline carnage may leave skies everywhere resembling the uncompetitive ones above North America. JPMorgan Chase, a bank, observes that American carriers generate two-thirds of global airline profits with barely a fifth of worldwide capacity (not to mention shabby service). Similar consolidation now looks all too probable in Europe and Asia.

Companies with the most resilient businesses, deepest pockets and longest investment horizons may grow more super still through cut-price acquisitions. Rumours swirl that Apple, with a gross cash pile of over \$200bn and Tinseltown ambitions, may swoop in to buy Disney, whose share price has nearly halved since January. Warren Buffett of Berkshire Hathaway, who is sitting on \$128bn and has long grumbled about overpriced equities, may at last find a bargain or two. Having raised a record \$888bn last year, private-equity firms are on the prowl. Steve Schwartzman declared earlier this month that the dislocation and fear caused by the coronavirus has created “a substantial opportunity” for Blackstone, the buy-out powerhouse he leads.

The Depression wreaked economic havoc but also produced radical new business models from carmaking and entertainment to beauty products. In time, today’s crisis, too, may lead to some corporate resurrections—and plenty of new births. Comparisons to that agonising time in world history must not be made lightly. That they look apt is a sign of just how bad things are looking right now. ■



商业和大流行病 病毒大屠杀

全球大部分商业活动都按下了暂停键。有些公司永远不会重启【新冠报道】

“新冠肺炎大流行正在全世界产生重大影响。”联邦快递的老板弗雷德·史密斯（Fred Smith）3月17日在公司财报会议上警告说。这么说已经算是委婉的了。这家快递巨头宣布正在大幅削减运力，还史无前例地拒绝给出盈利预告。经济学家仍在争论这场经济衰退会是短暂还是持久的，而全世界的企业老板们已经焦头烂额。自2月中以来，全球市值已在疫情中蒸发了23万亿美元。

为挽救生命，各国政府纷纷限制民众活动，包括大部分商业活动，企业的伤亡队伍随之扩大。人们坐飞机、打车、外出就餐、住酒店、看电影或者在各种场合的聚会都减少了。美国和欧洲的大多数体育联赛都已暂停。一级方程式赛车也已停赛。苹果和耐克关闭了中国以外的大部分门店。福特、丰田和大众等汽车制造商正在关闭欧美的工厂。

经济失血将持续。纽约市的主计长斯科特·斯特林格（Scott Stringer）预测，6月底前纽约酒店的空置率将保持在三分之二。餐厅和酒吧被下令关闭，营业额可能减少八成。美国酒店业协会担心，这次的打击可能比2001年911事件和2008年“大衰退”加起来还要严重。摩根士丹利估计，随着越来越多美国城市效仿欧洲进入封城状态，未来几周零售业的客流量可能锐减60%。

许多公司会捱过难关。各国政府连忙出手，尽可能救助更多企业。英国上周宣布了一项3300亿英镑（3820亿美元）的一揽子计划，为企业提供贷款担保等支持。美联储早些时候表示将建立新的融资工具，为美国商业票据的发行人提供流动性。总统特朗普呼吁国会通过一万亿美元的经济刺激方案。

即便如此，有些公司将无力回天。现在要判断哪些会倒下还为时尚早。要

了解哪些公司最危险，可以从流动性和商业模式着手。

先说流动性。据评级机构标普信评（S&P Global）称，美国企业占2024年底到期的全球非金融债务的55%，垃圾级债券的62%。美国非金融企业将有3940亿美元的投资级债券和870亿美元的垃圾级债券在今年到期；明年到期的规模分别为4610亿美元和1950亿美元。潜在的爆雷点包括建筑业（2021年底有近300亿美元垃圾级债券到期）、媒体和娱乐业（350亿美元），以及能源与公用事业（560亿美元）。

受油价暴跌影响，石油公司受到的打击尤其严重。3月18日原油价格跌至每桶25美元，是近20年来的最低水平。根据摩根士丹利计算，中等勘探和开采公司需要油价达到每桶51美元才能保本。全球实力最雄厚的石油巨头沙特阿美表示今年可能将资本开支削减最多四分之一。美国的埃克森美孚也表示将采取“重大”削减。

并不是只有石油公司在设法保留现金。许多公司让员工休假，甚至更糟。挪威航空公司（Norwegian Air Shuttle）临时裁掉了一万名员工中的九成。世界最大的连锁酒店万豪国际3月17日表示将不得不裁员数万人。

企业争相提取其银行提供的信用额度。世界最大酿酒商百威英博（AB InBev）正在取用其90亿美元的循环贷款。麻烦缠身的航空业巨头波音已经使用了138亿美元的信贷。嘉年华邮轮（Carnival Cruise Line）希望拽住30亿美元的救生索而不至沉没。金融数据公司彭博估计，如果五大行业（医疗、能源、运输、休闲和采矿）的公司用掉70%的信用额度，而其他行业动用30%，那么美国最大的几家银行将要掏出7000亿美元。

除流动性危机外，企业的另一个软肋源自其商业模式。在疫情大流行的年代，一些久经考验的商业模式突然显得格外脆弱。如果苹果在这期间没能卖出新款iPhone，它或许仍能说服消费者日后再买。但人们放弃去餐馆或电影院，这些收入就永远流失了。

这对艺术等行业很不利，它们的收入依赖于几场一次性的大型活动，至少在英国等国家是这样，那里对艺术产业的政府资助远不如法国、德国或海

湾酋长国家那么慷慨。上个月，香港巴塞尔艺术展取消。订于6月18日开幕的巴塞尔艺术展瑞士主展会可能也无法如期举行。许多艺廊都依赖这类展会，它们的销售收入可能有高达80%要化为泡影。

毫不意外，疫情正促使一些行业自省，尤其是比较保守的行业。香港巴塞尔艺术展在3月20日推出网上“展厅”，有超过231间艺廊参与——相当于原始参展阵容的90%以上。它们将展示两千多件作品，总价值2.7亿美元。这场危机也打破了好莱坞老板对传统影院发行模式的顽固坚持。环球影业的一些电影在影院上映当天即可在家中观看。《隐形人》和《艾玛》现已提供线上点播。迪士尼也在它新推出的流媒体服务Disney+上发布了热门电影《冰雪奇缘2》，比预定时间大大提前。

有些公司也许不仅能在这场大流行病中生存下来，甚至还活得很好——或者在疫情期间，或者在它消退之后。超市正在努力满足恐慌性采购。人们正疯狂囤积卫生纸，金佰利（Kimberly Clark）和其他供应卫生纸的公司也在这波行情中意气风发。清洁类产品的供应商也是如此，例如高乐氏（Clorox）和普瑞来（Purell）。

这样的小高潮恐怕不会持久。早期的恐慌情绪必然会逐渐平息。其他行业也许会迎来更长久的繁荣。疫情迫使许多人在家工作、购物和娱乐，或许会给互联网公司带来长远的提振。Zoom、Microsoft Teams、Slack、企业微信和其他企业级通讯服务的需求正在激增。分析公司Sensor Tower的数据显示，此类应用的每周新增用户数从1月初的140万跃升至3月初的670万。英国支付机构巴克莱卡（Barclaycard）委托开展的一项调查显示，截至2月21日的四周内，奈飞（Netflix）等订阅式娱乐服务同比增长了12%，食品外卖和送货支出增长了近9%。亚马逊正在美国新招聘十万名配送员，以满足网上购物的需求。

提前布局了线上服务的实体公司也在获利。调研公司Gordon Haskett 3月13日对美国购物者的调查发现，三分之一的人曾在过去一周网购食品。其中有41%是首次购买，而他们当中超过一半选择了沃尔玛，就是看中它便利的食杂提货和送货服务。在英国，乐购（Tesco）和英佰瑞（Sainsbury）

的发展速度就可能超过奥乐齐（Aldi）和利德（Lidl）这两家对线上服务投资较少的欧洲折扣连锁超市。

另外，任何能拿出新冠病毒疫苗或疗法的公司自然会一飞冲天。市场崩盘之际，正在测试一种抗病毒药物的生物科技公司吉利德（Gilead）今年以来股价已经上涨了20%。

病毒大流行几乎肯定会带来一个长期后果：企业影响力进一步向少数几家超级明星公司集中。航空公司正在被疫情“血洗”，结果可能是世界各地的航空业都变得和美国一样缺乏竞争。摩根大通注意到，尽管美国的航空公司运力顶多占全世界的五分之一（更不用提差劲的服务），却赚取了全球航空业利润的三分之二。现在看来，欧洲和亚洲非常可能出现类似的整合。

业务最具韧性、财力最雄厚、投资周期最长的公司也许会通过低价收购进一步壮大。迪士尼的股价自1月以来几乎腰斩，有传言称坐拥2000亿美元现金储备而且有意进军好莱坞的苹果可能会趁虚而入，出手收购迪士尼。伯克希尔·哈撒韦的巴菲特手握1280亿美元，以前一直抱怨股价过高，也许总算可以找到一两笔划算的买卖。私募股权公司去年募集了创纪录的8880亿美元资金，现在正四处物色目标。并购巨头黑石集团

（Blackstone）的CEO苏世民（Steve Schwartzman）本月早些时候宣称，新冠疫情造成的混乱和恐惧为黑石创造了“重大机遇”。

当年的大萧条给经济造成了严重破坏，但同时也催生了截然不同的新商业模式，从汽车制造、娱乐，到美容产品等。今天的危机最后同样可能促成大企业复兴，也会有大量新公司诞生。我们不能轻率地把眼下的状况与世界历史上的那个痛苦年代相提并论。而这种比较看似恰当，也显现出形势看起来有多糟糕。■



School closures

Mid-term break

How the covid-19 pandemic is interrupting children's education

CHILDREN USUALLY rejoice in a break from school, assuming it will be a chance to slack off. Not Ryu, a nine-year-old in Tokyo. As the new coronavirus spread across Japan, schools throughout the country closed on March 2nd. His parents have enforced a strict schedule every day. It includes Japanese, science and physical education. He does mathematics on his abacus every morning. On weekdays he is allowed to play in a park for 90 minutes. "I wish I could take him to the park more, but we have limited time as we work from home," frets his mother, Fujimaki Natsuko.

Ryu is one of almost 1bn students around the world whose schooling has been interrupted as a result of covid-19 (see map). As *The Economist* went to press, just over 100 countries including China, Italy and South Korea had closed their schools, as had 43 states in America, as part of efforts to contain covid-19. Britain will close all schools on March 20th. Schools, where sticky-fingered children gather every day, sharing toys and sucking on pencils, are an obvious place for diseases to flourish. In 2013 Britain's Health Protection Agency looked at flu outbreaks that coincided with school closures. It found that shutting them slowed the transmission of the virus, even if it also slowed the transmission of knowledge.

The data on whether school closures will curb covid-19 are limited. Children may not be the "main routes of transmission", says Michael Head, who studies global health at the University of Southampton. And the economic, social and educational costs are heavy. On March 12th Bill de Blasio, the mayor of New York, said there were "many, many reasons" not to close the city's 1,800 schools (though on March 16th it did just that, shuttering America's largest school system for at least four weeks). For all

governments, deciding whether or not to close schools is a choice between two bad options.

A study in 2009 modelling the effects of closing all schools and formal day-care centres in America for a month put the cost at 0.1-0.3% of GDP. Some countries seem better prepared to deal with the economic impact. In China the nationwide closures came with government-mandated work-from-home policies and subsidies for companies to enable their employees to do so. But in Japan not all parents are entitled to work from home or to take paid sick leave. In Italy one-fifth of workers are self-employed and so do not qualify for sick pay. People in precarious work may lose their jobs altogether if they have to stay at home to look after children.

For poor children, schools may provide the most nutritious meal of the day. Around 26m children in American schools—roughly half of all students—qualify for free or reduced-price lunches. In New York City 22,000 children sleep in municipal shelters. Some school districts in New York are setting up pickup points so that the hard-up can still get free meals. Britain has said it will continue to provide those children who ordinarily get free school meals with food.

Officials must always take such costs into account. But in the middle of a pandemic there is an extra consideration. The study in 2009 estimated that, if schools are closed for a month, between 6% and 19% of key health-care workers would have to stay at home to take care of their offspring. Britain will keep schools running for vulnerable children and those whose parents are key workers.

For most parents, however, the immediate worry is how prolonged school closures will affect their children's education. Those preparing to take crucial exams are particularly jittery. The *gaokao*, China's single university-entrance exam, is usually held in June. This year it will probably be delayed,

says Xu Liangdi of China Policy, a think-tank, although the government has so far made no announcement.

Around 245,000 students in Britain were expecting in May and June to sit their A-levels, the exams that determine which university—if any—will grant them a place. On March 18th the government announced that those exams would be cancelled. Boris Johnson, the prime minister, said that the government would make sure that children still got “the qualifications they need and deserve for their academic career.” That may go some way to assuaging fears that children whose parents lack the cash or knowledge to compensate for schools closing would be worst affected.

For American students the stakes are lower, in part because their transcript—based on their academic performance throughout the year—is the most important part of their university application, but also because they can take SATs, the exams used in college admissions, all year round. Most sit them in the spring. For those hoping to start university in 2021, the March and May tests have been cancelled. They will be rescheduled, however, and students may be able to take them at home.

Nonetheless universities may have to be more accommodating. Covid-19 will “absolutely” affect the admissions procedure for Miami University in Ohio, says Bethany Perkins, the director of admissions—particularly the deadlines. Students with offers from American universities have to choose which to accept by May 1st. But students worry that they will have to make an important decision without being able to visit any campuses. Along with their parents, some are calling for the date to be pushed back to June 1st. Colleges have yet to react. Harvard says it is not changing its application process.

The disruption has lent ammunition to those who disapprove of high-stakes exams, which some education theorists want to scrap. Some

institutions have already made SATs optional. Others, including Miami University, were considering doing so. The upheaval caused by covid-19 might accelerate that process, says Ms Perkins. But the flaws of other kinds of assessment may become clear in the coming months, bolstering those who believe that SATs and other high-stakes exams, which offer a relatively objective and transparent measure of ability, are the least unfair way to decide who gets into university.

The pandemic won't change this. But it will highlight the strengths and weaknesses of teaching online. Online resources are increasingly popular but few countries boast a developed digital infrastructure for all students. A survey by Teacher Tapp, an app, of over 6,000 teachers in Britain found that only 40% of those in state schools would be able to broadcast a video lesson, compared with 69% of teachers at independent schools. Elena Silva of New America, a think-tank, says that few American states have adequate kit for teaching online. "Most states are not that prepared. This is a moment of forced opportunity."

Teachers have little choice but to seize it. Since Italy closed its schools and universities on March 5th, teachers' forums have filled with discussions on the relative merits of Zoom, Moodle and virtual classrooms. Some teachers had been trained to use such technology, but many have faced a steep learning curve. Carla Crosato, a teacher in Treviso, in northern Italy, has been uploading videos in which she explains the novels of Italo Svevo and Luigi Pirandello to her students. "I never thought I'd become a YouTuber at 56," she says.

Even if teachers manage to broadcast their lessons, students may struggle to join them. Not everyone can get online (see chart). In America 7m school-age children cannot access the internet at home. Lin Kengying of 21st Century Education Research Institute, a think-tank in China, says that the closure of schools since the Lunar new year holiday, which began at the

end of January, has led his organisation to reconsider the potential of e-learning. “It hasn’t been smooth,” he says, citing problems such as internet access, scheduling classes, teachers unfamiliar with online tuition, and subjects such as physical education being “awkward” to teach remotely. In China teachers have to submit lesson plans for review by censors, which has led to delays. Students have been spamming the main online teaching app with one-star reviews in an effort to get it removed from the app store. And Xue Hua, a mother of two in Jiangxi province, has been printing out all the learning materials for her 16-year-old son, Guo Guo, because she worries about too much screen-time.

Even done properly, online learning is a poor substitute for the kind that happens in a classroom. On average, students fare worse working online, especially those with less strong academic backgrounds, says Susanna Loeb of Brown University. Online courses can be an asset when students cannot be in school, but she reckons that they are “suboptimal for most” and argues that long periods of time spent away from actual schools will probably lead to children’s education suffering.

Online learning has clear potential. Educational technology powered by artificial intelligence can help children in poor countries with iffy schools—supposing they have internet access. In 2018 researchers found that after four and a half months of using an Indian app called Mindspark, which tests basic language and maths skills, children made more progress in these areas than those in the control group. But the success of such initiatives relies on preparation and organisation, not sudden scrambles to teach existing curriculums to entire populations of students in the midst of a pandemic. ■



关停学校

期中休假

新冠肺炎全球大流行如何扰乱儿童教育【新冠报道】

孩子们通常都喜欢学校放假，心想又可以玩儿了。但在东京，九岁的小龙不开心。因为新冠病毒在日本传播，全国的学校都在3月2日关闭了。父母每天对他执行严格的学习时间表，包括日语、科学和体育。每天早上他在算盘上做算术。工作日他可以到公园里玩一个半小时。“我希望能多带他去公园，但我们在家工作，没那么多时间。”妈妈藤卷夏子也犯愁。

小龙是世界各地因为新冠肺炎而不能去上学的近10亿名学生之一（见地图）。在本刊于上周四付印之时，包括中国、意大利和韩国在内的100多个国家以及美国的43个州都为了防控疫情关停了学校。英国在20日也关闭了所有学校。在校园里，手指黏糊糊的孩子们每天聚在一起，分享玩具，咬铅笔头，这显然是个疾病容易肆虐的地方。2013年，英国健康防护局（Health Protection Agency）研究了与学校停课同时发生的流感爆发，结果发现关闭学校减慢了流感病毒传播，虽然它也减慢了知识的传播。

关闭学校能不能遏制新冠肺炎，相关数据还很有限。南安普顿大学研究全球健康的迈克尔·黑德（Michael Head）说，少儿可能不是“主要传播途径”。而这么做在经济、社会和教育方面的代价却很高。3月12日，纽约市市长白思豪（Bill de Blasio）表示，出于“很多、很多的原因”不能关闭纽约市的1800所学校（但到了16日事情就变了，这个美国最大的学校系统停摆至少四周）。对所有政府而言，决定是否关学校不过是两害相权取其轻。

在2009年开展了一项研究，对关闭美国所有学校和正规日托中心持续一个月的影响建模，结果得出这么做的损失达到GDP的0.1%到0.3%。一些国家在应对这种经济影响方面似乎更有准备。在中国，全国各地关闭学校的同时，政府也要求人们在家远程办公，并补贴企业好让它们的员工这么做。但在日本，并非所有父母都被允许在家工作或能请带薪病假。在意大利，

五分之一劳动者是个体户，没有资格领取病假工资。从事不稳定职业的人们如果不得不留在家里照顾孩子，可能会彻底丢了工作。

对贫困生而言，学校可能提供了一天里最营养的一餐。美国学校中约有2600万儿童（约占总数一半）有资格领取免费或优惠午餐。纽约市有22,000名儿童睡在市政府开设的收容所里。纽约州的一些学区目前都在设点，让贫困生可以领取免费午餐。英国已经表示会继续向那些平常领取免费校餐的儿童供应食物。

这些是官员们从来都要考虑的代价。但在疫病大流行期间还有一个额外的考量。2009年的研究估计，如果学校关一个月，关键医护人员中有6%至19%将不得不留在家中照顾自己的孩子。英国将为弱势儿童和父母是关键工作者的儿童继续开放学校。

不过，对大多数父母而言，最直接的担忧是长时间停课对子女学习的影响。那些准备参加重要考试的人尤其焦虑不安。中国唯一的大学入学考试高考通常在6月举行。智库中国政策（China Policy）的徐良迪（音译）说，今年高考可能会推迟，虽然到目前为止，政府还没有做任何公告。

英国约有24.5万名学生准备在五六月间参加A-level考试，这些考试将决定哪所大学会录取他们（如果有的话）。3月18日，政府宣布这些考试将被取消。总理鲍里斯·约翰逊表示，政府将确保孩子们仍能获得“为其学历所需也应得的资质”。这可能在某种程度上缓解了一些人的忧虑，他们担心那些父母缺乏现金或知识来弥补停校损失的孩子受到的影响最大。

美国学生的风险更低些，一部分是因为美国大学申请中最重要的部分是基于全年学业表现的成绩单，此外他们可以在一整年里多次参加大学入学的SAT考试。大多数人在春季参加考试。对于那些希望在2021年入校的学生，3月和5月的考试已经被取消了。不过考试时间会另作安排，而且学生们也许还可以在家里考试。

尽管如此，大学可能都必须变得更灵活通融。俄亥俄州迈阿密大学的招生负责人贝萨妮·珀金斯（Bethany Perkins）说，新冠肺炎“绝对”会影响该

校的招生程序，尤其是截止日期。拿到美国大学录取通知书的学生必须在5月1日前选定学校。但学生们担心自己还没能参观任何校园就要做出重大决定。一些学生和他们的家长一起呼吁将日期推迟到6月1日。学校尚未做出回应。哈佛大学表示它没有改变申请程序。

这种混乱为那些反对重大考试的人们提供了弹药——一些教育理论家一直想取消这类考试。有些学校已经不要求提供SAT考试成绩。包括迈阿密大学在内的其他学校也在考虑这样做。珀金斯说，疫情引发的混乱可能会加速这个进程。但其他类型的评估也可能在接下来的几个月暴露出它们的缺点，从而支持另一个阵营的看法——他们认为SAT等重大考试提供了相对客观和透明的衡量能力的标准，是决定谁该上大学的相对而言最公平的方法。

疫情不会改变这种对峙。但它将凸显在线教学的优缺点。线上教学资源日益受到欢迎，但很少有国家能为所有学生提供发达的数字基础设施。应用程序Teacher Tapp对英国6000多名教师的调查发现，公立学校中只有40%的教师能够播放视频课程，而私立学校中为69%。智库新美国（New America）的埃琳娜·席尔瓦（Elena Silva）说，美国拥有足够线上教学工具的州很少。“大多数州都没有准备得很好。这是一个被迫创造机遇的时刻。”

教师们别无选择，只能抓住它。自3月5日意大利关闭各类学校以来，教师论坛上充斥着关于Zoom、Moodle和虚拟教室的相对优点的讨论。一些教师已经接受过如何使用这类技术的培训，但许多人都面临一番痛苦的学习。意大利北部的特雷维索（Treviso）的教师卡拉·克罗萨托（Carla Crosato）一直在上传视频，给她的学生讲解伊塔洛·斯韦沃（Italo Svevo）和路伊吉·皮兰德娄（Luigi Pirandello）的小说。“我从没想过在56岁时会变成YouTube主播。”她说。

哪怕教师最终搞定了课程直播，学生们参加起来可能也有困难。不是所有人都能上网（见图表）。美国有700万学龄儿童没法在家中上网。中国智库21世纪教育研究院的林铿莹说，自1月底春节假期起学校关闭以来，研

究院对线上学习的潜力有了一些新的认识。“情况不太顺利。”他说。他罗列了一些问题，比如网络连接、排课、对上网课不熟悉的老师，另外远程上体育课也有点“别扭”。在中国，教师必须提交课程计划供平台审查，这导致了播放延时。学生们组团给一款大型线上教学应用打出一星评价，以求它被应用商店下架。在江西，两个孩子的母亲薛华（音译）因为担心孩子看屏幕的时间太久，一直在为16岁的儿子郭果（音译）打印出所有学习资料。

哪怕网课上得好，它也无法替代课堂里的那种学习。布朗大学的苏珊娜·勒布（Susanna Loeb）说，平均而言学生在网上的学习效果更差，尤其是那些成绩不太理想的学生。当孩子们没法去学校时，网课可能算是个福音，但她认为，它们“对大多数人而言不是最理想的选择”，长时间离开实体校园可能会让孩子们的教育受损。

网课的潜力十分明显。人工智能驱动的教育技术可以为那些学校质量堪忧的贫困国家儿童提供帮助（如果他们有条件上网的话）。2018年，研究人员发现，在使用印度的一款应用Mindspark测试基本语言和数学技能四个半月后，儿童在这些领域里的进步超过对照组。但是，这类方案的成功有赖于准备和组织，而不是在疫病大流行中赶鸭子上架般地把现有的课程内容搬到网上，塞给所有学生。 ■



The economic emergency

Experimental treatment

Governments are spending big, and trying new tricks, to keep the world economy from falling dangerously sick

A CHARACTER IN a novel by Ernest Hemingway once described bankruptcy as an experience that occurs “two ways: gradually, then suddenly”. The economic response to the covid-19 pandemic has followed this pattern. For weeks policymakers dithered, even as forecasts for the likely economic damage worsened. But in the space of just a few days the rich world has shifted decisively. Many governments are now on a war footing, promising massive state intervention and control over economic activity.

The new phrase on politicians’ lips is “whatever it takes”—a line borrowed from Mario Draghi, president of the European Central Bank (ECB) in 2011-19. He used it in 2012 to convince investors he was serious about solving the euro-zone crisis, and prompted an economic recovery. Mr Draghi’s promise was radical enough. Politicians are now proposing something of a different magnitude: sweeping, structural changes to how their economies work.

There are unprecedented promises. On March 16th President Emmanuel Macron of France declared that “no company, whatever its size, will face the risk of bankruptcy” because of the virus. Germany pledged unlimited cash to businesses hit by it. Japan passed a hastily compiled spending package in February, but on March 10th supplemented it with another one that included over ¥430bn (\$4bn) in spending and almost four times as much in cheap lending. Britain has said it will lend over £300bn (15% of GDP) to firms. America may enact a fiscal package worth well over \$1trn (5% of GDP). The most conservative estimates of the total extra fiscal stimulus

announced thus far put it at 2% of global GDP, more than was shovelled out in response to the global financial crisis of 2007-09.

| *That sinking feeling*

In part this radical action is motivated by the realisation that the coronavirus, first and foremost a public-health emergency, is also an economic one. The jaw-droppingly bad economic data coming out of China hint at what could be in store for the rest of the world. In the first two months of 2020 all major indicators were deeply negative: industrial production fell by 13.5% year-on-year, retail sales by 20.5% and fixed-asset investment by 24.5%. GDP may have declined by as much as 10% year-on-year in the first quarter of 2020. The last time China reported an economic contraction was more than four decades ago, at the end of the Cultural Revolution.

Grim numbers are starting to pile up elsewhere, not so much in the official statistics, which take time to be published, as in “real-time” economic data produced by the private sector. Across the world, attendance at restaurants has fallen by half, according to OpenTable, a booking platform.

International-passenger arrivals at the five biggest American airports are down by at least 30%. Box-office receipts have crumpled (see chart 2).

The disruption to international travel will hurt trade, since over half of global air freight is carried in the bellies of passenger planes. The combination of disrupted supply chains and depressed demand from shoppers should hit trade far harder than overall GDP, if the experience of the last financial crisis is anything to go by. Already, the American Association of Port Authorities, an alliance of the ports of Canada, the Caribbean, Latin America and the United States, has warned that cargo volumes during the first quarter of 2020 could be down by 20% or more from a year earlier.

Official data are now starting to drip out. The Empire manufacturing index, a monthly survey covering New York state, in March saw its steepest drop on record, and the lowest level since 2009. In February Norway's jobless rate was 2.3%; by March 17th it was 5.3%. State-level numbers from America suggest that unemployment there has been surging in recent days.

All this is fuelling grim forecasts. In a report on March 17th Morgan Stanley, a bank, estimated that GDP in the euro area will fall by an astonishing 12% year-on-year in the second quarter of the year. The Japanese economy is forecast to contract by 2% this quarter and 2% next. Most analysts see global GDP shrinking in the first half of the year, with barely any growth over 2020 as a whole—the worst performance since the financial crisis of 2007-09.

Even that is likely to prove optimistic. On March 17th analysts at Goldman Sachs noted that they had “not yet built a full lockdown scenario” into their forecasts for advanced economies outside Europe. Forecasts for America, which is at an earlier stage than Europe and Asia when it comes to the outbreak, remain Panglossian; very slow growth in China and a big recession in Europe could by itself be enough to send the world's largest economy the same way. Steven Mnuchin, America's treasury secretary, warned last week that the country's unemployment rate could reach 20% unless Congress passes a stimulus package. A negotiating ploy? With shopping malls emptying, factories grinding to a halt and financial markets buckling, lawmakers may be loth to challenge the claim.

Despite stomach-churning declines in GDP in the first half of this year, and especially the second quarter, most forecasters assume that the situation will return to normal in the second half of the year, with growth accelerating in 2021 as people make up for lost time. That judgment is in part informed by China's experience. More than 90% of its big industrial firms are officially back in business. Its stockmarket had been one of the

world's worst performers in early February but is now the best (or rather, least bad). There remains, however, a risk that global containment and suppression of the virus will need to continue for a year or longer. If so, global economic output could be dragged down for much longer than most people expect.

Perhaps the greatest lesson of the global financial crisis was that it paid to act decisively and to act big, convincing markets and households that policymakers were serious about countering the slump. If done right, central banks and governments can end up doing a lot less than they actually promised. A pledge to bail out banks makes it less likely savers will withdraw deposits and make a rescue necessary.

This time around, central banks sprang into action. Since February the Federal Reserve has cut interest rates by 1.5 percentage points. Other central banks have followed suit. Further deep rate cuts are not possible, though; interest rates were very low long before the virus began to spread.

| *Let's get fiscal*

Not all central banks are acting as boldly as they can. China has room to cut interest rates—its benchmark rate is 1.5%—but has held back in part because inflation is quite high (largely as a result of African swine fever, which hit pig stocks, raising prices). Central banks could try more creative policies. On March 19th the ECB's governing council agreed to launch a €750bn bond-buying programme, covering both sovereign and corporate debt. But the real action is now taking place on the fiscal front.

Governments are falling over each other to offer bigger and better stimulus packages. All countries are spending more on health care, both in an effort to find vaccines and cures and to increase hospital capacity. However, the bulk of the extra spending is on companies and people.

Take companies first. China, where the outbreak has slowed, is now trying to get people out and buying things. Foshan, a city in Guangdong province, has launched a subsidy programme for people buying cars. Some cities have started giving out coupons that can be spent in local shops and restaurants. Nanjing this month gave out e-vouchers worth 318m yuan (\$45m).

Most countries, however, are in or about to enter the worst part of the outbreak. As customers dry up, many firms will go bust without government help. Calculations by *The Economist* suggest that 40% of consumer spending in advanced economies is vulnerable to people shunning social situations. Firms in leisure and hospitality are especially rattled. The Moor of Rannoch hotel, in about as rural a part of Scotland as it is possible to find, says its insurer will not be paying out a penny for lost custom, since covid-19 is a new disease and thus not covered under its policy.

One approach is to reduce firms' fixed costs, largely rent and labour. China's finance ministry will exempt companies from making social-security contributions for up to five months. The government has also temporarily cut the electricity price for most companies by 5% and enacted short-term value-added-tax cuts. The British government has extended a one-year business-rates holiday to all companies operating in the retail, hospitality and leisure sectors. Yet for many firms, no matter how much the government helps them reduce costs, revenues are likely to fall further.

So measures may be needed to allow firms to maintain cashflow. Many banks are offering hefty overdrafts to tide corporate clients over. To encourage banks to keep lending, Britain has promised them cheap funding and state guarantees against losses. For very small firms, many of which do not borrow at all, it is offering non-repayable cash grants of up to £25,000.

Other countries are enacting similar plans. The Japanese government is helping small firms by mobilising its state-owned lenders to provide up to ¥1.6trn of emergency loans, much of it free of interest and collateral requirements. Small firms qualify for help if their monthly sales fall at least 15% below a normal month's takings. Bavaria, a rich state in Germany, announced on March 16th that small and medium-sized companies with up to 250 employees could receive an immediate cash injection of between €5,000 and €30,000. The European Commission has already relaxed state-aid rules so that governments can channel help to ailing companies.

The second part of the fiscal response is about helping people, and in particular protecting them from being made unemployed or suffering a drastic drop in income if that does happen. Ugo Gentilini of the World Bank counts more than 25 countries that are using cash transfers as part of their economic response to the virus. Brazil will give informal workers, who make up roughly 40% of the labour force, 200 reais (\$38) each. Small businesses will be allowed to delay tax payments and pensioners will get year-end benefits early. Australia is instituting a one-time cash payment of A\$750 (\$434) to pensioners, veterans and people on low incomes.

Northern Europe has led the way on implementing policies that make it less likely firms lay off workers. Germany has relaxed the criteria for *Kurzarbeit* ("short-time work"), under which the state pays 60-67% of the forgone wages of employees whose hours are reduced by struggling firms. Applications are going "through the roof", according to the federal labour agency. The use of *Kurzarbeit* probably halved the rise in unemployment during the recession of 2008-09. More firms are now eligible to use it, temporary workers are covered, and the government will also reimburse the social-security contributions companies make on behalf of affected workers.

| *Bringing home the Danish bacon*

In Denmark firms that risk losing 30% or more of their workforce will see the government pay 75% of the wages of employees who would otherwise be laid off, until June. Norway's government has beefed up unemployment benefits, guaranteeing laid-off workers the equivalent of their full salary for the first 20 days. Freelancers whose work vanishes for more than a fortnight will get payments equivalent to 80% of their previous average income. In Sweden the state will cover half of the income of workers who have been let go, with employers asked to cover most of the rest.

So far America has passed more modest legislation. Federal funding for Medicaid, which provides health care for the poor, is likely to boost spending by about \$30bn, assuming it remains in place until the end of December, reckons Oxford Economics, a consultancy. America also has a new paid-sick-leave policy for some 30m workers, including 10m who are self-employed, worth just over \$100bn. But in that regard America is merely catching up with other rich countries, which have far more generous sick-leave policies. America also has fewer automatic economic stabilisers, such as generous unemployment insurance, than most other rich countries. As a result, its discretionary fiscal boost needs to be especially large to make a difference.

It might be. The Trump administration's plan to funnel money directly to households, if approved by Congress, is the most significant policy. It bears some resemblance to a scheme that was introduced in February in Hong Kong, in which the government offered HK\$10,000 (\$1,290) directly to every permanent resident. Mr Mnuchin is thought to favour a cheque of \$1,000 per American—roughly equal to one week's average wages for a private-sector worker—with the possibility of a second cheque later. Some \$500bn-worth of direct payments could soon be in the post.

Some economists are leery about such a policy. For one thing, it would do

little to prevent employers from letting people go, unlike the plans in northern Europe. Another potential problem, judging by Hong Kong's experience, is administration of the plan: the territory's finance secretary hopes to make the first payments in "late summer", far too far away for people who lost work last week. Mr Mnuchin promises that payments will happen much sooner.

| *Chequered past*

America has done something similar before, with results that were not entirely encouraging. The government sent out cheques in both 2001 and 2008 to head off a slowdown. The evidence suggests that people saved a large chunk of it. The psychological reassurance of a bit of extra cash could be significant for many Americans, but the sums involved are not especially impressive. Bernie Sanders, a Democratic presidential contender, is not known for his smart economic policymaking, but his suggestion of \$2,000 per household per month until the crisis is over is probably closer to what is required.

Indeed, more fiscal stimulus will be needed across the world, especially if measures to contain the spread of the virus fall short. After the Japanese government passes the budget for next fiscal year at the end of this month, it can begin work on a supplementary budget that takes the virus into full account. Britain's Parliament has given Rishi Sunak, the chancellor of the exchequer, *carte blanche* to offer whatever support he deems necessary, without limit.

How much further can fiscal policy realistically go? Last year the 35-odd rich countries tracked by the IMF ran combined fiscal deficits of \$1.5trn (2.9% of GDP). On the not-unrealistic assumption that the average deficit rose by five percentage points of GDP, total rich-country borrowing would rise to over \$4trn this year. Investors have to be willing to finance that splurge. The yield on ten-year Treasury bonds, which had fallen as low as

0.5% as fears of the virus took hold and traders sought havens, has recently risen above 1%. This is probably due to firms and investors selling even their safest assets to raise cash, but might reflect some anxiety over the scale of planned government borrowing.

Still, 1% is still extremely low by historical standards. For a variety of reasons, including population ageing, there is—in normal times, at least—unprecedented demand for low-risk government securities. The Bank of Japan has promised to buy as many bonds as necessary to hold the yield on its government's ten-year bonds close to zero. Investors remain queasy over some rich countries' bonds, especially slow-growing European states. The ECB's latest intervention should allow heavily indebted economies viewed with suspicion by markets, such as Italy, to borrow more cheaply—though it does not fully dispel doubts around the euro zone's willingness to act to avert crisis.

The question of financing the spending splurge may be more one of practicalities than of feasibility. America's Treasury cannot issue trillions of dollars of new bonds overnight. It can, however, issue notes and bonds to the Federal Reserve, which could then credit the Treasury's account, allowing vast sums to be spent immediately, points out Ian Shepherdson of Pantheon Macroeconomics, a consultancy. The bonds could then be sold to investors at a later date. This approach amounts to money-printing, but with little risk of runaway inflation in these straitened times.

The economic hit from covid-19 will be bad enough for rich countries, in both human and economic terms. But they are in a relatively fortunate position, with strong health-care systems, and investors who, for now, remain willing to lend to them on cheap terms. Poorer countries, where the threat posed by the virus is also growing rapidly, have less room to borrow and job markets with a higher share of informal workers who are ineligible for many protections. The rich world faces tough times, but will get

through the crisis. The prospects of poorer places are far less certain. ■



经济告急

实验性治疗

各国政府正花费巨资并祭出新招，以防世界经济陷入危险的困境【新冠报道】

海明威小说中的一位人物曾经将破产描述成“以两种方式”发生的经历：“先是逐渐地，然后突然地。”对新冠肺炎大流行的经济反应也遵循了这种模式。在很多个星期里，尽管对可能发生的经济损失的预期越来越差，决策者们一直踌躇不前。然而在短短几天之内，富裕世界就发生了毅然决然的变化。许多政府现在都处于战争状态，承诺大规模干预并控制经济活动。

政客们挂在嘴边的新说法是“不惜一切代价”，这是从2011至2019年担任欧洲央行行长的马里奥·德拉吉（Mario Draghi）那里借来的一个表述。他在2012年用这句话来向投资者证明自己对解决欧元区危机这桩事是认真的。这在当时促进了经济复苏。德拉吉的承诺已经足够激进了，但政客们现在提议的东西是另一个量级的——对经济运作方式实施大范围的结构性的改变。

这些承诺是空前的。3月16日，法国总统马克龙宣布，“任何公司，不论大小，都不会因为病毒面临破产的风险”。德国承诺向遭受病毒打击的企业提供无限现金援助。日本在2月通过了一项仓促制定的支出方案，但在3月10日又补上了一个方案，其中包括超过4300亿日元（40亿美元）的支出，以及四倍于此的廉价贷款。英国已表示将向企业提供超过3000亿英镑的贷款（占GDP的15%）。美国可能会颁布价值超过1万亿美元（占GDP的5%）的一揽子财政方案。按最保守的估计，迄今宣布的财政刺激方案总额也已占到全球GDP的2%，超过了为应对2007至2009年金融危机做出的努力。

| 不祥的预感

采取这种激进的行动在某种程度上是由于人们认识到，冠状病毒虽然首先且最重要的是一个公共卫生事件，但也是一个经济紧急事件。中国糟糕的经济数据令人瞠目，这也暗示着世界其他地方将会遭遇什么。2020年的前

两个月，所有主要指标都非常负面：工业产出同比下降13.5%，零售额下降20.5%，固定资产投资下降24.5%。2020年第一季度GDP可能同比下降多达10%。中国上一次报告经济收缩是在40多年前，当时文化大革命刚刚结束。

严峻的数字开始在其他地方累积。官方统计数据看起来还好，因为需要过一段时间才会发布，但私营部门产生的“实时”经济数据则十分明显。根据预订平台OpenTable的数据，全球餐厅客流量下降了一半。美国五个最大机场的入境国际旅客人数降幅达至少30%。电影票房收入一蹶不振（见图2）。

国际旅行的中断将损害贸易，因为全球航空货运的一半以上是由客机的腹舱运送的。如果上一次金融危机的经历确有一些参考价值的话，供应链中断和购物者需求低迷结合起来，对贸易造成的冲击要远大于对GDP总量的冲击。美洲港务局协会（加拿大、加勒比海地区、拉丁美洲和美国港口组成的联盟）已经警告说，2020年第一季度的货运量可能比去年同期下降20%或更多。

官方数据现在开始点滴流出。纽约州月度调查“帝国制造业指数”3月录得有史以来最大跌幅，也是自2009年以来的最低水平。2月挪威的失业率为2.3%，到了3月17日已升至5.3%。美国的州级数据表明近日失业率在急升。

所有这些都加剧了悲观的预测。摩根士丹利银行在3月17日的报告中估计，欧元区的GDP在今年第二季度将同比下降多达12%。预计日本经济本季度将萎缩2%，下季度再萎缩2%。大多数分析师都认为，上半年全球GDP萎缩，整个2020年将几乎没有增长——这会是自2007至2009年金融危机以来最糟糕的表现。

但即便是这些预测也可能太乐观了。3月17日，高盛的分析师指出，他们“尚未将完全封锁的情况”纳入对欧洲以外发达经济体的预测中。比起欧洲和亚洲爆发，美国所处的阶段尚早，对它的预测仍然过分乐观；而中国非

常缓慢的增长和欧洲的严重衰退本身就足以使世界最大的经济体落入同样的下场。美国财政部长史蒂芬·姆努钦上周警告说，除非国会通过一揽子刺激方案，否则美国的失业率可能会达到20%。这是个谈判策略吗？商场空无一人，工厂陷入停顿，金融市场崩溃，议员们可能不愿意去质疑这一主张。

尽管今年上半年，特别是第二季度的GDP下降令人揪心，但大多数预测者认为情况将在下半年恢复正常，而随着人们弥补损失的时间，2021年的增长将加速。这种判断部分是根据中国的经验得出的。中国超过九成的大型工业公司正式恢复了运营。中国股票市场在2月初曾是全球表现最差的市场之一，但现在却是表现最好的（或着说是最不差的）。但是，需要花一年或更长时间在全球抑制病毒的风险仍然存在。如果是这样，全球经济产出被拖累的时间可能会比大多数人的预期要长得多。

也许从全球金融危机获得的最大教训是，采取果断而宏大的行动，使市场和家庭相信政策制定者在认真地应对经济下滑，是有好处的。如果做得好，各地央行和政府最终所做的可能比实际承诺的要少得多。对银行纾困的保证可降低储户急于提取存款而导致银行需要救援的可能性。

央行这次出手可谓迅捷。自2月以来，美联储已将利率降低了1.5个百分点。其他央行也纷纷效仿。不过，再要大幅降息已不可能了。早在病毒开始传播之前很久，利率就已经很低了。

| 上财政手段吧

并非所有央行都已尽其所能。中国还有降息的空间（基准利率为1.5%），但一定程度上由于通胀偏高（主要原因是非洲猪瘟影响了生猪存量，导致价格上涨）而未有动作。中央银行可以尝试更具创造性的政策。3月19日，欧洲央行理事会同意启动一项7500亿欧元的债券购买计划，涵盖主权债务和公司债务。但是，现在真正的行动是在财政方面。

各国政府正在竞相提供更大更好的刺激方案。所有国家都在医疗上投入更多资金，以期寻找疫苗和治疗方法，并提高医院的容量。不过，额外支出

中的大头是用于企业和民众。

先说企业。中国的疫情已经缓和，现在正努力让人们出门买东西。广东省佛山市已经启动了一项购车补贴计划。一些城市已经开始发放购物券，可在当地的商店和餐馆消费。本月南京发放了价值3.18亿元人民币的电子购物券。

但是，大多数国家正在或即将进入疫情最严重的阶段。随着客户枯竭，没有政府帮助的话会有许多企业破产。本刊的计算表明，人们避开社交场合会影响发达经济体中40%的消费者支出。休闲和招待类企业首当其冲。位于苏格兰乡村最偏僻地区的兰诺克沼地酒店（Moor of Rannoch）说，它投保的保险公司不会因酒店无人光顾而赔付一分钱，因为新冠肺炎是一种新疾病，不在其保险范围内。

一种方法是减少企业的固定成本，主要是租金和人力成本。中国财政部将免征企业社保缴费最多五个月。政府还暂时将大多数公司的电价下调了5%，并颁布了短期增值税削减计划。英国政府已为所有零售、酒店和休闲行业企业免征一年的营业房产税。然而，对于许多企业而言，无论政府如何帮助它们降低成本，收入都很可能进一步下降。

因此，也许需要采取措施帮助企业保持现金流。许多银行都提供大量透支，以帮助企业客户渡过难关。为了鼓励银行继续放贷，英国向他们承诺提供便宜的资金和国家对损失的担保。对于非常小的公司（其中许多公司根本没有借款），它正在提供最高25,000英镑的无需偿还的现金补助。

其他国家也在制定类似的计划。日本政府动员其国有放款人提供至多1.6万亿日元的紧急贷款来帮助小企业，其中大部分没有利息和抵押要求。如果小企业的月销售额比正常月份少至少15%，就有资格获得帮助。德国富裕的巴伐利亚州于3月16日宣布，拥有不超过250名员工的中小型企业可以立即获得5000至30,000欧元的现金注入。欧盟委员会已经放宽了国家援助的规定，以便政府向陷入困境的企业提供帮助。

财政对策的第二部分是帮助民众，特别是保护人们免于失业或收入剧减的

冲击（如果发生的话）。世界银行的乌戈·吉蒂利尼（Ugo Gentilini）称，有超过25个国家把现金转移支付加入了针对病毒的经济对策。巴西将给约占劳动力的40%的非正式工人提供每人200雷亚尔（38美元），小企业可以延迟纳税，退休人员将提早拿到年终福利。澳大利亚将向退休人士、退伍军人和低收入人群一次性发放现金750澳元（434美元）。

北欧在实施降低公司裁员可能性的政策方面领跑。德国放宽了“短工时”津贴政策（*Kurzarbeit*）的申请标准，向更多因为公司陷入困境而被缩短了工时的雇员补偿其损失工资的60%到67%。德国联邦劳工局称申请数量暴涨。在2008至2009年的经济衰退期间，这项津贴政策可能使得失业率的增长减少了一半。现在有更多的公司有资格使用它，临时工也被囊括进去，政府还将补偿公司为受影响的工人缴纳的社会保障金。

丨 带丹麦培根回家

在丹麦，对于有可能失去30%或更多劳动力的公司，政府将支付原本会被裁员的员工75%的工资直至6月。挪威政府提高了失业救济金，保证下岗工人在头20天会获得全薪；失去工作超过两周的自由职业者将获得相当于其先前平均收入的80%的付款。在瑞典，该州将支付被裁员工一半的收入，雇主被要求支付其余一半的大头。

到目前为止，美国通过的立法更温和。咨询机构牛津经济研究院（Oxford Economics）估计，为穷人提供医疗服务的医疗补助计划（Medicaid）所获的联邦资助如果持续到12月底，可能会增加约300亿美元的支出。美国还对大约3000万工人实行新的带薪病假政策，其中包括1000万自雇人士，总价值略高于1000亿美元。但在这方面，美国只是在追赶其他富裕国家，那些国家的病假政策要慷慨得多。与大多数其他富裕国家相比，美国也没有多少自动化经济稳定器，比如慷慨的失业保险。其结果是，它见机行事的财政刺激需要特别庞大才能有所作为。

它还真可能非常大。如果国会批准，特朗普政府直接给家庭送钱的计划将是最重要的政策。它与香港2月份推出的计划有些相似，该计划由政府直接向每位永久居民提供10,000港币（1290美元）。据信姆努钦倾向于让每

个美国人拿到一张1000美元的支票——大约等于私营部门工人一周的平均工资，之后还可能再拿一张。约5000亿美元的直接付款可能很快就会到位。

一些经济学家质疑这项政策。一方面，与北欧的计划不同，它对于阻止雇主裁员几乎没什么作用。从香港的经验来看，另一个潜在的问题是计划的执行：香港财政司司长希望在“夏季末”发放首笔付款，这对于上周已经失业的人来说太遥远了。姆努钦承诺付款会快得多。

| 成败参半的过去

美国以前也做过类似的事情，结果并没有多么鼓舞人心。政府在2001年和2008年都发放了支票来阻止经济放缓。证据表明人们存下了很大一部分。对于许多美国人来说，增加一点儿现金的心理安慰意义重大，但金额并不是很可观。民主党总统候选人伯尼·桑德斯（Bernie Sanders）并不以精明的经济政策闻名，但他建议在危机结束前给每户每月发放2000美元，倒可能更接近所需的水平。

确实，全世界都将需要采取更多的财政刺激措施，尤其是在遏制病毒传播的措施不力的情况下。日本政府在本月底通过下一个财政年度的预算后，可以开始制定一项补充预算来充分考虑病毒的影响。英国议会已授予财政大臣里什·萨纳克（Rishi Sunak）全权来提供他认为必要的任何支持，没有上限。

实际来说，财政政策还能再走多远？去年，国际货币基金组织追踪的约35个富裕国家的财政赤字总计1.5万亿美元（占GDP的2.9%）。如果假设平均赤字占GDP的比重上升五个百分点——并非不可能，那么富裕国家的总借贷今年将超过4万亿美元。投资者必须愿意为这种挥霍提供资金。十年期美国国债的收益率一度因对病毒的恐惧和交易者寻求避风港而下跌至0.5%，最近回升至1%以上。这可能是由于公司和投资者出售手头哪怕最安全的资产来筹集现金，但也可能反映出对计划中的政府借款规模的担忧。

但是，按照历史标准，1%仍然极低。由于包括人口老龄化在内的多种原因，至少在正常时期，对低风险政府证券的需求是空前的。日本央行已承诺购买无限量的债券，以将其政府十年期债券的收益率保持在接近于零的水平。投资者对某些富裕国家的债券仍然感到不安，尤其是增长缓慢的欧洲国家。欧洲央行最新的干预措施应该会使意大利等因债台高筑而受到市场怀疑的经济体更便宜地借贷，尽管它并不能完全消除人们对欧元区愿意采取行动避免危机的怀疑。

为大笔支出提供资金的问题可能不仅仅是理论上的，而更是实际操作上的。美国财政部不可能在一夜之间发行数万亿美元的新债券，但它可以向美联储发行票据和债券，后者将其记入财政部的账户，从而可以立即动用大量资金，咨询公司万神殿宏观经济（Pantheon Macroeconomics）的伊恩·谢泼德森（Ian Shepherdson）指出。债券可以在日后再出售给投资者。这种方法等同于印钞，但在当前困境中，通胀失控的风险很小。

不论是从人还是经济的角度，新冠肺炎造成的经济打击对富裕国家都将非常沉重。但它们的处境相对幸运——拥有强大的医疗系统，投资者目前仍愿意廉价向他们提供贷款。而在那些病毒威胁同样在迅速增长的贫穷国家，借贷的空间更小，就业市场上没有资格享受多种保护的非正式工人的比例也更高。富裕世界面临艰难时期，但将度过危机。贫困地区的前景就要模糊得多。■



The world economy

Fighting the slump

As the virus rages, governments need to be able to dial financial support up and down for people and firms

IN JUST TWO months the world economy has been turned upside down. Stockmarkets have collapsed by a third and in many countries factories, airports, offices, schools and shops have been closed to try to contain the virus. Workers are worried about their jobs and investors fear companies will default on their debts. All this points to one of the sharpest economic contractions in modern times. China's GDP probably shrank by 10-20% in January and February compared with a year earlier. For as long as the virus rages, similar drops are likely in America and Europe, which could trigger a further downward lurch in Asia. Massive government intervention is required to ensure that this shock does not spiral into a depression. But scale alone is not good enough—new financial tools need to be deployed, and fast.

Western authorities have already promised huge sums. A crude estimate for America, Germany, Britain, France and Italy, including spending pledges, tax cuts, central-bank cash injections and loan guarantees, amounts to \$7.4trn, or 23% of their GDP. Yet central banks are responsible for over four-fifths of that and many governments are doing too little. A huge array of policies is on offer, from holidays on mortgage-payments to bail-outs of Paris cafés. Meanwhile, orthodox stimulus tools may not work well. Interest rates in the rich world are near zero, depriving central banks of their main lever. Governments typically try to stimulate demand in a downturn but people trapped at home cannot spend freely. History is not much of a guide. The global pandemic of 1918 took place when the economy was wrecked by war. China has endured a lockdown but its social model is different from the West's.

What to do? An economic plan needs to target two groups: households and companies. And it needs to be fast, efficient and flexible so that if the virus retreats only to resurge, workers and firms can be confident that governments will dial assistance down and up again as needed. Start with households, where large government spending is needed. One aim is to protect vulnerable people, by subsidising sick pay and ensuring those without insurance have health care. But spending is also needed to discourage lay-offs at firms running far below capacity, by subsidising workers' wages—an area where Germany has led the way.

Governments also need to jerry-rig digital systems so they are able to distribute cash to households directly, as Hong Kong hopes to. The aim should be to have the capability to ramp further support up and down quickly. Many places, including America, rely on sluggish postal services and tax agencies to distribute cash. If funds can be sent instantly through mobile phones or online bank accounts, people will feel more confident and avoid hoarding cash and slowing the recovery when the virus recedes.

All this spending will cost governments dear, but the fiscal stimulus of about 1% of GDP so far across Europe is clearly too low. America's plan to spend 5% is closer to the mark given the risk of a double-digit GDP drop. As fiscal deficits balloon, governments will have to issue piles of bonds. Central banks should step in to buy those bonds in order to keep yields low and markets orderly. Inflation is a second-order concern and there is little danger of it taking off. To prevent a euro-zone crisis, the European Central Bank plans to buy €750bn of assets. But it and European governments should also give a clear guarantee of sovereign support for Italy and other peripheral economies.

The second priority is to get cash to millions of companies, whose failure would damage the economy's potential. They face a cash drought even as bills fall due. Bond markets are closed to many of them. Mass defaults

would fuel unemployment and bad debts at banks, and make it harder for commercial activity to rebound. Most governments have intervened, but in flawed ways. France says nationalisation is an option—which firms will resist. America is propping up the commercial-paper market, but this funds only a fraction of all corporate debt and is used by big firms—not small ones, which employ most people. Germany and Britain have offered loan-guarantee schemes but it is unclear who will process millions of loan applications. The best approach is to use the banking system—almost all firms have accounts, and banks know how to issue loans. Governments should offer banks cheap funding to lend to their clients while guaranteeing that it will bear most of the losses. Borrowers could be offered bonuses for repaying loans early.

There are huge drawbacks to all of this. Public and corporate debt will soar. Handouts will be given to rich people and loans extended to firms that are badly run. But even with this fearful list of side-effects, the advantages are overwhelming. Cash will be distributed fast. Vulnerable people will be able to get by. Households will be confident enough to spend when conditions improve. And firms will keep their workforces and plants intact, ready to get back to action when this dark episode has passed. ■



【首文】世界经济

对抗衰退

病毒肆虐，政府要能灵活便捷地调整对个人与企业的财政支持【新冠报道】

仅仅两个月，世界经济就已天翻地覆。股市暴跌三分之一，在许多国家，为遏制病毒扩散，工厂、机场、办公室、学校及商店都已关闭。劳动者担心工作不保，投资者担心企业发生债务违约。这一切预示着世界将经历现代史上最急剧的经济萎缩之一。中国在1月和2月的GDP较去年同期大概缩水了10%至20%。只要病毒持续肆虐，美国和欧洲就很可能出现类似的萎缩，这又可能引发亚洲经济进一步下行。政府需要大规模干预，以确保这场冲击不会恶化为大萧条。但仅靠规模还不够，还得启用新的财政手段，而且要快。

西方国家的政府已承诺投入巨资挽救经济。据粗略估计，美、德、英、法、意在支出承诺、减税、央行注资及贷款担保等方面的投入将共达7.4万亿美元，占这些国家GDP总值的23%。然而其中超过五分之四都是由央行承担的，许多政府的作为还是太少。从暂缓按揭还款到向巴黎的咖啡馆提供纾困金，可推出的政策多种多样。与此同时，正统刺激手段这次可能不大奏效。富裕国家的利率接近零，央行因而无法再动用其主要杠杆。政府通常会在经济低迷时期设法刺激需求，但人们被困家中，难以自由消费。历史上可供借鉴的经验不多。1918年流感大流行发生在经济遭受战争破坏之时。中国经受了封城抗疫，但其社会模式不同于西方国家。

该怎么办？经济方案需要针对两个群体：家庭和企业。而且必须迅速、高效且灵活，这样即使疫情在消退后卷土重来，劳动者和企业也有信心政府会根据需要再次调拨援助。先说对家庭的救助，这需要政府大量拨款。目标之一是保护弱势群体，方法是补贴病假工资以及确保没有医保的人能获得医治。但同时还需要通过补贴员工工资来防止开工严重不足的公司裁员，在这方面德国已率先行动。

政府还需要临时部署数字系统向家庭直接派发现金，就像香港希望做的那

样。目标应该是打造可以迅速调整支持力度的能力。包括美国在内的许多地方都依赖缓慢的邮政服务和税务机构来分发现金。假如能通过手机或网上银行账户即时转账，人们的消费信心会增强，不会在疫情消退时还囤积现金，拖慢经济恢复的速度。

这一切支出将让政府耗资巨大，但整个欧洲目前用于财政刺激的资金还只占GDP的1%左右，显然太低了。鉴于GDP可能出现两位数的下跌，美国占GDP5%的支出计划更为合理。随着财政赤字激增，政府将不得不发行大量债券。央行应介入购买这些债券，从而使收益率保持在低水平，维护市场秩序。通胀不是首要考虑的问题，而且目前通胀风险不大。为防止欧元区发生危机，欧洲央行计划购买7500亿欧元的资产。但它和欧洲各国政府还应明确保证对意大利和其他外围经济体的主权债务支持。

第二项要务是向数以百万计的企业提供资助，它们如果倒闭会损害经济潜力。眼看各种账单纷纷要到期，它们却紧缺现金。它们当中有很多都无法利用债券市场。大规模违约将加剧失业和银行坏账，使商业活动更难恢复。大多数政府都已出手干预，但方法都有问题。法国政府认为国有化是个办法，但企业肯定会反抗。美国政府正在支撑商业票据市场，但它只占到全部公司债务融资的一小部分，而且使用它的都是大公司，而非提供了大部分就业的小公司。德国和英国的政府推出了贷款担保计划，但并不清楚谁会来处理数百万笔贷款申请。最好的方法是使用银行系统，因为几乎所有的公司都有帐户，而银行熟悉发放贷款的流程。政府应向银行提供廉价资金，让它们贷款给客户，同时保证承担大部分损失。还可以向提前偿还贷款的借款人发放奖金。

上述方案都有严重的弊端。公共及公司债务将激增。富人也会拿到补助，经营不善的公司也能获得贷款。但即便有这么多可怕的副作用，其优点还是压倒性的。现金会快速地派发出去，弱势群体将能暂时渡过难关。等情况好转时，家庭会有足够的信心消费。公司也将保持员工队伍和厂房无恙，准备好在这黑暗一幕过后恢复运作。■



The pandemic

Closed

The struggle to save lives and the economy is likely to present agonising choices

PLANET EARTH is shutting down. In the struggle to get a grip on covid-19, one country after another is demanding that its citizens shun society. As that sends economies reeling, desperate governments are trying to tide over companies and consumers by handing out trillions of dollars in aid and loan guarantees. Nobody can be sure how well these rescues will work.

But there is worse. Troubling new findings suggest that stopping the pandemic might require repeated shutdowns. And yet it is also now clear that such a strategy would condemn the world economy to grave—perhaps intolerable—harm. Some very hard choices lie ahead.

Barely 12 weeks after the first reports of people mysteriously falling ill in Wuhan, in central China, the world is beginning to grasp the pandemic's true human and economic toll. As of March 18th SARS-CoV-2, the virus behind covid-19, had registered 134,000 infections outside China in 155 countries and territories. In just seven days that is an increase of almost 90,000 cases and 43 countries and territories. The real number of cases is thought to be at least an order of magnitude greater.

Spooked, governments are rushing to impose controls that would have been unimaginable only a few weeks ago. Scores of countries, including many in Africa and Latin America, have barred travellers from places where the virus is rife. Times Square is deserted, the City of London is dark and in France, Italy and Spain cafés, bars and restaurants have bolted their doors. Everywhere empty stadiums echo to absent crowds.

It has become clear that the economy is taking a much worse battering than

analysts had expected. Data for January and February show that industrial output in China, which had been forecast to fall by 3% compared with a year earlier, was down by 13.5%. Retail sales were not 4% lower, but 20.5%. Fixed-asset investment, which measures the spending on such things as machinery and infrastructure, declined by 24%, six times more than predicted. That has sent economic forecasters the world over scurrying to revise down their predictions. Faced with the most brutal recession in living memory, governments are setting out rescue packages on a scale that exceeds even the financial crisis of 2007-09.

This is the backdrop for fundamental choices about how to manage the disease. Using an epidemiological model, a group from Imperial College in London last week set out a framework to help policymakers think about what lies ahead. It is bleak.

One approach is mitigation, “flattening the curve” to make the pandemic less intense by, say, isolating cases and quarantining infected households. The other is to suppress it with a broader range of measures, including shutting in everybody, other than those who cannot work from home, and closing schools and universities. Mitigation curbs the pandemic, suppression aims to stop it in its tracks.

The modellers found that, were the virus left to spread, it would cause around 2.2m deaths in America and 500,000 in Britain by the end of summer. In advanced economies, they concluded, three months of curve-flattening, including two-week quarantines of infected households, would at best prevent only about half of these. Moreover, peak demand for intensive care would still be eight times the surge capacity of Britain’s National Health Service, leading to many more deaths than the model did not attempt to compute. If that pattern holds in other parts of Europe, even its best-resourced health systems, including Germany’s, would be overwhelmed.

No wonder governments are opting for the more stringent controls needed to suppress the pandemic. Suppression has the advantage that it has worked in China. On March 18th Italy added 4,207 new cases whereas Wuhan counted none at all. China has recorded a total of just over 80,000 cases in a population of 1.4bn people. For comparison, the Imperial group estimated that the virus left to itself would infect more than 80% of the population in Britain and America.

But that is why suppression has a sting in its tail. By keeping infection rates relatively low, it leaves many people susceptible to the virus. And since covid-19 is now so widespread, within countries and around the world, the Imperial model suggests that epidemics would return within a few weeks of the restrictions being lifted. To avoid this, countries must suppress the disease each time it resurfaces, spending at least half their time in lockdown. This on-off cycle must be repeated until either the disease has worked through the population or there is a vaccine which could be months away, if one works at all.

This is just a model, and models are just educated guesses based on the best evidence. Hence the importance of watching China to see if life there can return to normal without the disease breaking out again. The hope is that teams of epidemiologists can test on a massive scale so as to catch new cases early, trace their contacts and quarantine them without turning society upside down. Perhaps they will be helped by new drugs, such as a Japanese antiviral compound which China last week said was promising.

But this is just a hope, and hope is not a policy. The bitter truth is that mitigation costs too many lives and suppression may be economically unsustainable. After a few iterations governments might not have the capacity to carry businesses and consumers. Ordinary people might not tolerate the upheaval. The cost of repeated isolation, measured by mental well-being and the long-term health of the rest of the population, might not

justify it.

In the real world there are trade-offs between the two strategies, though governments can make both more efficient. South Korea, China and Italy have shown that this starts with mass-testing. The more clearly you can identify who has the disease, the less you must depend upon indiscriminate restrictions. Tests for antibodies to the virus, picking up who has been infected and recovered, are needed to supplement today's which are only valid just before and during the illness. That will let immune people go about their business in the knowledge that they cannot be a source of further infections.

A second line of attack is to use technology to administer quarantines and social distancing. China is using apps to certify who is clear of the disease and who is not. Both it and South Korea are using big data and social media to trace infections, alert people to hotspots and round up contacts. South Korea changed the law to allow the state to gain access to medical records and share them without a warrant. In normal times many democracies might find that too intrusive. Times are not normal.

Last, governments should invest in health care, even if their efforts take months to bear fruit and may never be needed. They should increase the surge capacity of intensive care. Countries like Britain and America are desperately short of beds, specialists and ventilators. They should define the best treatment protocols, develop vaccines and test new therapeutic drugs. All this would make mitigation less lethal and suppression cheaper.

Be under no illusions. Such measures might still not prevent the pandemic from extracting a heavy toll. Today governments seem to be committed to suppression, whatever the cost. But if the disease is not conquered quickly, they will edge towards mitigation, even if that will result in many more deaths. Understandably, just now that is not a trade-off any government is

willing to contemplate. They may soon have no choice. ■



【首文】全球大流行病

停摆

救命也要救经济，这将带来十分痛苦的抉择【新冠报道】

我们这个星球正在停摆。为防控新冠肺炎，一个接一个的国家要求国民减少社会接触。这令经济陷入困境，心急火燎的政府正试图通过发放数万亿美元的援助和贷款担保来帮助企业和消费者渡过难关。这些挽救措施效果会如何谁也说不准。

然而还有更糟糕的事。令人不安的新研究结果表明，要终止这场全球大流行可能需要反复地停摆。而现在可以明确的一点是，这种抗疫策略将导致世界经济遭受严重的，也许是无法承受的损害。等着大家的是一些非常艰难的抉择。

中国中部城市武汉首次报告出现不明原因病例后仅仅12周，全世界就开始见识到这场大流行病对人类和经济的真正冲击。截至3月18日，新冠病毒已在中国以外的155个国家和地区造成了13.4万例感染病例。短短七天之内，新增病例接近9万例，受感染的国家和地区增加了43个。实际感染人数被认为至少是确诊病例的十倍。

一片惊惶之中，各国政府纷纷紧急实施就在几周前还难以想象的防控手段。包括许多非洲和拉美国家在内的众多国家都禁止来自疫情严重地区的旅客入境。纽约时代广场空无一人，伦敦金融城一片黑暗，法国、意大利和西班牙的咖啡馆、酒吧和餐馆大门紧闭。各地体育场馆空空荡荡，人潮不再。

已经清楚的是，经济遭受的打击比分析师们预期的要严重得多。原本预计中国1月和2月的工业产值会较去年同期下降3%，但实际下降了13.5%；零售额降幅不是预期的4%，而是20.5%。衡量机械和基础设施等方面支出的固定资产投资下降了24%，是预期的六倍。世界各地的经济预测机构因而纷纷下调之前的预测。面对人们记忆中最残酷的经济衰退，各国政府正

在制定规模甚至超过2007至2009年金融危机时的救助方案。

这就是人们要对控制疫情做出根本性的抉择所面临的现实。上周，伦敦帝国理工学院的一个研究小组运用流行病学模型建立了一个框架，帮助政策制定者思考未来局面。结果显示形势很严峻。

一种方法是减缓疫情，例如通过隔离患者和受感染家庭，“压平曲线”，减轻疫情严重程度。另一种方法是用更广泛的措施来压制疫情，包括要求所有人居家不出（不能在家工作的人除外），并关闭各类学校。减缓措施意在抑制疫情，而压制措施则是要彻底阻断扼杀它。

建模人员发现，如果任由病毒传播，到夏季末，美国将约有220万人死于该病毒，英国为50万。他们推断，在发达经济体中，实施三个月的减缓措施（包括隔离被感染家庭两周）最多只能令预计死亡人数减少约一半。此外，疫情高峰期对重症监护服务的需求仍将是英国国家医疗服务体系（NHS）应急服务能力的八倍多，这会使死亡人数大大增加，而模型尚未计入这一部分。如果欧洲其他地区也按这种模式发展，即使是资源最充裕的卫生系统（包括德国的）也将不堪重负。

难怪各国政府正选择采取更严格的控制措施来压制疫情。压制措施的优势是它在中国已见成效。3月18日，意大利新增4207个病例，而武汉的统计显示零新增。中国有14亿人口，确诊病例略超过8万。相比之下，帝国理工学院的研究小组估计，如果放任病毒传播，英美将有80%以上的人口感染。

但正因为如此，压制措施的麻烦在后头。把感染率保持在相对较低的水平，也就意味着很多人仍然有感染病毒的危险。而帝国理工的模型显示，由于疾病如今在国家内部和全球各地广泛传播，只要限制措施一取消，几周之内本地疫情就会复发。为了避免这种情况，各国必须在每次疫情复发时都压制它，至少一半时间都处于封城封国状态。这种不断“开/关”的模式必须重复施行，直至病毒冲击过全体人口或者可能在几个月之后有了疫苗——如果它真的有效的话。

这只是一个模型，模型只是基于最佳证据的合理推测。所以，重要的是观察中国的情况，看生活恢复正常后疫情能否不再复发。希望在于，各个流行病学团队可进行大规模检测，以便及早发现新病例，追踪接触史并隔离相关人员，同时不会令社会秩序大乱。也许新药物会有帮助，例如中国上周表示日本的一款抗病毒药物显示出较好的前景。

但这只是希望，而希望不是政策。严酷的事实是，减缓措施会夺去太多性命，而压制措施则可能导致经济挺不下去。经过几轮反复，政府可能再也无力负担企业和消费者。普通人可能忍受不了这种动荡。如果考虑到整体人群的心理健康和长期健康，反复隔离的代价可能使得这种措施站不住脚。

在现实世界中，在两种策略间会有平衡折中，但政府可以让两者都变得更高效。从韩国、中国和意大利的经验来看，这可以从大规模排查开始。越能清楚识别染病者，就越不必实施全面的无差异限制。现在的检测只能发现发病前和发病中的人，除此之外还需要推广病毒抗体检测以找出被感染过而已康复的人。这将让已获得免疫力的人群知道自己不会再成为感染源，从而可以自由开展常规活动。

第二条进攻路线是运用技术来管理隔离和保持社交距离。中国正在运用手机应用来认证需要隔离管理的人群。中国和韩国都在利用大数据和社交媒体追踪病例，提醒人们避开病例聚集爆发地，以及追踪隔离密切接触者。韩国修订了法律，政府无须申请搜查令就能调阅及共享患者病历。在正常时期，许多民主国家可能会认为这种做法过于侵扰隐私。但如今是非常时期。

最后，政府应加大医疗投资，即便这样的努力需要几个月才能显现成果，甚至有些可能永远派不上用场。政府应提升重症监护的应急服务能力。英美等国紧缺床位、专科医师和呼吸机。政府还应制订最佳治疗方案，研发疫苗并测试新药。这一切将减少减缓措施中的死亡人数，降低压制措施付出的代价。

但别抱幻想。这些措施可能仍然无法阻止这场全球大流行病带来惨重的损失。目前，各国政府似乎都在拼命压制疫情。但假如无法速战速决，它们将渐渐转向减缓措施，即便这将导致更多人死亡。可以理解的是，眼下任何政府都不愿意考虑这种妥协。但它们可能很快就别无选择了。■



Schumpeter

Plan V

Covid-19 is foisting change on business. Some of it may be for the better

IN FEBRUARY 2014 a strike on the London Underground offered management theorists a lesson in resilience and adaptation. Because the shutdown closed some but not all Tube lines, frustrated Londoners were forced to rethink their commutes to and from work. Researchers at Oxford and Cambridge universities subsequently found that around 5% of passengers stuck to their new itineraries even after normal service resumed. The long-term economic gains of one in 20 travellers adopting new and improved ways to get to work turned out to be greater than the short-term costs of the disruption.

The global covid-19 outbreak presents a far greater challenge to the corporate world than striking transport workers. Profit warnings are spreading nearly as fast as the disease. Analysts at Goldman Sachs, a bank, estimate that earnings growth for firms in the S&P 500 index could grind to a halt. Gauges of business activity, such as purchasing managers' indices, have cratered in Asia and are expected to weaken elsewhere as the coronavirus crosses more borders. Consumers are spending money on little except sanitary wipes, face masks and tins of Campbell's Soup. Fears of a pandemic have wiped \$7trn off the market value of listed firms worldwide in the past fortnight.

Some companies will, like most of London's commuters, revert to autopilot once the threat recedes. But for others the interruption will have a lasting effect, accelerating trends in business organisation that were already under way. Two are particularly important. The next few months are set to be a giant experiment in whether new technologies can allow successful mass remote working for employees, speeding up the reinvention of the office.

And for firms already worried about rickety supply chains amid a trade war, the virus gives another reason to reconfigure them.

Take employees first. Companies have had to ask themselves whether to let employees travel, attend conferences or even come into the office. In all three cases the answer is increasingly “no”. Many big firms, including Amazon and JPMorgan Chase, have banned all non-essential excursions. Airlines and hotels are reporting steep falls in bookings. Corporate Travel Management, a listed Australian firm that organises business jaunts, has warned the impact could last up to six months. It has slashed its earnings forecast for the year by up to 16.5%. A survey by the Global Business Travel Association, an industry body, found that business travel, which costs companies over \$1trn a year (and emits roughly as much carbon as Ukraine in flights alone), could fall by over a third while the epidemic rages.

Large corporate events are being called off. The oil industry’s biggest annual jamboree in Houston and the Geneva motor show will not take place this month. Google and Facebook have given the term “teleconferencing” a whole new meaning by moving a few of their big shindigs partly or wholly online. With Milan and Paris fashion weeks curtailed, Armani streamed its autumn/winter show from behind closed doors. This is bad news for events firms such as Informa, whose share price is down by a fifth since the start of February, especially at a time when many high-profile industry powwows are already losing their lustre.

At the same time more companies are learning to love telecommuting. On March 3rd JPMorgan Chase told thousands of its bankers in America to work from home as it tests its contingency plans. Twitter has asked its 5,000 employees to do likewise. Sony went so far as to shut some of its European offices altogether, just in case. The affected workers are nonetheless expected to toil remotely.

As well as highlighting how bloated some travel budgets are, virus contingency plans may also reveal how inefficiently office space is used. Big British and American firms pay on average \$5,000 per employee in annual rental costs. Just 40-50% of desks are actually used during working hours—often not very well. Last year two in five respondents to a survey of 600,000 desk-jockeys by Leesman, a data provider, said their office prevented them from working productively. If their managers now find that productivity does indeed rise—or at least doesn't dip—as staff self-isolate at home, the case for teleworking may look irresistible. Investors are betting it will. In the past month the share prices of Slack, a corporate-messaging platform, and Zoom, which makes videoconferencing software, have shot up by 18% and 35%, respectively.

The second way in which companies are rethinking their business has to do with supply chains. Since the 1980s these have become more complex and global, with large firms now dependent on thousands of suppliers. The embrace of lean manufacturing and just-in-time delivery of components, pioneered by Toyota in the 1970s, has made production more efficient but more vulnerable to disruption, as companies stockpile fewer and fewer necessary materials. The median firm in the S&P 500 carries only 66 days of inventory, and some have far smaller buffers than even that—Apple has just nine days, according to data from Bloomberg.

When natural disasters strike big companies usually get by, shifting production temporarily from afflicted areas to those that are not. But unlike a flood, an earthquake or even the Sino-American trade war, all of which companies have some experience in planning for, covid-19 could affect all of a firm's actual and potential subcontractors simultaneously. In such a scenario carrying bigger inventories and having suppliers at home may no longer look wasteful. It may come to be seen as necessary.

| *Immune response*

The coronavirus will not make business travel or lean global supply chains disappear. Chinese factories are cranking up again and high-flyers will, in all likelihood, be back in airport lounges soon enough. But the crisis offers a chance to experiment with new ways of doing things—and to question the wisdom of old habits. Chief executives should not be immune to the opportunity. ■



熊彼特

V计划

新冠肺炎正在迫使企业做出改变。某些改变可能会成为利好【新冠报道】

二〇一四年二月，伦敦地铁工人罢工给管理学家们上了一堂关于抗冲击和适应性的课。由于罢工导致部分地铁线路停运，沮丧的伦敦人被迫重新考虑通勤方式。牛津大学和剑桥大学的研究人员随后发现，即使在地铁服务恢复正常之后，仍有大约5%的乘客继续按新路线出行。事实证明，每20名乘客中有1人采用经过新的改进的通勤路线所带来的长期经济收益要大于混乱造成的短期损失。

与运输工人罢工相比，全球爆发新冠疫情给企业界带来的挑战要大得多。眼下盈利预警的扩大几乎和疾病一样快。高盛的分析师估计，标普500指数成分股公司的收益增长可能会逐渐停止。采购经理人指数等衡量商业活动的指标在亚洲已经大幅下跌，随着病毒蔓延到更多国家，预计在其他地区也将减弱。除了购买消毒湿巾、口罩和金宝汤罐头外，消费者几乎不再花钱。过去两周里，对疫情全球大流行的担忧导致全球各地上市公司的市值蒸发了7万亿美元。

一些公司会像伦敦的大多数通勤者那样，在威胁消退后恢复惯有模式。但对另一些公司来说，此次中断会产生持久的影响，加速商业组织形式中业已存在的趋势。其中有两点特别重要。未来几个月将是一场大规模的实验，看看新技术能否让员工成功开展大规模远程工作，加速办公室的再造。而对于那些在贸易战中就已经在担心供应链不稳定的公司来说，病毒又给了它们一个重新配置供应链的理由。

先说员工。公司已经不得不自问，还要不要让员工出差、开会，甚至进办公室。对于这三个问题，越来越多的回答是“不要”。包括亚马逊和摩根大通在内的许多大公司都禁止了所有非必要的差旅。航空公司和酒店的预订量急剧下降。组织商务旅行的澳大利亚上市公司商旅管理公司

（Corporate Travel Management）警告称，这种影响最长可能会持续六个

月。该公司将今年的盈利预期下调了16.5%。行业组织全球商务旅行协会（Global Business Travel Association）的一项调查发现，企业的商务旅行成本每年超过1万亿美元（仅商旅航班的碳排放量就与乌克兰一国相当），随着疫情的蔓延，商务旅行可能会减少三分之一以上。

大型企业活动也被取消。本月，休斯顿将不会举行石油行业最大的年度盛会，日内瓦车展也将取消。谷歌和Facebook把自己的几个大型会议部分或全部转移到线上，赋予了“电话会议”一词全新的含义。米兰和巴黎时装周草草收场，阿玛尼关起门来在网上直播了今年的秋冬时装秀。这对Informa这样的活动策划公司来说是个坏消息，尤其是在许多知名的业界聚会本就已光彩渐失的情况下。自2月初以来，Informa的股价已经下跌了五分之一。

与此同时，越来越多的公司开始喜欢远程办公。3月3日，摩根大通要求它在美国的数千名银行员工在家办公，以测试其应急计划。推特也已经要求它的5000名员工这样做。索尼甚至关闭了部分欧洲办事处以防万一，不过受影响的员工还是要远程工作。

除了突显部分商旅预算有多庞大之外，病毒应急计划也许还揭示了办公空间的利用效率有多低下。英国和美国的大公司平均每年为每名员工支付5000美元的租金，而实际上在办公时间内只有四五成办公桌被使用，通常还不是充分使用。去年数据供应商Leesman对60万名办公室职员展开调查，五分之二受访者表示，办公室妨碍了他们高效工作。如果他们的主管现在发现员工在家自我隔离时工作效率真的提高了，或者至少没有下降，那么远程办公也许看起来就愈发诱人。投资者下注远程办公会成功。上个月，企业通讯平台Slack和视频会议软件公司Zoom的股价分别上涨了18%和35%。

企业对自身业务的第二个反思在供应链方面。自上世纪80年代以来，供应链变得更加复杂和全球化，大公司现在依赖于成千上万的供应商。丰田在上世纪70年代率先推行精益生产和零部件及时交付，企业积极践行这样的生产方法，提高了生产效率，但也更容易受到生产中断的影响，因为企业

必需物料的库存越来越少。根据彭博的数据，标普500指数公司的库存中值仅为66天，有些公司的缓冲甚至还要短得多——苹果公司只能撑九天。

当自然灾害来袭时，大公司通常能应付过去，把生产暂时从灾区转移到安全地区。在应对洪水、地震甚至中美贸易战这些问题时，各家公司都有一定经验。但新冠肺炎不同，它可能会同时影响一家公司所有的分包商——不管是现有的还是可能的。在这种情况下，持有更大的库存并在国内拥有供应商也许不再被视为浪费，而可能被认为有必要。

| 免疫反应

冠状病毒不会让商务旅行或精益式全球供应链完全消失。中国的工厂正在重启，成功人士十有八九很快就会回到机场休息室。但这次危机提供了一个尝试新的行事方式的机会，并对老套路明智与否提出了质疑。首席执行官们不应对这种机遇免疫。 ■



Ageing Europe

Old, rich and divided

All of the rich world is ageing. But demography could tear Europe apart

FOR BULGARIAN bosses, recruitment is becoming a bit of a nightmare. Finding a lathe operator—competent or otherwise—takes more than six months, and may require forking out cash to a recruitment agency. Older, savvier machine operators are retiring, complains Julian Stephanov, who runs a manufacturing firm near Sofia, and too few young people have the right skills. One problem is a lack of training. Another is that Bulgaria's workforce has shrunk by 6% since 2008. Continued high emigration and low birth rates mean it is expected to fall by another third by 2050.

All across Europe, people are living longer and having fewer children. The same trends are, of course, seen in other rich countries, and many developing ones—but coping with them will be harder in Europe, because of its half-formed union where workers can move freely and many countries share a currency, but where there is no common fiscal policy or strategy to deal with ageing.

Investors are well aware of some of Europe's shortcomings. The sovereign-debt crisis showed that converging inflation and interest rates did not, by themselves, ensure a sustainable currency union or integrated banking system. Wage bargaining, regulation and so on need to converge to stop imbalances between countries building up. Less well understood is that demography could also tear the union apart.

Even though Europe receives more migrants than it loses, the UN projects that its population will fall by around 5% by 2050. By then the median European will be 47 years old, nine years older than at the turn of the century, and four years older than the median American. In 2015 there was

about one person older than 65 for every four people of working age (ie, an old-age dependency ratio of around 25%). By 2050 there will be two, to America's three.

Some countries will suffer even more. Spain and Italy are expected to lose more than a quarter of their workforce by 2050. Populations in the south and east are forecast to shrink by a tenth on average. With fewer workers, those countries risk seeing growth stagnate, even as rising spending on pensions and health services pushes up public debt.

The 28 members of the European Union fall into three broad groups. Women in northern and western countries tend to have more children than the EU average (Germany is an exception). Though their fertility rates are below the 2.1 needed to sustain a population, high immigration means their populations have still grown.

Those in southern Europe, the second group, have stagnated or shrunk. Fertility rates are lower; in some countries, emigrants have outnumbered immigrants since 2010. Italy is emblematic. Older Italians drift away from work well before they reach pensionable age, and a shortage of child care means many women never return to work after giving birth. By the age of 50, just over half are in work. If those low employment rates persist as Italy ages further, in 2050 there will be more Italians over the age of 50 who are out of the labour force than there are workers of all ages, points out Stefano Scarpetta of the OECD, a Paris-based think-tank.

Populations in central and eastern Europe, the third group, have been falling fast because of emigration. Around 2.5m Romanian nationals of working age, equivalent to a fifth of the population, live elsewhere in the EU. These countries also have relatively low older and female participation rates (the Baltic states, which take inspiration from the Nordics, are an exception). Poland and Hungary offer financial incentives for child-

bearing. But research suggests that these rarely work.

These demographic disparities worsen economic divides. Southerners start in a poor position. Productivity is low and as the number of people in work falls, growth will weaken. Their gross public debt is already high—in Italy, over 130% of GDP—and risks rising further. The euro-zone's one-size-fits-all monetary policy may seem less appropriate as growth prospects diverge.

Most central and eastern countries are outside the currency union. But here too there are strains. EU membership promised speedy catch-up towards western European levels of income. But the IMF reckons that the annual growth rate of GDP per person will be up to a percentage point lower because of demographic decline, slowing convergence. Many of these newish members were initially keen on free movement. But after losing working-age people to Europe's north and west, they are cooling on it. Croatia, which lost 5% of its population in the three years after it joined in 2013, wants the union to discuss tackling the effects of demographic decline.

Migration within the EU, as in America, has seen workers move to more dynamic cities and regions. Research by the Centre for European Reform suggests that less successful places tend to be older and less productive. The EU has a pot of money to ensure "cohesion", but it is small and less equipped than national budgets to redistribute from winners to losers.

Europe needs coherent policies if it is to hold together as it ages. Older people and women—who tend to have lower employment rates—should be encouraged into work. If Italian women were as likely to work as German ones, Italy's workforce would be 14% bigger. Matching older workers' employment rates would add 5%.

Judging by France, providing cheap child care both encourages women into

work and supports fertility rates, says Mr Scarpetta. Existing workers can be better trained; automation can supplement them. Improving education and investing in infrastructure could increase productivity. Governments can ensure that retirement ages keep pace with lifespans. All these policies would have the added benefits of attracting immigrants and convincing would-be emigrants to stay.

To date, northern countries have done the most. Germany acted decisively in the 2000s, says Axel Börsch-Supan of the Munich Centre for the Economics of Ageing. Reforms to state pensions linked contributions and payouts to the old-age dependency ratio. Partly thanks to rises in the pensionable age, employment rates for older people, especially women, shot up. In 2000 the share of older people in the workforce was only slightly above that in Spain and Greece. Now it is the EU's third highest.

But enacting and sustaining reforms has proved tricky. Past reforms have been rolled back. Higher pensionable ages introduced in Italy in 2011 were partially reversed last year; so too were measures in Poland and even Germany. Strikes in France against a pensions overhaul are in their second month. Changes to pensions are so unpopular in the south because whole families often live off them, says Cinzia Alcidi of the Centre for European Policy Studies, a think-tank in Brussels. Spending more on working-age benefits would help.

The necessary reforms go far beyond those obviously connected to population ageing. Analysis by the European Bank of Reconstruction and Development, for instance, finds that cutting corruption and strengthening institutions in less well-run countries could convince potential emigrants to stay home. Marshalling a decisive response to the continent's changing demography will not be easy. But the EU's very survival may depend on it.





欧洲老龄化

老龄、富裕与分裂

富裕国家都在老龄化，但人口结构变化可能会分裂欧洲

对于保加利亚的企业老板来说，招聘简直成了一场噩梦。招一名车床操作工（无论称职与否）需要六个多月的时间，可能还要付钱给职介所。年纪较大的熟练操作工纷纷退休，技能适配的年轻人少之又少，在首都索非亚（Sofia）附近经营一家制造公司的朱利安·斯蒂芬诺夫（Julian Stephanov）抱怨道。一个原因是培训不足。另一个原因是保加利亚的劳动人口自2008年以来减少了6%。外迁人数居高不下，出生率持续走低，预计到2050年劳动人口还要缩减三分之一。

欧洲各地的人口寿命都在延长，生育率也都在降低。当然，其他富裕国家和许多发展中国家也存在相同的趋势。但在欧洲，应对这些趋势会更加困难，因为欧洲的工会不健全，工人可以自由流动；许多国家共用一种货币，却没有共同的财政政策或战略来应对老龄化。

投资者都很清楚欧洲的某些不足。主权债务危机表明，只是让通胀和利率趋同并不能确保可持续的货币联盟或统一的银行体系。工资谈判、法规等都需要趋同，以阻止国家之间不断扩大的失衡。人们不太了解的是，人口结构也可能分裂欧盟。

尽管欧洲接收的移民数量超过其外迁人口的数量，但据联合国预测，到2050年，欧洲人口将减少5%左右。届时欧洲的中位年龄将为47岁，比本世纪之交时大九岁，比美国的中位年龄大四岁。2015年，欧洲每四个劳动年龄人口大约负担一名65岁以上老人（即老年人口抚养比约为25%），到2050年将变成两个负担一个，美国是三个负担一个。

一些国家的情况还将更严重。预计到2050年，西班牙和意大利的劳动人口将缩减超过四分之一。南欧和东欧的人口预计将平均缩减十分之一。随着劳动人口减少，这些国家在养老金和医疗服务支出增加推高公共债务的同

时，还将面临增长停滞的风险。

欧盟的28个成员国可分为三大类。北欧和西欧国家女性的生育率往往高于欧盟平均水平（德国是个例外）。尽管这些国家的生育率低于维持人口所需的2.1，但大量移民涌入使得它们的人口仍在增长。

第二类是南欧的成员国，它们的人口或者停止增长，或者已经下降。生育率降低了；自2010年以来，某些国家的外迁人数超过了迁入人数。意大利的情况非常典型。年长的意大利人远未达到退休年龄就逐渐退出了劳动力市场，儿童保育服务不足导致许多女性在生育后不再重返职场。50岁以上人群中还在工作的刚刚过半。总部在巴黎的智库经合组织的斯特凡诺·斯卡佩特（Stefano Scarpetta）指出，随着意大利进一步老龄化，如果就业率持续低迷，那么到2050年，50岁以上不再工作的人口将比所有年龄段劳动人口的总数还要多。

中东欧国家属于第三类，人口因外迁而快速下降。罗马尼亚大约有250万劳动年龄国民居住在其他欧盟成员国，相当于该国总人口的五分之一。这些国家的老年人和女性的劳动参与率也相对较低（借鉴北欧的波罗的海国家除外）。波兰和匈牙利提供财政奖励来鼓励生育，但研究表明这无甚作用。

这些人口结构差异加剧了经济差距。南欧国家起点较低。它们的生产率低下，而随着劳动人口的减少，增长将会放缓。它们的公共债务总额已经很高（在意大利已经超过GDP的130%），并且可能进一步上升。随着增长前景的分化，欧元区一刀切的货币政策似乎欠妥。

大多数中欧和东欧国家都不属于欧元区，但也面临压力。加入欧盟原本有望迅速赶上西欧的收入水平，但国际货币基金组织估计，由于人口下降，人均GDP年增长率将放缓多达一个百分点，令趋同放缓。这些新晋成员国中有许多起初非常支持人口自由流动，但在大量劳动年龄人口流失到北欧和西欧之后，热情冷却了。克罗地亚在2013年加入欧盟后的三年内流失了5%的人口，它希望欧盟能就如何应对人口下降的影响展开讨论。

欧盟范围内的移民趋势与美国国内一样，也是劳动者向更有活力的城市和地区流动。欧洲改革中心（Centre for European Reform）的研究表明，不发达的地方往往人口年龄更大，生产率更低。欧盟有一笔资金来确保“凝聚力”，但钱不多，而且很难像国家预算那样在贫富之间做再分配。

欧盟若要在老龄化的过程中继续保持团结，就需要协同一致的政策。应鼓励就业率较低的老人和女性参加工作。如果意大利女性的就业率和德国女性一样，意大利的劳动力将扩大14%；如果其年长劳动力的就业率和德国一样，将扩大5%。

斯卡佩特说，从法国的情况来看，提供廉价的育儿服务既能鼓励女性参加工作，又能维持生育率。可以向现有劳动者提供更好的培训，自动化可以辅助他们工作。改善教育水平和投资基础设施可以提高生产率。政府可以确保随寿命延长调整退休年龄。所有这些政策都会带来额外的好处，即吸引外来移民，并说服有外迁想法的人留下来。

迄今为止，北欧国家做的努力最多。慕尼黑老龄经济学中心（Munich Centre for the Economics of Ageing）的阿克塞尔·博尔希-苏潘（Axel Börsch-Supan）说，德国在本世纪前十年采取了果断措施。对国家养老金的改革将缴费和支付与老年抚养比挂钩。一定程度上由于退休年龄的提高，年长劳动力、特别是女性的就业率猛增。2000年德国年长者占劳动人口的比例仅略高于西班牙和希腊，现在已跃居欧盟第三。

但事实证明，实施和维持改革都很难。一些过去的改革被撤销。意大利于2011年提高了领取养老金的年龄，但去年又回调了一些。波兰甚至德国的政策也是如此。法国抗议养老金改革的罢工已进入第二个月。布鲁塞尔的智库欧洲政策研究中心（Centre for European Policy Studies）的辛齐亚·阿尔奇迪（Cinzia Alcidi）说，在南欧，经常有整个家庭靠养老金为生的情况，所以养老金政策改革非常不受欢迎。增加与工龄挂钩的福利支出会有帮助。

必须改革的远不仅是与老龄化明显相关的问题。例如，欧洲复兴开发银行

（European Bank of Reconstruction and Development）的分析发现，在治理不善的国家减少腐败和加强制度建设或许可以说服想要移民的人留在国内。对欧洲的人口演变采取果断的对策并不容易，但欧盟的继续可能取决于此。■



Buttonwood

Involuntary code

A spike in the dollar has been a reliable signal of global panic. Are we due one?

THERE ARE two types of sellers in financial markets. The first kind sell because they want to. They may need cash to meet a contingency; or they might coolly judge that the risks of holding an asset are not matched by the prospective rewards. The second kind sell because they have to. The archetype is an investor who has borrowed to fund his purchase and has his loan called. If there are lots of forced sellers, as can happen in periods of stress, the result is a rout.

Involuntary selling can amplify any decline in asset prices. A called loan is not the only trigger. It might be a ratings downgrade; an order from a regulator; or a jump in volatility that breaches a risk limit. What happens in the markets then feeds back to the broader economy, making a bad situation worse.

This brings us to the dollar. An evergreen concern is the scale of dollar securities issued or held outside America. In the midst of the financial crisis of 2007-09, the Federal Reserve set up currency-swap lines with other central banks to deal with a lack of dollars, as borrowers outside America were caught short. In stressed markets a spike in the greenback is a tell. Investors sell what they own to buy the dollar not because they want to but because they have to.

So far the dollar has traded reasonably. In recent weeks it has rallied against a clutch of currencies hurt most by the slump in oil and commodity prices and lost ground against the yen and Swiss franc (the other havens in a storm) as well as the euro (see chart). Perhaps there are stresses out there, but they are obscured by other factors weighing on the dollar. There has

been a sense that it is due a fall. It looks expensive on yardsticks of value, such as purchasing-power parity. The Fed's interest-rate cut earlier this month, with further reductions likely, means that holding dollars has become less appealing.

Yet it is easy to forget how bearish sentiment on the dollar was in 2008. Many expected it to fall in the teeth of a crisis that had, after all, originated in America. Instead it spiked as banks outside America scrambled to get hold of greenbacks in order to roll over the short-term dollar borrowings that funded their holdings of mortgage securities. In 2015-16 China ran down its reserves by \$1trn in part to meet demand for dollars from Chinese companies who had borrowed heavily offshore. And notwithstanding attempts by countries, such as Russia, to de-dollarise their economies, the greenback is as central to the world economy as it ever was. If there are hidden strains in cross-border finance, they will eventually be revealed by spikes in the dollar.

It would be foolish to rule this out. No doubt pockets of stress will emerge in the coming weeks—a hedge fund, say, that has borrowed dollars to buy riskier sorts of assets and faces a cash crunch. But the sort of aggressive borrow-short-to-lend-long bets that intensified the 2007-09 crisis have been much harder to make. Banks have tighter constraints on their lending. Panic by overborrowed foreigners does not seem a first-order concern.

Other plausible, but voluntary, changes in behaviour would affect the dollar in a variety of ways, or not at all. Foreign investors might simply choose to sell (or refrain from buying) American securities amid the current turmoil—a sort of financial self-quarantine. But surplus savings must be put to work somewhere. Asian funds have been steady buyers of overseas debt securities. Japan's Government Pension Investment Fund, a \$1.6trn pool of retirement savings, had signalled that it will increase its holdings of foreign debt and equities in the coming financial year. There is no sign that

it is backing away from this, says Mansoor Mohi-uddin, of NatWest Markets in Singapore. Indeed there is a logic to its front-loading foreign-asset purchases, as a means of weakening the yen and helping Japan's exporters.

Japanese funds have in recent years preferred to buy euro-denominated debt, because the costs of hedging euro currency risk is low. But if the Fed keeps cutting rates, dollar hedges will become cheaper. Currency-hedged Asian investors might then tilt towards American assets. That would be neutral for the dollar (because of the hedging) but a welcome fillip for issuers of corporate debt in America.

The dollar remains an unloved currency. Witness the surge in gold prices spurred by seekers of an alternative. It is the currency investors are forced to buy, not the one they want to buy. The dollar's calmness is reassuring. A sudden spike in its value would be a bad sign indeed. ■



梧桐

非自愿信号

美元飙升向来是全球恐慌的可靠信号。危机要来了吗？【新冠报道】

金融市场上的卖家分两类。第一类是自己想要卖出。他们可能需要现金来应急，或者是冷静评估，认为持有某一资产的风险与预期回报不相称。第二类是不得不卖出。典型的情况就是投资者借钱买资产，然后收到通知被要求还款。如果出现大量被迫卖出者，正如在市场受压时期可能发生的那样，结果就是崩盘。

非自愿卖出可能会放大任何资产价格下跌幅度。还款通知并非唯一的诱因，可能还有评级下调、监管机构颁令，或者波动性激增突破了风险限额。市场上的变化继而又会反馈给更广泛的经济，令糟糕的局面恶化。

这时焦点就来到了美元上。美国境外发行或持有的美元证券的规模从来都是一个关切点。2007到2009年金融危机期间，鉴于美国境外的借款人没有足够的美元偿还债务，美联储与其他央行建立了货币互换机制以应对美元紧缺。在市场受压时，美元飙升就是一个信号。此时投资者出售资产来买入美元，并非他们情愿，而是迫不得已。

到目前为止美元汇率尚算合理。近几周来，随着石油和大宗商品价格暴跌，美元对一系列受打击最严重的货币升值，而对日元和瑞士法郎（另外两种避险货币）以及欧元贬值（见图表）。或许压力已经存在，但它们被其他压低美元的因素所掩盖。市场一直感觉美元该贬值了。从购买力平价等价值指标来看，美元似乎是贵了。美联储在本月早些时候降低了利率，而且很可能进一步降息，意味着持有美元的吸引力已经减弱。

但别忘了，2008年时市场对美元也是一片看跌情绪。当时许多人预计美元将在危机中逆行下跌，毕竟这场危机起源于美国。相反，由于美国以外的银行持有按揭证券的许多资金来自短期美元借款，它们为了贷款展期而争相购入美元，导致美元汇率飙升。2015至2016年期间，中国的外汇储备减

少了一万亿美元，其中一部分就是用来满足在境外大量借款的中国公司对美元的需求。尽管俄罗斯等国家试图在本国经济中去美元化，但美元在世界经济中的核心地位却一如既往。如果跨境金融中存在隐性压力，最终都会通过美元飙升暴露出来。

不考虑这种可能性将是愚蠢的。毫无疑问，未来几周将会出现零星的压力事件，比如一家对冲基金此前借入美元来购买更高风险的资产，眼下面临现金危机。但是，曾经加剧了2007至2009年危机的短借长贷的激进押注如今已经变得困难许多。银行已经收紧了对借贷的限制。国外过度借贷引发的恐慌看起来并非最需要担心的问题。

其他貌似合理但自愿采取的行为变化可能会以各种方式影响美元，但也可能根本没有影响。在当前的动荡局势中，外国投资者可能干脆选择卖出（或者不再买入）美国证券——一种金融自我隔离。但储蓄盈余总要找个别投资去向。亚洲的资金一直在稳步买入海外债务证券。日本的政府养老投资基金——一个规模达1.6万亿美元的养老金储蓄池——之前曾表示会在下个财政年度增持海外债券和股票。没有迹象表明该基金打算放弃这一计划，NatWest Markets新加坡分支的曼苏尔·毛希丁（Mansoor Mohiuddin）表示。事实上，日本提前购买海外资产是合乎逻辑的，因为此举可以削弱日元，助力日本出口商。

近年来，由于对冲欧元汇率风险的成本较低，日本的基金更倾向于购买以欧元计价的债券。但如果美联储继续降息，美元对冲的成本也会降低。到时候，对冲货币的亚洲投资者就可能转向美国资产。这对于美元汇率而言并无影响（因为对冲的关系），但对美国公司债的发行人来说是利好刺激。

美元依旧是一种不受宠的货币。因投资者寻求替代品而导致的金价飙升就是证明。投资者是被迫买入美元，并非心甘情愿。美元平稳的时候令人安心，它骤然升值则实在是个不好的征兆。■



The covid-19 virus

Anatomy of a killer

How SARS-COV-2 causes covid-19, and how it might be stopped

THE INTERCONNECTEDNESS of the modern world has been a boon for SARS-CoV-2. Without planes, trains and automobiles the virus would never have got this far, this fast. Just a few months ago it took its first steps into a human host somewhere in or around Wuhan, in the Chinese province of Hubei. As of last week it had caused over 120,000 diagnosed cases of covid-19, from Tromsø to Buenos Aires, Alberta to Auckland, with most infections continuing to go undiagnosed.

But interconnectedness may be its downfall, too. Scientists around the world are focusing their attention on its genome and the 27 proteins that it is known to produce, seeking to deepen their understanding and find ways to stop it in its tracks. The resulting plethora of activity has resulted in the posting of over 300 papers on MedRxiv, a repository for medical-research work that has not yet been formally peer-reviewed and published, since February 1st, and the depositing of hundreds of genome sequences in public databases.

The assault on the vaccine is not just taking place in the lab. As of February 28th China's Clinical Trial Registry listed 105 trials of drugs and vaccines intended to combat SARS-CoV-2 either already recruiting patients or proposing to do so. As of March 11th its American equivalent, the National Library of Medicine, listed 84. This might seem premature, considering how recently the virus became known to science; is not drug development notoriously slow? But the reasonably well-understood basic biology of the virus makes it possible to work out which existing drugs have some chance of success, and that provides the basis for at least a little hope.

Even if a drug were only able to reduce mortality or sickness by a modest amount, it could make a great difference to the course of the disease. As Wuhan learned, and parts of Italy are now learning, treating the severely ill in numbers for which no hospitals were designed puts an unbearable burden on health systems. As Jeremy Farrar, the director of the Wellcome Trust, which funds research, puts it: “If you had a drug which reduced your time in hospital from 20 days to 15 days, that’s huge.”

Little noticed by doctors, let alone the public, until the outbreak of SARS (severe acute respiratory syndrome) that began in Guangdong in 2002, the coronavirus family was first recognised by science in the 1960s. Its members got their name because, under the early electron microscopes of the period, their shape seemed reminiscent of a monarch’s crown. (It is actually, modern methods show, more like that of an old-fashioned naval mine.) There are now more than 40 recognised members of the family, infecting a range of mammals and birds, including blackbirds, bats and cats. Veterinary virologists know them well because of the diseases they cause in pigs, cattle and poultry.

Virologists who concentrate on human disease used to pay less attention. Although two long-established coronaviruses cause between 15% and 30% of the symptoms referred to as “the common cold”, they did not cause serious diseases in people. Then, in 2002, the virus now known as SARS-CoV jumped from a horseshoe bat to a person (possibly by way of some intermediary). The subsequent outbreak went on to kill almost 800 people around the world.

Some of the studies which followed that outbreak highlighted the fact that related coronaviruses could easily follow SARS-CoV across the species barrier into humans. Unfortunately, this risk did not lead to the development of specific drugs aimed at such viruses. When SARS-CoV-2—similarly named because of its very similar genome—duly arrived,

there were no dedicated anti-coronavirus drugs around to meet it.

| *As a known enemy*

A SARS-CoV-2 virus particle, known technically as a virion, is about 90 nanometres (billionths of a metre) across—around a millionth the volume of the sort of cells it infects in the human lung. It contains four different proteins and a strand of RNA—a molecule which, like DNA, can store genetic information as a sequence of chemical letters called nucleotides. In this case, that information includes how to make all the other proteins that the virus needs in order to make copies of itself, but which it does not carry along from cell to cell.

The outer proteins sit athwart a membrane provided by the cell in which the virion was created. This membrane, made of lipids, breaks up when it encounters soap and water, which is why hand-washing is such a valuable barrier to infection.

The most prominent protein, the one which gives the virions their crown- or mine-like appearance by standing proud of the membrane, is called spike. Two other proteins, envelope protein and membrane protein, sit in the membrane between these spikes, providing structural integrity. Inside the membrane a fourth protein, nucleocapsid, acts as a scaffold around which the virus wraps the 29,900 nucleotides of RNA which make up its genome.

Though they store their genes in DNA, living cells use RNA for a range of other activities, such as taking the instructions written in the cell's genome to the machinery which turns those instructions into proteins. Various sorts of virus, though, store their genes on RNA. Viruses like HIV, which causes AIDS, make DNA copies of their RNA genome once they get into a cell. This allows them to get into the nucleus and stay around for years. Coronaviruses take a simpler approach. Their RNA is formatted to look like

the messenger RNA which tells cells what proteins to make. As soon as that RNA gets into the cell, flummoxed protein-making machinery starts reading the viral genes and making the proteins they describe.

First contact between a virion and a cell is made by the spike protein. There is a region on this protein that fits hand-in-glove with ACE2, a protein found on the surface of some human cells, particularly those in the respiratory tract.

ACE2 has a role in controlling blood pressure, and preliminary data from a hospital in Wuhan suggest that high blood pressure increases the risks of someone who has contracted the illness dying of it (so do diabetes and heart disease). Whether this has anything to do with the fact that the virus's entry point is linked to blood-pressure regulation remains to be seen.

Once a virion has attached itself to an ACE2 molecule, it bends a second protein on the exterior of the cell to its will. This is TMPRSS2, a protease. Proteases exist to cleave other proteins asunder, and the virus depends on TMPRSS2 obligingly cutting open the spike protein, exposing a stump called a fusion peptide. This lets the virion into the cell, where it is soon able to open up and release its RNA (see diagram below).

Coronaviruses have genomes bigger than those seen in any other RNA viruses—about three times longer than HIV's, twice as long as the influenza virus's, and half as long again as the Ebola virus's. At one end are the genes for the four structural proteins and eight genes for small “accessory” proteins that seem to inhibit the host's defences (see diagram below). Together these account for just a third of the genome. The rest is the province of a complex gene called replicase. Cells have no interest in making RNA copies of RNA molecules, and so they have no machinery for the task that the virus can hijack. This means the virus has to bring the genes with which to make its own. The replicase gene creates two big

“polyproteins” that cut themselves up into 15, or just possibly 16, short “non-structural proteins” (NSPs). These make up the machinery for copying and proofreading the genome—though some of them may have other roles, too.

Once the cell is making both structural proteins and RNA, it is time to start churning out new virions. Some of the RNA molecules get wrapped up with copies of the nucleocapsid proteins. They are then provided with bits of membrane which are rich in the three outer proteins. The envelope and membrane proteins play a large role in this assembly process, which takes place in a cellular workshop called the Golgi apparatus. A cell may make between 100 and 1,000 virions in this way, according to Stanley Perlman of the University of Iowa. Most of them are capable of taking over a new cell—either nearby or in another body—and starting the process off again.

Not all the RNA that has been created ends up packed into virions; leftovers escape into wider circulation. The coronavirus tests now in use pick up and amplify SARS-CoV-2-specific RNA sequences found in the sputum of infected patients.

| *Take your time, hurry up*

Because a viral genome has no room for free riders, it is a fair bet that all of the proteins that SARS-CoV-2 makes when it gets into a cell are of vital importance. That makes each of them a potential target for drug designers. In the grip of a pandemic, though, the emphasis is on the targets that might be hit by drugs already at hand.

The obvious target is the replicase system. Because uninfected cells do not make RNA copies of RNA molecules, drugs which mess that process up can be lethal to the virus while not necessarily interfering with the normal functioning of the body. Similar thinking led to the first generation of anti-HIV drugs, which targeted the process that the virus uses to transcribe its

RNA genome into DNA—another thing that healthy cells just do not do.

Like those first HIV drugs, some of the most promising SARS-CoV-2 treatments are molecules known as “nucleotide analogues”. They look like the letters of which RNA or DNA sequences are made up; but when a virus tries to use them for that purpose they mess things up in various ways.

The nucleotide-analogue drug that has gained the most attention for fighting SARS-CoV-2 is remdesivir. It was originally developed by Gilead Sciences, an American biotechnology firm, for use against Ebola fever. That work got as far as indicating that the drug was safe in humans, but because antibody therapy proved a better way of treating Ebola, remdesivir was put to one side. Laboratory tests, though, showed that it worked against a range of other RNA-based viruses, including SARS-CoV, and the same tests now show that it can block the replication of SARS-CoV-2, too.

There are now various trials of remdesivir’s efficacy in covid-19 patients. Gilead is organising two in Asia that will, together, involve 1,000 infected people. They are expected to yield results in mid- to late-April. Other nucleotide analogues are also under investigation. When they screened seven drugs approved for other purposes for evidence of activity against SARS-CoV-2, a group of researchers at the State Key Laboratory of Virology in Wuhan saw some potential in ribavirin, an antiviral drug used in the treatment of, among other things, hepatitis C, that is already on the list of essential medicines promulgated by the World Health Organisation (WHO).

Nucleotide analogues are not the only antiviral drugs. The second generation of anti-HIV drugs were the “protease inhibitors” which, used along with the original nucleotide analogues, revolutionised the treatment of the disease. They targeted an enzyme with which HIV cuts big proteins into smaller ones, rather as one of SARS-CoV-2’s NSPs cuts its big polyproteins into more little NSPs. Though the two viral enzymes do a

similar job, they are not remotely related—HIV and SARS-CoV-2 have about as much in common as a human and a satsuma. Nevertheless, when Kaletra, a mixture of two protease inhibitors, ritonavir and lopinavir, was tried in SARS patients in 2003 it seemed to offer some benefit.

Another drug which was developed to deal with other RNA-based viruses—in particular, influenza—is Favipiravir (favilavir). It appears to interfere with one of the NSPs involved in making new RNA. But existing drugs that might have an effect on SARS-CoV-2 are not limited to those originally designed as antivirals. Chloroquine, a drug mostly used against malaria, was shown in the 2000s to have some effect on SARS-CoV; in cell-culture studies it both reduces the virus's ability to get into cells and its ability to reproduce once inside them, possibly by altering the acidity of the Golgi apparatus. Camostat mesylate, which is used in cancer treatment, blocks the action of proteases similar to TMPRSS2, the protein in the cell membrane that activates the spike protein.

Not all drugs need to target the virus. Some could work by helping the immune system. Interferons promote a widespread antiviral reaction in infected cells which includes shutting down protein production and switching on RNA-destroying enzymes, both of which stop viral replication. Studies on the original SARS virus suggested that interferons might be a useful tool for stopping its progress, probably best used in conjunction with other drugs

Conversely, parts of the immune system are too active in covid-19. The virus kills not by destroying cells until none are left, but by overstimulating the immune system's inflammatory response. Part of that response is mediated by a molecule called interleukin-6—one of a number of immune-system modulators that biotechnology has targeted because of their roles in autoimmune disease.

Actemra (tocilizumab) is an antibody that targets the interleukin-6 receptors on cell surfaces, gumming them up so that the interleukin-6 can no longer get to them. It was developed for use in rheumatoid arthritis. China has just approved it for use against covid-19. There are anecdotal reports of it being associated with clinical improvements in Italy.

While many trials are under way in China, the decline in the case rate there means that setting up new trials is now difficult. In Italy, where the epidemic is raging, organising trials is a luxury the health system cannot afford. So scientists are dashing to set up protocols for further clinical trials in countries expecting a rush of new cases. Dr Farrar said on March 9th that Britain must have its trials programme agreed within the week.

International trials are also a high priority. Soumya Swaminathan, chief scientist at the WHO, says that it is trying to finalise a “master protocol” for trials to which many countries could contribute. By pooling patients from around the world, using standardised criteria such as whom to include and how to measure outcomes, it should be possible to create trials of thousands of patients. Working on such a large scale makes it possible to pick up small, but still significant, benefits. Some treatments, for example, might help younger patients but not older ones; since younger patients are less common, such an effect could easily be missed in a small trial.

| *Come as you are*

The caseload of the pandemic is hard to predict, and it might be that even a useful drug is not suitable in all cases. But there are already concerns that, should one of the promising drugs prove to be useful, supplies will not be adequate. To address these, the WHO has had discussions with manufacturers about whether they would be able to produce drugs in large enough quantities. Generic drug makers have assured the organisation that they can scale up to millions of doses of ritonavir and lopinavir while still supplying the HIV-positive patients who rely on the drugs. Gilead,

meanwhile, has enough remdesivir to support clinical trials and, thus far, compassionate use. The firm says it is working to make more available “as rapidly as possible”, even in the absence of evidence that it works safely.

In the lab, SARS-CoV-2 will continue being dissected and mulled over. Details of its tricksiness will be puzzled out, and the best bits of proteins to turn into vaccines argued over. But that is all for tomorrow. For today doctors can only hope that a combination of new understanding and not-so-new drugs will do some good. ■



covid-19病毒

解剖杀手

SARS-COV-2如何导致了2019冠状病毒病，以及如何可能阻止它【新冠报道】

现代世界的互联互通对于SARS-CoV-2（严重急性呼吸综合征冠状病毒2）来说是个福音。没有飞机、火车和汽车，病毒绝对无法这么快传播到眼下这个地步。就在几个月前，它迈出了第一步，感染了中国湖北省武汉市或附近的一位人类宿主。截至上周，从挪威的特罗姆瑟到阿根廷的布宜诺斯艾利斯，从加拿大的艾伯塔到新西兰的奥克兰，它已造成了超过12万2019冠状病毒病（covid-19）确诊病例，而大多数感染者仍未得到诊断。

但互联互通也可能是它最终衰亡的原因。世界各地的科学家都将注意力集中在它的基因组和已知产生的27种蛋白质上，试图加深理解并找到阻止其继续扩散的方法。由此展开的大量研究活动自2月1日以来已经在MedRxiv（尚未经过正式同行评审和发表的医学研究论文库）上发表了300多篇论文，在公共数据库中存储了数百个基因组序列。

对疫苗的攻关不仅发生在实验室。截至2月28日，中国临床试验注册中心列出了105项针对SARS-CoV-2的药物和疫苗试验，这些试验要么已经在招募患者，要么提出了招募计划。截至3月11日，美国的同类机构国家医学图书馆（National Library of Medicine）列出了84项试验。考虑到这种病毒最近才被科学界所知，这似乎有点仓促。药物研发不是非常缓慢的吗？但是，人们对这种病毒的基本生物学特性已经有了相当的了解，所以有可能确定哪些现有药物有一定的成功机会，这至少给了人们一点抱有希望的理由。

哪怕一种药物只能稍稍降低死亡率或疾病的严重程度，也可能对疾病的进程产生很大的影响。武汉已经经历过而意大利部分地区正在经历的教训告诉我们，治疗远超出医院设计容量的大量重症患者会给卫生系统带来难以承受的负担。正如资助研究的惠康基金会（Wellcome Trust）总监杰里米·法拉（Jeremy Farrar）所说：“如果有一种药能把住院时间从20天缩短到

15天，就会有巨大的作用。”

直到2002年在广东省爆发SARS（严重急性呼吸道综合征）之前，很少有医生注意到冠状病毒，更不用说公众了。科学界在1960年代首次认识到了冠状病毒家族。之所以叫它们冠状病毒，是因为在那个时期的早期电子显微镜下，它们的形状让人想起了君主的王冠。（实际上用现代的观察方式看它们更像老式水雷。）这个家族现在有40多个已确认的成员，感染了许多哺乳动物和鸟类，包括黑鸬、蝙蝠和猫。兽医病毒学家非常了解它们，因为它们让猪、牛和家禽生病。

专注于人类疾病的病毒学家过去很少关注它们。尽管两种历史悠久的冠状病毒带来了15%至30%所谓“普通感冒”的症状，但它们没有在人类中引发严重的疾病。然后在2002年，现在称为SARS冠状病毒（SARS-CoV）的病毒从中华菊头蝠传播到了人身上（可能是通过某种中间宿主），随后的疫病爆发导致全世界约800人死亡。

那次疫情爆发后的一些研究凸显了一个事实：相关冠状病毒可以很容易地追随SARS冠状病毒的脚步，跨越物种屏障感染人类。不幸的是，这种风险并没有让人们着手开发针对此类病毒的特殊药物。当SARS-CoV-2（因其基因组与SARS冠状病毒非常相似而得名）如约而至时，人们手边并没有专门的抗冠状病毒药物来抵御它。

| 宿敌

SARS-CoV-2病毒颗粒——专业上称为“病毒体”——直径约90纳米，大约相当于它感染的人类肺部细胞的百万分之一大。它包含四种不同的蛋白质和一条RNA链。RNA这种分子与DNA一样，可将遗传信息存储为由叫做核苷酸的化学字母组成的序列。在SARS-CoV-2病毒体中，该信息包括如何制造病毒要完成自我复制所需的、但并不在细胞间携带的所有其他蛋白质。

外层的蛋白质横贯了一层由产生病毒体的细胞提供的膜。这层由脂质制成的膜在遇到肥皂和水时会破裂，这就是为什么洗手是如此重要的防感染屏障。

最醒目的蛋白质称为“刺突”，它突出在膜外，使病毒体具有冠状或水雷状的外观。另外两种蛋白，包膜蛋白和膜蛋白，位于刺突之间的膜中，支撑着结构完整性。在膜内，第四种蛋白（核衣壳）充当支架，病毒围绕该支架把构成其基因组的29,900个RNA核苷酸缠绕在一起。

尽管活细胞将基因存储在DNA中，但仍会使用RNA进行其他一系列活动，例如将写在细胞基因组中的指令带至将指令转化为蛋白质的机器中。但是，各种各样的病毒却将其基因存储在RNA上。诸如导致艾滋病的HIV等病毒一旦进入细胞，就会产生其RNA基因组的DNA副本。这使它们能够进入细胞核并留在那里多年。冠状病毒的做法更简单。它们的RNA被排列成看起来像信使RNA，而信使RNA会告诉细胞要制造什么蛋白质。一旦这种RNA进入细胞，被蒙蔽的蛋白质制造机器就开始读取病毒基因并制造它们描述的蛋白质。

病毒体与细胞之间的首次接触是由刺突蛋白完成的。这种蛋白质上有一个区域可以紧密结合ACE2，一种在某些人体细胞（尤其是呼吸道细胞）表面发现的蛋白质。

ACE2在控制血压方面发挥作用。而武汉市一家医院的初步数据表明，高血压会增加感染者的死亡风险（糖尿病和心脏病也是如此）。病毒的进入点与血压调节相关这一事实是否促成了这种风险，还有待观察。

病毒体将自身附着在ACE2分子上后，就会让细胞表面的另一个蛋白质俯首听命。这就是蛋白酶TMPRSS2。蛋白酶的存在就是为了裂解其他蛋白质，而该病毒让TMPRSS2乖乖切开刺突蛋白，从而暴露出称为融合肽的残端。这使病毒体进入细胞，之后它很快就能打开并释放其RNA（参见下图）。

冠状病毒的基因组比任何其他RNA病毒的都要大——是HIV的约四倍，流感病毒的两倍，埃博拉病毒的1.5倍。它的一端是四个结构蛋白的基因，以及似乎抑制了宿主防御能力的八个“附件”蛋白的基因（见下图）。这些加在一起仅占了基因组的三分之一，其余都是一种称为“复制酶”的复杂基

因的地盘。细胞对复制RNA分子并不感兴趣，所以它们没有用于这项任务的机器可供病毒劫持。这意味着病毒必须自己携带基因来完成复制。复制酶基因会生成两个大的“多蛋白”，它们将自身切成15个（或可能16个）短的“非结构蛋白”（NSP）。这些非结构蛋白构成了复制和校对基因组的机器，尽管其中一些可能还有其他作用。

一旦细胞同时产生结构蛋白和RNA，就该开始生产新的病毒体了。一些RNA分子被核衣壳蛋白的副本包裹着，然后获得富含三种外层蛋白质的膜碎片。包膜蛋白和膜蛋白在这个组装过程中起着重要作用，该过程发生在称为“高尔基体”的细胞车间里。爱荷华大学的斯坦利·珀尔曼（Stanley Perlman）说，一个细胞可以这种方式制造100到1000个病毒体。它们中的大多数都可以占领一个新细胞，无论是在附近或是另一个身体内，再次开始这个过程。

并非所有产生的RNA最终都被包装到病毒体里，剩余的那些会散逸到更大范围的循环中。现在使用的冠状病毒检测可拾取并扩增在感染者的痰液中发现的SARS-CoV-2特异性RNA序列。

| 慢慢来，快一点

由于病毒基因组并没有空间留给“闲人”，因此可以比较可靠地猜想SARS-CoV-2进入细胞后制造的所有蛋白质都至关重要。这使得每一种蛋白质都成为了药物设计者的潜在标靶。但是，面临全球疫病大流行的紧迫现实，当前的重点是那些可能被现有药物击中的标靶。

显而易见的标靶是复制酶系统。鉴于未被感染的细胞不会产生RNA分子的RNA副本，扰乱这种复制过程的药物就有可能杀死病毒，而不一定会干扰人体的正常运作。类似的思路催生了第一代抗HIV药物，它们瞄准艾滋病毒将自身RNA基因组转录为DNA的过程——这又是一件在健康细胞中不会发生的事。

和最早的抗HIV药物一样，一些最有希望抗击SARS-CoV-2的疗法是被称为“核苷酸类似物”的分子。它们看起来就像是组成RNA或DNA序列的字母，

但当病毒试图把它们用做组成序列的原料时，它们会以各种方式“捣乱”。

最受关注的抗SARS-CoV-2核苷酸类似物药物是瑞德西韦（remdesivir）。它最初由美国生物技术公司吉利德科学（Gilead Sciences）研发用于治疗埃博拉热病。当时这项工作已经进行到了表明该药对人类是安全的阶段，但因为抗体疗法被证实能更好地治疗埃博拉，瑞德西韦被暂放一边。但是，实验室测试表明，它可以对抗多种其他基于RNA的病毒，包括SARS冠状病毒，而现在相同的测试表明它也可以抑制SARS-CoV-2的复制。

目前有多个试验正在测试瑞德西韦对2019冠状病毒病患者的疗效。吉利德在亚洲组织了两个测试，共有1000名受感染者参与，预计将于4月中下旬出结果。其他核苷酸类似物药物也在检测中。位于武汉的病毒学国家重点实验室的一批研究人员筛查了七种已被批准用于其他用途的药物对SARS-CoV-2的效力，认为利巴韦林（ribavirin）具有一定潜力。这种抗病毒药物已被用于治疗丙型肝炎等疾病，列在世卫组织颁布的基本药物清单中。

核苷酸类似物不是唯一的抗病毒药。第二代抗HIV药物是“蛋白酶抑制剂”，它们与最初的核苷酸类似物合并使用，彻底改变了艾滋病疗法。它们瞄准的是HIV病毒用于把大蛋白切割成小蛋白的一种酶，有点像SARS-CoV-2的其中一种非结构蛋白把自己大个的多蛋白切成了更多个小的非结构蛋白。尽管这两种病毒酶的作用相似，它们却毫不相干——HIV和SARS-CoV-2的共同点就如同人和一只蜜柑。但是，2003年在SARS患者中尝试使用两种蛋白酶抑制剂利托那韦（ritonavir）和洛匹那韦（lopinavir）的混合物克力芝（Kaletra）时，它似乎发挥了一些用处。

另一种被开发用于治疗其他RNA病毒（尤其是流感病毒）的药物是法匹拉韦（Favipiravir或favilavir）。它似乎干扰了生成新RNA的过程中涉及的一种非结构蛋白。但是，可能对SARS-CoV-2有效的现有药物并不限于最初设计用来抗病毒的那些。主要用于控制疟疾的药物氯喹（Chloroquine）在2000年代显示出对SARS冠状病毒有一定作用。在细胞培养研究中，它既降低了这种病毒入侵细胞的能力，也降低了病毒在入侵细胞后的繁殖能力，而这可能是通过改变高尔基体的酸性实现的。癌症药物甲磺酸卡莫司

他（Camostat mesylate）可以阻断与细胞膜中激活刺突蛋白的TMPRSS2类似的蛋白酶的活动。

并非所有药物都需要瞄准病毒本身。有些可以通过辅助免疫系统来发挥作用。干扰素促进了受感染细胞中广泛的抗病毒反应，包括关闭蛋白质生产和激活能破坏RNA的酶——两者均阻断了病毒复制。对SARS病毒的研究表明，干扰素可能是阻止该病毒进程的有用工具，与其他药物合并使用可能效果最佳。

与之相反的是，在2019冠状病毒病中，免疫系统的某些部分被过度激活。该病毒并非通过把全部细胞破坏殆尽来夺命，而是通过过度激活了免疫系统的炎症反应。这种反应的一部分是由名为白介素6（interleukin-6）的分子介导的。生物技术已经根据一些免疫系统调节剂在自体免疫性疾病中扮演的角色将其列为标靶，白介素6是其中之一。

雅美罗（Actemra，托珠单抗）是一种瞄准位于细胞表面的白介素6受体的抗体。它使这些受体粘合在一起，这样白介素6就无法再与之接触。它最初被研发用于治疗风湿性关节炎。中国刚刚批准将其用于治疗2019冠状病毒病。有传闻称意大利临床治疗出现改善与之有关。

尽管中国正在开展许多试验，但那里的发病率下跌意味着现在已经很难再启动新试验。在疫病肆虐的意大利，组织试验是其医疗系统无法承受的奢侈。因此，科学家们正加紧制定方案，以在预期新增病例将激增的国家开展更多临床试验。法拉博士3月9日表示，英国必须在一周内商定其试验项目。

国际试验也是高优先级事项。世卫组织首席科学家苏米娅·斯瓦米纳坦（Soumya Swaminathan）表示，为开展许多国家都可参与的试验，世卫正在努力敲定一项“主方案”。如果能把世界各地的患者汇聚起来并设定标准，如招募哪些受试者以及如何衡量结果等，应该就可以创建覆盖成千上万患者的试验。如此大规模的试验有可能取得虽小却仍重要的益处。例如，有些治疗可能对较年轻而非年长的患者有用。由于年轻患者在临床中

更少见，因此在小规模试验中很容易错过这类疗效。

| 保持本色

全球大流行的病例数难以预测，而即便某种药有效，可能也不适用于所有病例。但人们已经在担心，假如其中一种有潜力的药物被证明确实有用，其供应可能会不足。为解决这些问题，世卫组织已与制药商探讨了它们能否生产出足够多的药物。通用名药物（非专利药）生产商已向该组织保证，可将利托那韦和洛匹那韦的生产剂量扩大到数以百万计，同时仍向依赖该药的HIV患者供药。与此同时，吉利德有足够多的瑞德西韦支持临床试验以及迄今为止的同情用药。该公司表示正在努力“尽快”生产更多，即使目前尚无证据表明其安全性。

在实验室里，SARS-CoV-2将继续被“解剖”和研究。有关其狡猾特性的细节将被解开，科学家们将争论把哪些蛋白质成分转化为疫苗是最佳选择。但这些都是为了明天的打算了。眼下，医生们只能希望，把对这种疾病新获得的理解和不那么新的药物结合起来会有些用处。 ■



Oil prices

Scorched earth

No one wins from the oil-price war

SAUDI ARABIA and Russia are used to fighting their enemies via proxies. But the oil-price war that has broken out between them is head-on and has swiftly escalated. It started when Russia refused to slash production during a meeting with the Organisation of the Petroleum Exporting Countries in Vienna on March 6th. Saudi Arabia, OPEC's de facto leader, hit back with discounts to buyers and a promise to pump more crude. Shortly thereafter it said it would provide customers with 12.3m barrels a day (b/d) in April, about 25% more than it supplied last month—and a level it has never before attained. Russia said it could raise output, too, adding up to 500,000 b/d to its 11.2m b/d. The price of Brent crude plunged by 24%, to \$34 a barrel, on March 9th—its steepest one-day drop in nearly 30 years.

Amid turmoil in global markets unleashed by the plummeting oil price, and panic about its impact on the global economy, Saudi Arabia upped the ante again on March 11th, ordering Saudi Aramco, its state-owned oil giant, to raise national production capacity by a further 1m b/d. Is the kingdom merely strengthening its bargaining position to force Russia back to the table? Or is it waging a fierce price war to crowd out rivals that will instead ensure what analysts at Bernstein, an investment firm, call “mutually assured destruction”? The answer may determine how long the disruption will last.

The fallout caps a seismic decade for oilmen. Power has shifted between Saudi Arabia, Russia and America (see chart). In 2014 Saudi Arabia sought to check America's ascendant shale industry by flooding the market with oil. The result was cataclysmic for all producers. Two years later OPEC restored its grip on output by forging an alliance with Russia and others.

In recent years, though, Russia has flouted the terms of its deals with OPEC. Its oil companies, led by Rosneft, have chafed at market share lost to American frackers. As troubling for Russia, America has become less shy about leaning on foreigners. In December it announced sanctions to delay Nord Stream 2, a Russian gas pipeline to Europe. In February America imposed sanctions to punish Rosneft for its dealings with Venezuela.

Russia's partnership with OPEC has won it new influence in the Middle East, while Saudi Arabia has borne most of the burden of production cuts. The Saudis are getting tired of the role of swing producer. That position has become all the more invidious since January, when the outbreak of covid-19 in China, the world's biggest oil importer, put downward pressure on prices.

The Saudi decision to open the spigots is nevertheless extremely rash. With the coronavirus raging, global appetite for oil may decline in 2020 for only the third time in more than 30 years. Increasing supply at a time of falling demand may send the price of Brent crude below \$30 in the second quarter, estimates Citi, a bank.

The pain may be most acute for smaller, unstable countries dependent on oil revenue, such as Nigeria. Iraq's government is already teetering—a collapsing oil price may topple it. The movement of forward contracts on Gulf currencies pegged to the dollar, such as Oman's rial, suggest incipient concerns about the ability to sustain the pegs if dollar revenues from oil remain depressed for a long time.

America, too, will be hit hard. Cheap oil used to be a boon to America's economy. That is no longer the case. In a viral outbreak, savings on petrol are unlikely to translate into more spending on other things, especially ones that involve crowds. Even if it did, any boost to the economy from consumers would be outweighed by damage to shale states such as Texas

and North Dakota. Breakeven prices—those oil producers need to turn a profit—in America’s shale basins range from \$23 to \$75 a barrel, according to the Dallas Federal Reserve. Production cuts and lay-offs are likely.

Making matters worse, shale firms were suffering even before the latest sell-off, as investors questioned their capacity for sustained profits. Capital markets have all but closed to the industry. It will not collapse; many shale firms are hedged against falling prices this year. Those on their knees may well be taken over by bigger competitors. Analysts say larger rivals such as ExxonMobil have the balance-sheets to cope with cheap oil.

Russia may fail in its attempt to kill off America’s shale industry. Moreover, weak oil prices will hurt its economy. But unlike Saudi Arabia, whose currency is pegged to the dollar, the rouble floats. When oil prices fall, the currency does, too, lowering production costs. On March 10th Russia’s finance ministry said that the country had enough foreign-currency reserves to withstand a decade of prices hovering between \$25 and \$30. It seems in no hurry to go back to negotiations with OPEC.

With some of the world’s cheapest oil, Saudi Arabia may be able to pile more pressure on the Russians. Aramco has more than 50 years of reserves, and costs per barrel of less than \$9, according to Rystad Energy, a data firm, compared with \$15 for Russia. Still, Saudi Arabia may struggle to maintain production—even 12.3m b/d will require tapping its vast inventories.

Moreover, the kingdom’s budget requires an oil price of more than \$80, estimates the IMF. Goldman Sachs, a bank, reckons that if it increases output and oil prices recover, its finances will weather temporary pain. But if the virus persists and demand keeps plunging, the damage may be more lasting. It is a price war that no one looks likely to win. ■



油价

焦土战

石油价格战没有赢家

沙特阿拉伯和俄罗斯惯于通过代理人与敌人对抗。但在两国间爆发的这场石油价格战中，双方正面交锋，且战事迅速升级。导火线是俄罗斯3月6日与欧佩克在维也纳会晤时拒绝削减产量。欧佩克实际上的领导国沙特做出反击，向买家提供折扣，并承诺加大原油产量。此后不久，沙特表示将在4月为客户供应每日1230万桶原油，比2月时增加约25%，是它从未达到过的产量水平。俄罗斯表示自己也可能增产，在目前每日1120万桶的基础上增加最多50万桶。3月9日，布伦特原油价格暴跌24%至每桶34美元，创下近30年来的最大单日跌幅。

油价暴跌引发了全球市场骚动，也让人们恐慌它可能给全球经济造成冲击。结果沙特于11日再次加码，命令国有石油巨头沙特阿美（Saudi Aramco）提升全国产能，每日再增产100万桶。沙特是在加强自己的谈判筹码，好迫使俄罗斯重返谈判桌吗？还是要发动残酷的价格战把对手排挤出局，以求（用投资公司盛博的分析师的话说）“同归于尽”？答案可能决定了这轮冲击将持续多久。

此番影响超过了石油业这十年来的种种震荡。权力一直在沙特、俄罗斯和美国之间流转（见图表）。2014年，沙特将大量石油推向市场，企图遏制美国蒸蒸日上的页岩油产业。其结果对所有产油国来说都是灾难性的。两年后，欧佩克与俄罗斯等国结盟，重新开始限产。

但最近几年，俄罗斯一直无视与欧佩克达成的协议条款。以俄罗斯石油公司（Rosneft，以下简称俄石油）为首的俄石油企业对市场份额流失给了美国页岩油公司感到恼火。同样困扰俄罗斯的是，美国更不避讳向外国施压了。去年12月，美国宣布实施制裁，阻挠俄罗斯通往欧洲的天然气管道项目“北溪二号”（Nord Stream 2）。今年2月，美国又因俄石油与委内瑞拉做交易而对其实施制裁。

与欧佩克的伙伴关系让俄罗斯在中东赢得了新的影响力，沙特却承担了大部分的减产负担。沙特已逐渐厌倦扮演产量调节者的角色。今年1月，全球最大的石油进口国中国爆发新冠疫情，给油价带来下行压力，让沙特更是怨恨这一角色。

但沙特放开生产的决定实在轻率。随着新冠病毒肆虐，2020年全球石油需求可能下降，这将是30多年以来的仅仅第三次。花旗银行估计，在需求下降时增加供应可能会令布伦特原油价格在第二季度跌破30美元。

像尼日利亚这种依赖石油收入且局势不稳的小国感受到的痛苦可能最为剧烈。伊拉克政府本就摇摇欲坠，油价崩溃可能会让它倒台。像阿曼的里亚尔这种与美元挂钩的海湾地区货币的远期合约走势表明，人们已经开始担心，假如出口石油的美元收入长期处于低迷状态，它们是否还能维持与美元的挂钩。

美国也将受到重创。廉价石油曾经是美国经济的福音，但那已是过去式。爆发疫情时，人们在汽油上省下的钱不太可能转化为其他方面的支出，尤其是那些人群聚集型消费活动。即使可以转化，消费对经济的任何提振作用也会被德克萨斯州和北达科他州等页岩油产地的损失所抵销。达拉斯联储的数据显示，美国页岩盆地的保本油价（而那些石油生产商需要盈利）在每桶23美元至75美元之间。未来很可能会出现减产和裁员。

更糟糕的是，由于页岩油公司的投资者质疑其能否持续盈利，它们在最近的抛售潮之前就已经在承压。资本市场几乎对这个行业关上了大门。页岩油产业不会崩溃，许多页岩油公司都对今年的油价下跌做了对冲。那些被逼到了悬崖边缘的页岩油公司很可能被更大的竞争对手收购。分析人士表示，埃克森美孚等较大的对手的财务实力能够抗衡低油价的冲击。

俄罗斯打垮美国页岩油产业的尝试可能会失败。而且，油价疲软也会损害俄罗斯经济。但不同于和美元挂钩的沙特货币，俄罗斯卢布是自由浮动的。油价下跌时，卢布汇率也会下跌，令生产成本下降。3月10日，俄罗斯财政部表示，俄罗斯拥有足够的外汇储备，可承受油价在25美元至30美

元之间波动十年。俄罗斯似乎不急于重回与欧佩克的谈判桌。

沙特拥有一些全球开采成本最低的石油储量，也许能对俄罗斯施加更大压力。数据公司雷斯塔能源（Rystad Energy）的信息显示，沙特阿美有超过50年的储量，每桶成本不到9美元，而俄罗斯要15美元。尽管如此，沙特可能难以维持产量，即使日产1230万桶也需要动用其庞大的储备。

此外，据国际货币基金组织估计，沙特的财政预算需要油价高于80美元。高盛认为，如果沙特增产而油价回升，沙特的财政将能经受住短暂的痛楚。但假如疫情持续且石油需求继续下降，损害可能会更持久。这场价格战似乎不会有赢家。 ■



Jack Welch

Captain of industry

The former boss of GE transformed American capitalism—in good ways and bad

IN HIS AUTOBIOGRAPHY, published soon after retiring from GE in 2001, Jack Welch explained the challenge he had faced when taking over as chairman and chief executive of the iconic American company 20 years earlier. The firm had grown top-heavy and sclerotic. Some divisions had not posted profits in over a decade. In his farewell speech, Reginald Jones, his patrician predecessor, likened the industrial conglomerate poetically to the *Queen Mary*, a majestic ocean liner, caught in a storm.

In his inaugural address Mr Welch maintained the nautical metaphor—with less decorum and a greater sense of urgency. He told his charges that he wanted GE to be like a speedboat in the harbour “trying to move like hell”. The threat from sophisticated competitors from Japan was growing. He did not want GE to go the way of Detroit’s carmakers or IBM, which failed to adapt. As corporate America mourns his death on March 1st, aged 84, the company he reinvented is itself struggling to keep up with the times.

Mr Welch certainly revved up GE’s propellers. Under Jones, who led the firm from 1973 to 1980, it doubled revenues to \$25bn and saw its share price sink by about a fifth. Under Mr Welch revenues quintupled from \$27bn in 1981 to \$130bn in 2000. Total shareholder returns, including dividends, rose 70-fold, more than three times as fast as those for the S&P 500 index of big corporations (see chart 1).

This made him the talk of corporate America. In 1999 *Fortune* magazine anointed him “manager of the century” (never mind Henry Ford, who pioneered mass production, and Alfred Sloan, who more or less invented

modern management at General Motors). The plain-spoken Mr Welch had admirers outside business circles, too. Beth Comstock, a former GE vice-chairwoman, recalls attending overflowing shareholder meetings with him where “little old ladies were shaking like they were meeting a rock star.”

The Welch revolution rested on four pillars: people, process, purpose and profit. Start with people. Ex-lieutenants praise him for nurturing talent. He encouraged employees to take risks and speak their minds, remembers Jeff Sonnenfeld of the Yale School of Management, who taught at the company university in Crotonville.

He also promoted an obsessive, ruthless meritocracy. To tame GE’s bloated bureaucracy, he introduced the policy of “rank and yank”, sacking the bottom 10% of managers, measured by financial and other metrics, each year. “Public hangings are...worth a thousand CEO speeches,” Mr Welch once quipped. He lavished praise when managers excelled, but upbraided them publicly if they did not. “You were either a pig or a prince,” recalls a senior aide.

Mr Welch was also obsessed with processes. Some were radical in his day but have since become commonplace. To prevent turf wars from killing new ideas, for instance, he insisted that town-hall meetings (dubbed “work-outs”) be held so that all relevant parties could raise objections. He championed Six Sigma, a series of techniques that aimed to keep manufacturing defects below 3.4 per million parts.

GE’s purpose also changed on his watch. Since its founding by Thomas Edison in 1892 it had focused on engineering, from refrigerators to turbines. Mr Welch extended it to product-related services, like selling airlines flight time rather than merely jet engines. More controversially, he also grew GE’s financial-services arm.

Everything, always, in the service of profits. To boost them further, Mr Welch slashed costs and sold flagging units, insisting that every GE division be first or second in its industry. Net income duly soared from \$1.7bn in 1981 to \$12.7bn in 2000.

| *Unfinished business*

Mr Welch always had critics. His insistence on downsizing while GE was still profitable—headcount fell from above 400,000 in 1980 to below 300,000 five years later—earned him the epithet “Neutron Jack”, in reference to the neutron bomb, which kills people but leaves buildings intact. Tom Peters, co-author of “In Search of Excellence”, a hallowed management tome, accepts that GE needed discipline as its woes were “obvious to a fourth grader”. But he likens Mr Welch’s methods to “dumping loads of bodies off the side of the cruise ship”.

More important, GE began to unravel almost as soon as he left. His hand-picked successor, Jeffrey Immelt, was finally ousted in 2017 after failing to reverse a sharp decline. John Flannery, who replaced him, lasted barely a year. GE’s market capitalisation fell from a peak of \$600bn in 2000 to \$95bn today.

Was Mr Welch to blame? Some strategies that fuelled heady returns during his tenure no doubt played a role. “The dark side of worshipping at the altar of Six Sigma is that breakthrough innovations get cut,” says Vijay Govindarajan of the Tuck School of Business. The checklist culture and underinvestment in research left GE’s innovation engine sputtering.

Mr Welch also missed the digital revolution. He admitted in his autobiography that he was “slow to understand the impact of the internet”. Mr Govindarajan points to his aggressive outsourcing of information technology to Indian firms, a move that saved money in the short run at the expense of surrendering the future. “If Jack had been visionary, we could

have done what Google or AWS [Amazon's cloud-computing arm] did," grumbles a former senior GE man. Instead, Mr Welch bought trophy assets like NBC, a television network and Kidder Peabody, an investment bank.

Mr Welch's most consequential mistake was to grow the financial arm, GE Capital, into a monster. The division's easy profits during the long economic expansion of the 1990s masked plenty of sins, including mounting troubles at GE's core industrial units. As Mr Peters puts it, mincing no words, Mr Welch handed his successor "a real pile of shit" in the form of GE Capital.

The division grew quickly from the early 1990s, bolstering profits, free cashflow and returns on capital. Its loaded up on debt and relied on fickle short-term funding. By 2000 it generated 51% of GE's revenues; GE's industrial and power divisions eked out barely a tenth each.

Industrial performance peaked as Mr Welch left, and collapsed between 2001 to 2003, with Mr Immelt in charge. Part of this was down to a recession in 2001. However, after 2003 GE's industrial businesses continued to deteriorate; their returns on capital collapsed and cashflow dried up. Mr Immelt pursued pricey acquisitions (most notably of France's Alstom, which makes power equipment, and Baker Hughes, an energy firm) and ill-timed asset sales. For years he continued to expand GE Capital. Though less dependent on short-term funding, it remained highly leveraged. It was pushed to the brink by the global financial crisis of 2007-09, saved only by a federal bail-out. Only then was Mr Immelt forced to shrink the division, a move his successors have since intensified.

There is no denying that Mr Welch was a towering figure who helped jolt America Inc out of the complacent 1970s. At times, he may have shaken too hard. On March 4th the current boss, Larry Culp, observed that Mr Welch had "changed the business landscape as we know it". He did not say

whether it was for better or worse. ■



杰克·韦尔奇 工业界舵手

GE前老板改变了美国资本主义——好坏兼而有之

杰克·韦尔奇2001年从GE退休，之后不久便出版了自传。他在自传中讲述了自己20年前刚接任这家美国标志性企业的董事长兼CEO时面临的挑战。当时这家公司已是将多兵少，制度僵化，有些部门已经十多年没有盈利了。他的前任、贵族做派的雷金纳德·琼斯（Reginald Jones）在告别致辞中诗意地将这家工业企业集团比作“玛丽皇后号”——一艘遭遇风暴的豪华巨轮。

韦尔奇在他的就职演讲中沿用了航船的比喻，但却少了些庄严沉稳，多了几分紧迫感。他告诉下属，他希望GE像港口里的快艇那样“全速冲刺”。经验丰富的日本竞争对手对GE的威胁正在加大。他不希望GE重蹈底特律汽车制造商和IBM未能与时俱进的覆辙。本月1日，韦尔奇去世，享年84岁，美国企业界纷纷哀悼，而此时他重塑的GE正在艰难地想要跟上时代的步伐。

韦尔奇无疑加快了GE这艘船的螺旋桨转速。1973年至1980年，GE在琼斯的领导下收入翻了一番，达250亿美元，但股价却下跌了约五分之一。韦尔奇执掌GE后，公司收入增长了四倍，从1981年的270亿美元增至2000年的1300亿美元。包括股息在内的股东总回报增长了70倍，涨幅是代表大公司的标准普尔500指数的三倍多（见图表1）。

这让韦尔奇成为美国企业界的热议人物。1999年，他被《财富》杂志评选为“世纪经理人”（当然获此殊荣的还有率先实现大规模生产的亨利·福特，以及或多或少可算是现代管理开创者的通用汽车的阿尔弗雷德·斯隆 [Alfred Sloan]）。直言不讳的韦尔奇在商界之外也有众多仰慕者。GE前副董事长贝丝·康斯托克（Beth Comstock）回忆了和他一起参加人山人海的股东大会的情景：“小老太太们身体摇晃着，就像见到摇滚明星一样。”

人、流程、目标和利润是韦尔奇改革的四大基石。先从人说起。韦尔奇对人才的培养赢得了前副手们的交口称赞。耶鲁大学管理学院的杰夫·索南菲尔德（Jeff Sonnenfeld）曾经任教于GE位于克罗顿维尔（Crotonville）的企业大学。他回忆说，韦尔奇鼓励员工勇于冒险，畅所欲言。

他还推行一种偏执、残酷的精英治理体制。为了整治GE臃肿而官僚的管理层，他引入了“末位淘汰制”，根据财务和其他衡量指标，每年解雇排名最末10%的管理人员。韦尔奇曾打趣道：“公开执行绞刑……胜过一千次CEO演讲。”他对表现出色的管理者大加赞赏，对表现不佳的当众责骂。一位高级助手回忆：“你要么是头猪，要么是条龙。”

韦尔奇还非常注重流程。尽管有些做法后来变得司空见惯，但在他那个年代却是很激进的。比如，为防止地盘之争扼杀创意，他坚持召开公司全员大会（称为“群策群力”），以便所有相关各方都能提出异议。他力挺“六西格玛”，一套旨在将制造缺陷控制在百万分之3.4以下的管理方法。

在他任内，GE的目标也发生了变化。公司自1892年由托马斯·爱迪生创立以来，一直将业务重心放在从冰箱到涡轮机的工程制造上。韦尔奇将它扩展到与产品相关的服务领域，比如向航空公司出租而不仅仅是销售喷气式发动机。更有争议的是，他还拓展了GE的金融服务部门。

利润永远至上。为进一步提高利润，韦尔奇大幅削减成本并卖掉那些日薄西山的部门，坚持要求GE的每个部门都要做到在业内数一数二。公司净收入如愿从1981年的17亿美元飙升到2000年的127亿美元。

| 未竟的事业

韦尔奇从来不乏批评者。他坚持在GE还在盈利的时候裁员——员工人数从1980年的40多万下降到五年后的不到30万——他也因此得了个“中子弹杰克”的外号，因为中子弹能在不损坏建筑物的情况下夺人性命。管理学经典巨著《追求卓越》（In Search of Excellence）的合著者汤姆·彼得斯（Tom Peters）认可纪律对GE的必要性，因为“即便四年级小学生都能一眼看出”它麻烦缠身。但他将韦尔奇的方法比作“从邮轮边上抛下大量尸

体”。

更重要的是，GE几乎从韦尔奇一离任就开始分崩离析。由他亲自挑选的继任者杰夫·伊梅尔特（Jeffrey Immelt）未能扭转一落千丈的局面，最终在2017年被罢免。而接替他的约翰·弗兰纳里（John Flannery）的在位时间只维持了一年。GE的市值从2000年时6000亿美元的峰值下降到如今的950亿美元。

这该归咎于韦尔奇吗？他任期内采取的一些让回报率猛增的刺激性策略无疑有一定责任。“对六西格玛顶礼膜拜的副作用就是阻断突破性的创新。”塔克商学院（Tuck School of Business）的维贾伊·戈文达拉扬（Vijay Govindarajan）表示。检查单式的企业文化以及研发投入不足导致GE的创新引擎运转不良。

韦尔奇还错过了数字革命。他在自传中承认自己“没有及时认识到互联网的影响”。戈文达拉扬指出，他激进地将信息技术工作外包给印度公司，此举在短期内节约了资金，却牺牲了未来。“如果杰克有远见，谷歌或（亚马逊的云计算部门）AWS做成的事情，我们说不定也做成了。”一位GE的前高管抱怨道。而事实却是韦尔奇收购了美国全国广播公司（NBC）和投行Kidder Peabody等一些能给自己脸上贴金的资产。

韦尔奇犯下的最严重错误是把金融部门GE Capital养成了一头巨兽。该部门在上世纪90年代的长期经济扩张中轻松获利，掩盖了大量过失，包括GE核心的工业部门日益增多的问题。正如彼得斯直言不讳地指出的，韦尔奇交给继任者的GE Capital“真是一堆屎”。

GE Capital自上世纪90年代初期以来发展迅猛，带动了利润、自由现金流和资本回报的增加。它大举借债，依赖不稳定的短期融资。到2000年，公司收入的51%来自GE Capital，而工业和电力部门分别只勉强贡献了10%。

GE工业部门的业绩在韦尔奇离任时达到顶峰，在2001年到2003年伊梅尔特掌舵期间大幅下滑。部分原因是2001年的经济衰退。然而，2003年之后

其业绩继续恶化，资本回报率暴跌，现金流枯竭。伊梅尔特实施了几次高价并购，其中最有名的是法国电力设备制造商阿尔斯通（Alstom）和能源公司贝克休斯（Baker Hughes），还在不当的时机出售了一些资产。多年间，他继续扩张GE Capital。尽管GE Capital对短期融资的依赖有所降低，但其杠杆率依然居高不下。2007到2009年的全球金融危机将GE Capital推到了破产边缘，依靠联邦政府的纾困才逃过一劫。直到那时，伊梅尔特才被迫缩减了该部门的规模，此后他的继任者们一直在加大缩减力度。

不可否认，韦尔奇是一位杰出人物，他帮助摇醒了美国企业，让它们不再沉醉于上世纪70年代的自满中。但有时他也可能用力过猛。3月4日，GE现任老板拉里·卡尔普（Larry Culp）指出，韦尔奇“改变了我们所认识的商业格局”。至于是变得更好还是更坏，他未置一词。■



Financial conditions

V is for vicious

How to make sense of the mayhem in markets

WHEN FACED with a bewildering shock it is natural to turn to your own experience. As covid-19 rages, investors and officials are scrambling to make sense of the violent moves in financial markets over the past two weeks. For many the obvious reference is the crisis of 2007-09. There are indeed some similarities. Stockmarkets have plunged. The oil price has tumbled below \$40 a barrel. There has been a flurry of emergency interest-rate cuts by the Federal Reserve and other central banks. Traders are on a war footing—with a rising number working from their kitchen tables. Still, the comparison with the last big crisis is misplaced. It also obscures two real financial dangers that the pandemic has inflamed.

The severity of the shock so far does not compare with 2007-09. Stockmarkets have fallen by a fifth from their peak, compared with a 59% drop in the mortgage crisis. The amount of toxic debt is limited and easy to identify. Some 15% of non-financial corporate bonds were issued by oil firms or others hit hard by the virus, such as airlines and hotels. The banking system, stuffed with capital, has yet to seize up; interbank lending rates are under control. When investors panic about the end of civilisation they rush into the dollar, the reserve currency. That has not yet happened.

The nature of the shock is different, too. The 2007-09 crisis came from within the financial system, whereas the virus is primarily a health emergency. Markets are usually spooked when there is uncertainty about the outlook six or 12 months out, even when things seem calm at the time—think of asset prices dropping in early 2008, long before most subprime mortgage borrowers defaulted. Today, the time horizon is inverted: it is unclear what will happen in the next few weeks, but fairly

certain that within six months the threat will have abated.

Instead of tottering Wall Street banks or defaults on Florida condos, two other risks loom. The first is a temporary cash crunch at a very broad range of companies around the world as quarantines force them to shut offices and factories. A crude “stress test” based on listed companies suggests that 10-15% of firms might face liquidity problems. Corporate-bond markets, which demand precise contractual terms and regular payments, are not good at bridging this kind of short but precarious gap.

In 2007-09 the authorities funnelled cash to the financial system by injecting capital into banks, guaranteeing their liabilities and stimulating bond markets. This time the challenge is to get cash to companies. This is easy in China, where most banks are state-controlled and do as they are told. Credit there grew by 11% in February compared with the previous year. In the West, where banks are privately run, it will take enlightened managers, rule tweaks and jawboning from regulators to encourage lenders to show clients forbearance. Governments need to be creative about using tax breaks and other giveaways to get cash to hamstrung firms. While America dithered, Britain set a good example in last week’s budget.

The second area to watch is the euro zone. It is barely growing, if at all. Central-bank interest rates are already below zero. Its banks are healthier than they were in 2008 but still weak compared with their American cousins. Judged by the cost of insuring against default, there are already jitters in Italy, the one big economy where banks’ funding costs have jumped. As we went to press, the European Central Bank was meeting to discuss its virus response. The danger is that it, national governments and regulators fail to work together.

Every financial shock is different. In 1930 central banks let banks fail. In 2007 few people had heard of the subprime mortgages that were about to

blow up. This financial shock does not yet belong in that company. But the virus scare of 2020 does create financial risks that need to be treated—fast. ■



【首文】金融状况

险恶冲击

如何解读市场的混乱【新冠报道】

当出现纷乱的冲击时，人们自然会诉诸于自身经验。随着新冠肺炎肆虐全球，投资者和官员们正忙不迭地探究过去两周金融市场为何剧烈波动。对许多人来说，一个明显的参照就是2007年至2009年的金融危机。两者确实有相似之处。股市暴跌，石油价格已跌破每桶40美元。美联储和多国央行纷纷紧急降息。交易员进入战备状态（越来越多的人以自家厨房的工作台为阵地）。尽管如此，将眼下的状况与上一次大危机相提并论是不恰当的，而且也模糊了全球疫病大流行点燃的两个真正的金融风险。

到目前为止，此番冲击的严重程度还比不上2007年至2009年的情形。股市从最高峰下跌了五分之一，而当年次贷危机时下跌了59%。目前出现的不良贷款数量有限且易于识别。非金融企业债券中约15%是由石油公司或航空公司和酒店等受疫情打击严重的公司发行的。银行体系资本充沛，尚未运转失灵；银行同业拆借利率处于可控范围。投资者在恐慌末日到来时往往会涌向作为储备货币的美元，而这种情况尚未发生。

这次冲击的性质也与上次不同。2007年至2009年的危机来自金融系统内部，而这次新冠疫情主要是一次公共卫生紧急事件。当未来6至12个月存在不确定性时，市场通常会惊慌失措，即使当下看来一切还风平浪静，例如2008年初的资产价格骤跌，而当时次贷违约尚未大规模出现。这一次，时间表却倒转了：未来几周情况会如何还不得而知，却可以相当肯定六个月内威胁将减轻。

此次的问题并非华尔街的银行摇摇欲坠或佛罗里达的公寓出现房贷违约，而是浮现出另外两种风险。首先是全球各地有众多不同行业的企业因为隔离措施而被迫关闭办公室和工厂，导致暂时性现金紧缺。对上市公司所做的粗略“压力测试”表明，有10%至15%的公司可能面临资金周转问题。合同条款一丝不苟且须定期还款付息的企业债券市场并不适于弥合这种短暂

但不稳定的缺口。

在2007年至2009年的危机中，官方向银行注资，为其债务提供担保并刺激债券市场，从而把资金注入金融系统。这次的挑战是给企业提供现金支持。在中国这很好办，因为大多数银行都是国有的，听命于政府指示。中国2月份的信贷较去年同期上升了11%。在西方，银行是私有的，需要有开明的管理人加上法规的微调及监管机构施压才能促使贷款方给予客户宽限。各国政府需要发挥创意，利用税收减免和其他补助措施为周转不灵的企业注入资金。美国还在犹豫不决之际，英国在上周的预算中做出了好榜样。

第二个需要关注的领域是欧元区。目前欧元区内经济近乎停滞。央行利率已经低于零。欧元区的银行比2008年时健康，但与美国的银行相比仍然孱弱。意大利这个大经济体的银行融资成本已经攀升，鉴于违约保险成本之高，意大利国内已惶惶不安。在本刊于上周四付印之时，欧洲央行正开会讨论对病毒的应对措施。危险在于欧洲央行、各国政府和监管机构不能协力应对。

金融冲击次次不同。1930年，各国央行坐视银行破产。2007年，即将引爆危机的次级贷款对很多人来说还是个新名词。这次的金融冲击还不属于那种情况。但2020年的病毒恐慌确实制造了金融风险，亟待诊治。■



The Economist Film

Ocean Deep: A New Gold Rush

Some of the world's most valuable metals can be found deep under the waves - a discovery that has begun to pique the interests of the global mining industry. But mining in the deep ocean might have unknowable impacts.



经济学人视频

深海掀起淘金热

在海洋深处，可以找到一些全世界最有价值的金属——这一发现正在吸引了全球采矿业的关注。但深海开采可能有着意想不到的后果。



Social networks

A friendly portrait

A journalist offers an inside look at Facebook's rise

“I WOULD ALWAYS say to regulators, ‘Look, bad things happen in human society, therefore bad things happen on Facebook.’” So said Chris Kelly, an ex-Facebooker once in charge of the social network’s privacy policies, to Steven Levy, a veteran technology journalist whose book about Facebook was published on February 25th. Mr Kelly was recounting conversations with officials in 2007, amid early rumblings about Facebook’s seamier side—specifically the ease with which children could find questionable content, such as a group named “I’m Curious About Incest”.

More than a decade on, Facebook claims 2.5bn people—a third of humanity—as users. The charge sheet against the company has grown as well. It has been accused of spreading fake news, facilitating paedophilia, and allowing countries to interfere in each other’s elections. Mr Levy’s book offers a ringside view of the growth of one of the world’s biggest companies, and of the backlash it has provoked. Other books, and even a Hollywood film, have chronicled the firm’s rise. But Mr Levy’s effort is fresh, up-to-date and insiderish. Thanks to the indulgence of the firm’s boss, Mark Zuckerberg, he had the run of its California headquarters and its denizens.

Such access can be a reporter’s blessing. It has long been apparent from the outside that Facebook grew so quickly that its employees had little time to grapple with all the implications, even those that would become central to the business. But it is still noteworthy to hear interviewees confirm as much to Mr Levy in their own words. Carolyn Everson, an advertising executive at Microsoft, was poached to head advertising sales at Facebook in 2011. Ms Everson assumed that her new employer knew what it was

doing—after all, it was already raking in hundreds of millions of dollars. She was quickly disabused of that notion: “[Facebook] didn’t have everything figured out...everything was brand-new and [they were] still building.”

In 2008 Mr Zuckerberg hired Sheryl Sandberg, a Google executive, to be Facebook’s chief operating officer, handing off responsibility for everything not directly related to building Facebook’s product. (It would take him a decade, writes Mr Levy, to realise that such a division of labour was a mistake.) Facebook’s board upbraided both of them for not spotting a Russian misinformation campaign designed to influence America’s election in 2016. When subsequently asked by Mr Levy whether he thought she had “let him down”, Mr Zuckerberg offers only a pause, followed by a non-committal response.

The author’s access risks putting him in thrall to his subject. He is not afraid to chronicle Facebook’s failures. But his tone is occasionally fawning. He recounts how Mr Zuckerberg reacted to a question about the wisdom of Instagram’s founders selling their photo-sharing app to Facebook “as if he were a chess grandmaster, startled by a move from an inferior player who suddenly shifted the board to his disadvantage”. At times Mr Levy can seem too quick to accept the tech industry’s macho self-image, for instance in his description of an internal team charged with driving new users to Facebook as “a data-driven Dirty Dozen armed with spreadsheets instead of combat rifles”.

In recent years Facebook has hired legions of moderators to check up on its users, and fortified them with automated monitoring systems. But its chief defence against accusations of harm is one to which Mr Levy seems mostly sympathetic: that from the crooked timber of humanity, no straight thing was ever made, not even a social network. It is a belief that Mr Zuckerberg seems to hold sincerely. It is tactically useful, too, because while it contains

more than a grain of truth, it also minimises the firm's culpability.

In the end, Mr Levy sees Mr Zuckerberg as a Utopian genius undone by the world's lamentable wickedness; a man who "set out to connect a world that was perhaps not ready to be connected". Not everyone will be so generous. ■



社交网络

友好的肖像画

一位记者从内部观察了Facebook的崛起【《Facebook：内幕》书评】

“我总会跟监管机构讲，‘你们看，人类社会中总有坏事发生，所以Facebook上也有坏事’。”Facebook前员工、曾负责该公司隐私政策的克里斯·凯利（Chris Kelly）对资深科技记者史蒂芬·列维（Steven Levy）说道。列维关于Facebook的书于2月25日出版。凯利回忆了2007年与官员们的谈话，当时人们开始抱怨Facebook丑陋的一面，尤其是孩子们轻而易举就能找到有问题的内容，比如一个名为“我对乱伦很好奇”（I’m Curious About Incest）的小组。

十多年过去了，现在Facebook声称拥有25亿用户，占全球人口的三分之一。它被指控的罪名列表也变长了——传播假新闻、助长恋童癖、使得各国可以彼此干涉选举。列维的书让读者得以近距离观察全球其中一家最大公司的成长过程，以及它引发的强烈抵制。其他一些书（甚至还有一部好莱坞电影）也记录了Facebook的崛起，但列维这本书角度新颖、材料新鲜，而且深入内部。幸有老板马克·扎克伯格的宠溺，列维得以自由探访公司位于加州的总部，尽情采访那里的员工。

这样的渠道对于记者可谓幸事。长期以来，有一点在外人看来很明显，那就是Facebook发展得太快，员工们几乎没有时间去应对方方面的影响，即便是那些可能对公司变得至关重要的影响。但仍值得倾听列维的受访者亲口向他证实这些。2011年，微软广告业务主管卡罗琳·埃弗森（Carolyn Everson）被挖来负责Facebook的广告销售。埃弗森以为她的新雇主肯定知道自己在做什么，毕竟它已经狂赚了几亿美元。但很快她就醒悟过来：“（Facebook）还没把事情桩桩件件搞清楚……所有的一切都是全新的，（他们）还在创建。”

扎克伯格在2008年聘请了谷歌高管雪莉·桑德伯格（Sheryl Sandberg）担任Facebook的首席运营官，把所有与打造Facebook产品无直接关联的事务

都交予她负责。（列维写道，扎克伯格花了十年时间才意识到如此分工是个错误。）Facebook董事会谴责他们两人没有发现俄罗斯大肆传播虚假信息，意欲影响2016年美国大选的行为。事后列维问扎克伯格有没有觉得桑德伯格“让他失望”时，扎克伯格只是停顿了一下，然后给出了一个不置可否的回答。

这样深入探访的机会也可能让作者受到采访对象的影响。他不怕记录Facebook的失败，但语气偶尔也会恭维奉承。当他问扎克伯格Instagram的创始人把自己的照片分享应用卖给Facebook是否明智时，他这样描述扎克伯格的反应：“他好比是一位国际象棋大师，看到一个初级对手用一步妙招扭转棋局，自己忽落下风，吓了一跳”。有时列维似乎不假思索地接受了科技行业男性化的自我形象定位，比如，他把一个负责将新用户引入Facebook的内部团队描述成“一群数据驱动的十二金刚，披挂的是电子表格而非作战步枪”。

近年来，Facebook雇用了大批审核员核查其用户，并配备了自动化监控系统来增强他们的审核能力。但对于外界指控自己所造成的危害，这家公司的一条主要辩解之词似乎也是列维最同情的：基于扭曲的人性，不可能造出笔直的东西来，哪怕是一个社交网络。扎克伯格似乎真心相信这一点。它在战术上也很有用，因为它不仅确有些道理，还将这家公司的过失最小化了。

最终，列维视扎克伯格为一个乌托邦式的天才，却被这世上可悲的邪恶打败了；他“想要连接世界，而世界可能还没准备好被连接起来”。不是所有人都会这么宽容。■



Telemedicine in China

The smartphone will see you now

The covid-19 epidemic has brought millions of new patients online. They are likely to stay there

WHEN SARS, a coronavirus, hit China in 2003 citizens hunkered down at home. This proved a blessing for some businesses. Chinese social media took off. So did e-commerce. Richard Liu, who ran a chain of consumer-electronics shops, shut all his brick-and-mortar stores and set up JD.com. The firm is now valued at \$64bn.

A novel coronavirus that has brought China to a halt this year is boosting another fledgling industry: telemedicine. As hospitals turn away patients with other ailments and many Chinese are confined to their homes or steer clear of clinics for fear of infection, millions are seeking treatment and advice on the internet. The government is egging them on.

Xin Lijun, boss of JD Health, says that his platform's monthly consultations have grown tenfold since the outbreak, to 2m. Some 1.6m tuned in to a talk by a top cardiologist that the JD.com subsidiary live-streamed. Without the outbreak, the shift in consumer behaviour would have taken perhaps five years, reckons Mr Xin. Chen Qiaoshan of Analysys, a consultancy in Beijing, thinks that China's online health-care market may near 200bn yuan (\$29bn) this year, up from her pre-outbreak estimate of 158bn yuan.

China's telemedicine market—including consultations and drug sales—had been predicted to grow vigorously even before the latest epidemic. Ping An Good Doctor, a medical-services app run by a big insurer, claimed in September that over 300m had registered on it, equivalent to one in three internet users in China. Tianyancha, a data firm, counts over 1,000 home-grown telemedicine companies.

Until now, however, most of these firms have stuck to delivering drugs or, in Ping An's case, booking appointments with specialists, whom Chinese patients favour over general practitioners, even if it means queuing for hours at a hospital. Prestigious "AAA" hospitals account for one in ten public institutions but receive half of all outpatients. And the many Chinese who believe in traditional medicine, with its injunction that a reliable diagnosis cannot be made without feeling the pulse, would not dream of accepting health advice by video link.

Authorities, too, have been cautious. In many countries, including America, the world's biggest telemedicine market, most insurers do not reimburse patients' online expenses. Nor, in all but a few regions, does China's national health-insurance scheme. Most Chinese online doctors are permitted only to handle repeat prescriptions and follow-up consultations, not make an initial diagnosis. A draft government policy from 2017 took "a negative tone" on internet hospitals and recommended they be shut down, recalls Li Tiantian, founder of Dingxiang Doctor, which runs a medical myth-busting-and-advice forum.

Last year the government began to lift some restrictions, such as a ban on the sale of prescription drugs. But covid-19, as the new disease is known, has accelerated the shift. At the peak of the epidemic in early February a health-ministry directive mandated that internet-based medical services be given "full play" to diagnose and treat patients. Another encouraged hospitals to give online consultations. Jiangsu province, China's industrial powerhouse, authorised reimbursements for online medical care. So have cities including Shanghai and Wuhan, capital of Hubei province, where covid-19 first emerged.

Telemedicine firms are trying to win over the government and consumers by behaving like good corporate citizens. Many, including JD Health, are offering patients consultations free of charge while the epidemic lasts. Ali

Health, an arm of Alibaba, China's e-commerce titan, launched a free "online clinic" for residents of Hubei, which has been under lockdown; in five days 100,000 patients got a remote consultation. WeDoctor, an app backed by Tencent, a tech giant, mobilised 20,000 physicians to work online for no pay. Ping An set up an "antivirus command centre" to dispatch free face masks around the country. Dingxiang Doctor got epilepsy medication to 300 children in Hubei amid an acute shortage of suppliers and delivery firms. Its real-time heat map tracking covid-19 infections has been viewed 2.5bn times.

All this is costing the companies money. But, says Mr Xin of JD Health, it makes "little sense" to focus on profit at the moment. What matters, he adds, is how covid-19 has made people think twice about rushing to hospital and helped foster trust in general practitioners, who provide the bulk of online advice. It has also broadened the appeal of firms like his, beyond middle-aged patients with chronic conditions to web-savvy youngsters seeking advice for parents and grandparents and healthy types simply seeking reassurance. Of the 10m people who have turned to the internet for health services in the past month, perhaps half were first-time online patients, says Ms Chen. At least a third are likely to keep using such apps, she estimates.

| *Remote possibilities*

It is not just patients and politicians who are embracing telemedicine. JD Health has lured more pharmacies to its platform (in part by waiving the fee it earns on drug orders in Hubei). China's underpaid, overworked doctors are also keen. Xiao Xingxing left a AAA hospital in Beijing to consult full-time for JD Health; many old colleagues and classmates are doing the same, she reports. And against the backdrop of a global, virus-induced stockmarket rout, Chinese online health firms offer a tonic to ailing investors. This year the share prices in Ping An Healthcare and Ali

Health are up by 33% and 74%, respectively. ■



中国的远程医疗

手机医生来问诊

新冠疫情促使成百上千万病人上网求诊，这可能成为常态【新冠报道】

当2003年由一种冠状病毒引发的非典疫情席卷中国时，人们宅在家中闭门不出。这对一些企业来说反倒是个福音。中国社交媒体乘势起飞。电子商务也大举兴起。当时经营数码产品连锁店的刘强东关掉了所有实体店铺，创办了京东。如今，该公司的市值已达640亿美元。

今年一种新型冠状病毒让中国陷入停顿，这又在推动另一个正在起步的产业：远程医疗。随着医院停止接收其他疾病的患者，以及许多中国人在家自我隔离或担心去医院会感染病毒，成百上千万的人正在互联网上寻求治疗和建议。而政府也在鼓励这种做法。

京东健康的CEO辛利军表示，自疫情爆发以来，其平台的月问诊量已经增长了10倍，达到200万人次。这家京东子公司邀请一位顶尖心脏病专家做了一场网络直播讲座，吸引了约160万人收看。辛利军估计，若不是此次疫情爆发，这样的消费者行为转变可能还需要五年。北京咨询公司易观的陈乔山认为，今年中国线上医疗的市场规模可能接近2000亿元，疫情爆发前她的预测是1580亿元。

在这轮疫情爆发之前就已有预测认为中国的远程医疗市场（包括线上问诊和药品销售）将迎来强劲增长。大型保险公司平安运营的医疗服务应用“平安好医生”去年9月宣称注册用户已超三亿人，相当于中国网民总数的三分之一。根据数据公司天眼查的统计，中国本土远程医疗公司已超过1000家。

然而到目前为止，多数远程医疗公司的业务还仅限于送药上门，或者像平安好医生那样提供专科医生挂号。比起全科医生，中国的患者更偏爱专科医生，哪怕要在医院排上几个小时的队。声名显赫的三甲医院数量只占公立医疗机构的十分之一，却接诊了一半门诊病人。而对于很多相信中医的

中国人来说，既然中医讲究靠把脉做出可靠诊断，他们不会想要通过视频来问诊。

政府也态度谨慎。在许多国家，包括拥有世界最大远程医疗市场的美国，大部分保险公司都不会赔付患者的线上医疗费用。除了少数几个地区外，中国的社保也不报销网上看病的费用。中国大多数线上医生只被允许处理复诊续方，不得做初诊诊断。丁香医生（运营着一个辟谣和科普医学论坛）的创始人李天天回忆，2017年一份政府政策草案对互联网医院持“负面态度”，并建议关停这些医院。

从去年开始，政府陆续取消了一些限制，例如允许在网上销售处方药。但这一次的新冠疫情影响加速了这种转变。在2月初疫情最严重的时候，国家卫健委出台政策，要求“充分发挥”互联网医疗的作用，为患者提供诊断和医疗服务。另一项政策鼓励医院开展线上问诊服务。工业强省江苏已经批准了线上医疗的医保报销。其他城市也先后将线上医疗纳入医保，包括上海和首先爆发疫情的湖北省会武汉。

远程医疗公司正努力扮演良好企业公民的角色，以赢得政府和消费者的信任。包括京东健康在内的许多公司均在疫情期间为患者提供免费问诊服务。中国电商龙头阿里巴巴旗下的阿里健康为封城中的湖北居民提供“线上义诊”，五天内有十万名患者接受了远程问诊。科技巨头腾讯投资的微医动员了两万名医生在线上无偿工作。平安成立了“抗击病毒指挥中心”，在全国免费发放口罩。丁香医生在供应和配送公司严重紧缺的情况下，为湖北300名儿童送去了癫痫药物。该网站实时跟踪疫情的热力图已被浏览了25亿次。

这些公司为此大把花钱。但京东健康的辛利军表示，这个时候考虑盈利“毫无意义”。他说，真正重要的是新冠病毒使得人们不再动辄跑去医院，而有助于培养人们对全科医生的信任，这些医生提供了绝大部分的线上问诊。疫情也让他们这类公司吸引到了更多用户，不再只是中年慢性病患者，还有精通网络、为父母和祖父母寻求建议的年轻人，此外还有仅仅是为消除疑虑的健康人群。陈乔山说，过去一个月里有一千万人通过互联网

寻求医疗服务，其中可能有一半是初次上网求医。她估计，至少有三分之一的人可能会继续使用此类应用。

| 远程的潜力

积极拥抱远程医疗的不止病患和政客。京东健康还吸引了更多药店进驻其平台（部分原因是它免收湖北地区药物订单的平台费用）。工资收入低、工作强度大的中国医生对此也充满了热情和期待。肖幸幸（音译）从北京一家三甲医院辞职后，加入了京东健康担任全职医生。她说自己的许多老同事和同学也做出了同样的选择。在疫情引发全球股市暴跌的背景下，中国的互联网医疗公司为困顿的投资者注入了一针强心剂。今年以来，平安健康医疗科技和阿里健康的股价已经分别上涨了33%和74%。 ■



The world economy

Sneezy money

The economy is reeling from an unusual illness. Interest-rate cuts are only a partial remedy

IF THE FINAL week of February saw financial markets jolted awake to the dangers of a covid-19 pandemic, the first week of March has seen policymakers leaping into action. The realisation that global GDP will probably shrink for part of this year, and the looming risk of a financial panic and credit-crunch, has led central banks to slash interest rates at a pace last seen in the financial crisis of 2007-09.

On March 3rd the Federal Reserve lowered its policy rate by 0.5 percentage points, two weeks before its scheduled monetary-policy meeting. Central banks in Australia, Canada, Indonesia and England have also cut rates. The European Central Bank is expected to follow. If the money-markets are right, more Fed cuts are in store. A composite measure of the global monetary-policy rate, compiled by Morgan Stanley, a bank, is expected to fall to 0.73% by June, from 1% at the start of the year and 2% at the start of 2019.

Yet there is an uneasy feeling that a flurry of rate cuts may not be the solution to this downturn. In part that reflects the fact that they are already so low. A golden rule of crisis-fighting is that in order to be credible you should always have more ammunition available. In 2008-10 the global composite policy rate fell by three percentage points. Today, outside America, rich-world interest rates are close to, at, or below zero. Even the Fed has limited scope to cut much further—one reason, perhaps, why share prices failed to revive in the hours after its latest move.

The tension also stems from the peculiarity of the shock that the economy

faces—one that involves demand, supply and confidence effects. The duration of the disruption mainly depends on the severity of the outbreak and the public-health measures undertaken to contain it. Given those uncertainties, policymakers know that while interest-rate cuts are an option, they also need fiscal and financial measures to help business and individuals withstand a temporary but excruciating cash crunch.

One way the virus hurts the economy is by disrupting the supply of labour, goods and services. People fall ill. Schools close, forcing parents to stay at home. Quarantines might force workplaces to shut entirely. This is accompanied by sizeable demand effects. Some are unavoidable: sick people go out less and buy fewer goods. Public-health measures, too, restrict economic activity. Putting more money into consumers' hands will do little to offset this drag, unlike your garden-variety downturn. Activity will resume only once the outbreak runs its course.

Then there are nasty spillovers. Both companies and households will face a cash crunch. Consider a sample of 2,000-odd listed American firms. Imagine that their revenues dried up for three months but that they had to continue to pay their fixed costs, because they expected a sharp recovery. A quarter would not have enough spare cash to tide them over, and would have to try to borrow or retrench. Some might go bust. Researchers at the Bank for International Settlements, a club of central banks, find that over 12% of firms in the rich world generate too little income to cover their interest payments.

Many workers do not have big safety buffers either. They risk losing their incomes and their jobs while still having to make mortgage repayments and buy essential goods. More than one in ten American adults would be unable to meet a \$400 unexpected expense, equivalent to about two days' work at average earnings, according to a survey by the Federal Reserve. Fearing a hit to their pockets, people could start to hoard cash rather than

spend, further worsening firms' positions.

Modelling the resulting hit to economic activity is no easy task. In China, which is a month ahead of the rest of the world in terms of the outbreak, a survey of purchasing managers shows that manufacturing output in February sank to its lowest levels since factory bosses were first surveyed in 2004. It seems likely that GDP will contract in the first quarter for the first time since the death of Mao Zedong in 1976.

Forecasters are pencilling in sharp falls in output elsewhere (see chart 1). Goldman Sachs, a bank, reckons global GDP will shrink at an annualised rate of 2.5% in the first quarter. With luck the slump will end once the virus stops spreading. But even if that happens the speed and size of the economic bounce-back also depends on the extent to which those costly spillovers are avoided.

That is why central bankers and finance ministries are turning to more targeted interventions (see chart 2). These fall into three broad categories: policies to ensure that credit flows smoothly through banks and money markets; measures to help companies bear fixed costs, such as rent and tax bills; and measures to protect workers by subsidising wage costs.

Start with credit flows. Central banks and financial regulators have tried to ensure that markets do not seize up, but instead continue to provide funds to those who need them. On March 2nd the Bank of Japan conducted ¥500bn (\$4.6bn) of repo operations to ensure enough liquidity in the system. The People's Bank of China has offered 800bn yuan (\$115bn, or 0.8% of GDP) in credit to banks so long as they use it to make loans to companies badly hit by the virus. Banks have been asked to go easy on firms whose loans are coming due.

Governments are also helping firms with their costs, the second kind of

intervention. Singapore plans corporate-tax breaks, and rental and tax rebates for commercial property. Korea will give cash to small firms struggling to pay wages. Italy will offer tax credits to firms that experience a 25% drop in turnover. In China the government has told state landlords to cut rents and given private-sector landlords subsidies to follow suit.

The final set of measures is meant to protect workers by preventing lay-offs and keeping incomes stable. China's government has enacted a temporary cut to social-security contributions. Japan will subsidise wages of people who are forced to take time off to care for children or for sick relatives. Singapore has announced cash grants for employers of affected workers.

Today these policies are being sporadically announced, and their implementation is uncertain. As the virus spreads, expect more interest-rate cuts—but also the systematic deployment of a more complex cocktail of economic remedies. ■



世界经济

染病的钞票

不同寻常的疾病正在重创经济。仅靠降息并不能药到病除【新冠报道】

如果说2月最后一周金融市场才猛然意识到新冠肺炎全球大流行的危险，那么到3月第一周，政策制定者已迅速采取了行动。认识到全球GDP可能会在今年部分时间里萎缩，加之金融恐慌和信贷紧缩的危险逐渐逼近，各国央行大幅降息。上一次如此迅猛的降息还是在2007至2009年的金融危机期间。

本月3日，距召开货币政策会议尚有两周，美联储将政策利率下调了0.5个百分点。澳大利亚、加拿大和印度尼西亚、英国的央行也纷纷下调了利率。预计欧洲央行也会跟上。如果货币市场状况尚可，美联储还会继续降息。摩根士丹利编制的全球货币政策利率的综合指标预计到6月将从今年初的1%降至0.73%，而2019年初是2%。

然而人们还是心神不宁，担心一连串降息可能无法逆转此次衰退。这种不安在一定程度上源自利率已然很低的事实。对抗危机的黄金法则是，要想策略令人信服，就得始终拥有更多弹药。从2008年到2010年，全球综合政策利率下降了三个百分点。如今，美国以外的富裕国家的利率不是接近零，就是已经为零，甚至低于零。就连美联储也缺乏进一步大幅降息的空间，这也许是在它最近一次降息后几小时内股价没有反弹的原因之一。

这种紧张情绪还源于这一次经济面临的冲击具有特殊性——它对需求、供给和信心都有影响。冲击持续的时间主要取决于疫情的严重程度以及为遏制疫情采取的公共卫生措施。鉴于这些不确定因素，政策制定者明白，虽然他们可以选择降息，但也需要采取财政和金融措施，帮助企业和个人抵抗暂时却严峻的现金危机。

病毒损害经济的方式之一是干扰劳动力、商品以及服务的供应。人们病倒；学校停课，迫使父母们也待在家里。隔离措施可能会强制工作场所完

全关闭。与此相伴的是相当大的需求效应。有些是不可避免的：患病的人出门少，买东西也少。公共卫生措施也限制了经济活动。与一般的经济低迷不同的是，让消费者拿到更多钱并不能抵消疫情的拖累。经济活动只有在疫情结束之后才能恢复。

然后是严重而棘手的溢出效应。企业和家庭都将面临现金紧张。来看看2000多家美国上市公司构成的样本。想象一下它们在三个月里没有收入，但仍必须继续支付固定成本，因为它们期望经济会强劲复苏。其中四分之一的公司没有多余的资金来渡过难关，只能尝试去贷款或紧缩开支。有些可能会破产。央行组织国际清算银行的研究人员发现，富裕国家和地区中超过12%的公司无法产生足够的收入来支付利息。

许多劳动者也没有多少安全缓冲。他们可能会失去收入和工作，但仍然要还按揭及购买生活必需品。美联储的一项调查显示，超过十分之一的美国成年人无法负担400美元的意外开支，按平均收入水平计算这大概相当于两天的工资。由于害怕钱包承压，人们可能会开始多攒钱少花钱，这将进一步恶化企业的状况。

对经济活动因此受到的冲击建模并非易事。中国爆发疫情比世界其他地区早了一个月。在那里，一项针对采购经理的调查显示，2月份制造业产出跌至2004年首次启动该调查以来的最低水平。自1976年毛泽东去世以来，GDP很可能第一次在第一季度出现萎缩。

预测机构预计世界其他地方的产出将急剧下降（见图表1）。高盛估计，第一季度全球GDP的年化收缩率将达2.5%。幸运的话，衰退将在病毒停止传播时止步。但即便如此，经济反弹的速度和规模也取决于能在多大程度上避免那些代价高昂的溢出效应。

因此，各国央行官员和财政部正在采取更具针对性的干预措施（见图表2）。这些措施分为三大类：确保信贷在银行和货币市场中平稳流动的政策；帮助企业承担租金和税收等固定成本的措施；通过补贴工资成本来保护劳动者的措施。

先说信贷流动。央行和金融监管机构已努力确保市场不会失灵，而能继续向有需求者提供资金。3月2日，日本央行进行了5000亿日元（46亿美元）的回购操作，以保证金融系统有足够的流动性。中国人民银行向银行提供了8000亿元（相当于GDP的0.8%）的信贷，让它们向在疫情中受重创的企业提供贷款。银行已收到指令对贷款即将到期的企业予以宽限。

各国政府也正在帮助企业负担运营成本，这属于第二种干预措施。新加坡计划减免公司税，并对商业地产减免租金和退税。韩国将向发不出工资的小企业提供现金支持。意大利将向营业额下降25%的企业提供税收抵免。在中国，政府已要求国有物业减免租金，并补贴私有物业让它们也减免租金。

最后一类措施旨在通过防止裁员和稳定收入保护劳动者。中国政府已宣布暂时减免社保缴费。日本将向不得不请假照看孩子或患病亲属的人给予工资补贴。新加坡已宣布向受影响职工的雇主提供现金补贴。

现在这些政策都是零星宣布的，具体实施情况还不确定。随着病毒进一步蔓延，可以预期会有更多降息举措，同时也应预期将系统性地部署更为复杂的综合经济拯救措施。 ■



Oncology

The topography of tumours

The most comprehensive genetic map of cancers ever made shows how hard they will be to crack

PERHAPS MORE than any other, cancer is seen as a disease of genes gone wrong. So, as genetic-sequencing technology has become cheaper and faster, cancer scientists are using it to check which changes to genes cause tumours to spread.

The latest insights from one group, the international Pan-Cancer Analysis of Whole Genomes (PCAWG), are revealed last month in *Nature*. In an analysis of the full genomes of 2,658 samples of 38 types of tumour taken from the bladder to the brain, the researchers give a blow-by-blow account of how a series of genetic mutations can turn normal cells into runaway clones. It provides the most comprehensive analysis yet of where to find this damaging disruption to DNA and, by unpicking the genetics of what makes cancer tick, just how hard it will be to tame.

For each of the cancer samples, the team produced a read-out of the tumour genome—the 3bn or so individual DNA letters—and compared it with the genome sequences of healthy cells taken from the same patients. In this way they could look for the genetic signatures of the cancer cells, where specific mutations had warped the genetic information.

Most mutations in the genome are harmless. But driver mutations, where genetic changes cause a cell to multiply more easily and faster than other cells, can trigger tumour growth. Many driver mutations have been found over the past decade and a handful have been translated into new medicines. In a fifth of breast cancers (pictured), for example, a driver mutation in the gene HER2 makes cells produce more of a protein on their

surface that encourages them to grow and divide out of control. A series of drugs, including Herceptin, target this protein, and lead to significantly improved survival rates. The same HER2 mutation also appears in some lung cancers, raising hopes that similar therapies could work against that disease.

The problem is that most cancers have multiple driver mutations. Indeed, the PCAWG work found that on average each cancer genome carried four or five. And with some clever genetic archaeology they also found that some driver mutations can occur years before symptoms appear.

To discover this, researchers used a new concept called “molecular time” to reconstruct the cellular evolution of tumour cells. By comparing the DNA of cells within tumours, the researchers could place mutations in chronological order based on how many cells they appeared in. Earlier mutations occur more frequently. For example, driver mutations in a gene called TP53 were found to have originated at least 15 years before diagnosis in types of ovarian cancer, and at least five years before in types of colorectal and pancreatic cancer. Driver mutations in a gene called CDKN2A were found to have occurred in some lung cancers more than five years before diagnosis. In theory, that provides a window in which to find people at risk of developing these diseases, and perhaps prevent the cancer ever appearing.

The new study closes down talk that significant numbers of unknown driver mutations could lurk in the relatively unexplored regions of the human genome. One such driver mutation in non-coding DNA was found in 2013—a mutation in the TERT gene across many different cancer types. To check for more like this, the consortium sequenced and analysed all the DNA letters of these non-coding regions (which account for 98% of human DNA) for the first time. They found that non-TERT driver mutations occurred at a rate of less than one per 100 tumours in these regions.

Peter Campbell of the Wellcome Sanger Institute in Cambridge, Britain, and a member of the PCAWG consortium, says an important contribution of the study is that by sequencing so many tumours it has raised the number of patients in whom a genetic contribution to their cancer can be identified from less than 70% to 95%. The goal, he says, is for genome sequencing of tumours to become routine. Efforts to introduce this are under way in some countries, including Britain, the Netherlands and South Korea, he adds.

| *Results, results, results*

Insights are all very well, but what about cold, hard clinical progress? Turning genome sequences into meaningful predictors of cancer will require comparisons between samples from tens of thousands of patients, say the researchers, along with data on their treatments and survival rates. Processing this would be beyond the reach of any single organisation. Instead, a follow-up project is planned that includes national funding agencies, charities and corporate partners from more than a dozen countries around the world. It aims to link full sequences of 200,000 cancer patients to their clinical data by 2025. ■



肿瘤学

肿瘤测绘

迄今最全面的癌症基因图谱表明，要攻克癌症困难重重

相较于其他疾病，癌症或许更多地被认为是因基因出错而引发。因此，随着基因测序技术成本下降和操作更加快捷，肿瘤学家正在利用这项技术来核查是哪些基因变化导致了肿瘤扩散。

其中一个科研团队上个月在《自然》杂志上发表了他们最新的研究成果。“泛癌症全基因组分析”（PCA WG）国际团队分析了包括膀胱癌和脑癌在内的38种肿瘤的2658个样本的全部基因组，极为详尽地描述了一系列基因突变如何令正常细胞变成恶性增殖的癌细胞的过程。它为从何处寻找DNA受到的这种损害性扰乱提供了迄今为止最全面的分析，并且，通过揭示癌症发病的遗传学机制，告诉人们要攻克癌症困难重重。

该团队对每一份癌症样本都进行了肿瘤基因组测序，即分析其约30亿个独立DNA碱基的序列，然后与同一病人健康细胞的基因组序列做比对。通过这种方法，他们得以寻找癌细胞的遗传标志，也就是那些因特定突变导致遗传信息发生变异的位置。

基因组中大多数的突变都是无害的。但发生“驱动突变”时，基因变化会导致突变细胞比其他细胞更容易并更快速地繁殖，可能触发肿瘤生长。过去十年中，人类已经找到了不少驱动突变，并基于其中的几个研制出了新药。例如，在五分之二的乳腺癌中（见图），HER2基因发生的驱动突变使细胞表面产生更多的蛋白质，导致细胞的生长和分裂失控。包括赫赛汀（Herceptin）在内的一系列靶向药物就是针对这种蛋白质，显著提高了存活率。部分肺癌中也出现了同样的HER2突变，因此类似的疗法也有望用于治疗肺癌。

问题是大多数癌症存在多重驱动突变。实际上，PCA WG的研究发现每个癌症基因组平均携带四到五个驱动突变。通过一些巧妙的基因溯源手段，研

究还发现有些驱动突变可能在出现症状数年之前就已发生。

为验证这一发现，研究人员采用了被称为“分子时间”的新概念来重现癌细胞的演化过程。通过比较肿瘤内细胞的DNA，他们可以根据发生突变的细胞数量来按时间顺序排列突变。较早发生的突变发生的次数也更多。例如，TP53基因的驱动突变在各类卵巢癌被确诊的至少15年前开始发生，在各类结直肠癌和胰腺癌被确诊的至少五年前开始发生。CDKN2A基因也是在部分肺癌被确诊的至少五年前就已发生驱动突变。从理论上讲，这提供了窗口期来找出可能发展成癌症的人，从而可能遏制癌症的发生。

这项新研究让一种说法偃旗息鼓——有些人认为还有大量未知的驱动突变可能潜伏在人类基因组中相对未被探索的区域。2013年，在非编码DNA中发现了这样一种驱动突变，即出现在许多不同癌症中的TERT基因突变。为检测更多这样的突变，PCAWG研究团队首次对这些非编码区域（占人类DNA的98%）的所有DNA碱基做了测序和分析，发现在这些区域，肿瘤中存在非TERT驱动突变的比率低于1%。

研究团队成员、英国剑桥的威廉桑格研究所（Wellcome Sanger Institute）的彼得·坎贝尔（Peter Campbell）指出，这项研究的一大贡献在于，通过对这么多肿瘤测序，把可以识别出其所患癌症的遗传因素的病患比率从不到70%升至95%。他表示，研究的目的是将肿瘤基因组测序常态化。他补充道，包括英国、荷兰和韩国在内的一些国家正在努力推行这一做法。

| 实效，实效，出实效

这样的研究成果固然很好，但是否能促成切实可靠的临床进展呢？PCAWG的研究人员表示，要将基因组序列转化为有效的癌症预测指标，需要比对数十万名癌症患者的样本，还需要他们的治疗和存活率数据。单靠任何一个机构都无法做到这些。因此，研究人员规划了一个后续项目，参与者包括全球十多个国家的全国性赞助机构、慈善机构和企业合作伙伴，希望在2025年前将20万名癌症患者的全基因序列与其临床治疗数据对接起来。■



Coronavirus statistics

Tracking the stealthy killer

Tourism flows and death rates suggest under-reporting of covid-19 cases

IN RECENT WEEKS covid-19, a deadly new disease, has slowed in China but spread widely elsewhere. China's strict quarantine has led to a 90% decline in new infections, whereas outbreaks in Italy and Iran have grown rapidly. In the last week of February 70% of new diagnoses were outside of China. As covid-19 reaches countries unwilling or unable to monitor it, officials must use educated guesswork to track its evolution.

The number of cases each country reports depends both on the number of infections and on how many people get tested. By March 1st South Korea had tested over 100,000 people; America just 472.

To estimate the number of undetected cases, scholars can make use of patterns in more complete data. One model, built by a team at Harvard, used the number of people flying from Hubei province in China, where the outbreak began, to various countries to predict imported cases. Such data are less relevant now, because Hubei has been locked down for a month.

To derive fresh estimates, *The Economist* built a similar model. We tested the link within the OECD—a club of mostly rich countries, which should have strong detection capacity—between Chinese tourism in 2019 and confirmed covid-19 cases. As expected, OECD states that swapped lots of tourists with China, such as Switzerland, tend to report higher infection rates than do ones with small flows, like Belgium.

Applied worldwide, our model finds big outliers. The outbreaks in Iran, Italy and South Korea, where the virus is spreading internally, are bigger than tourist flows suggest. At the other extreme, countries like Singapore

may have fewer diagnoses than expected because of strong containment efforts. But the Philippines, Russia, Myanmar and Indonesia have lots of people and tourism to and from China, and just eight confirmed cases in total. Thousands more have probably gone undetected.

Another pattern bolsters this finding. South Korea and China test regularly. In both places—excluding Hubei, where the virus began claiming lives before authorities formulated a response—0.5-1% of people who have tested positive have died. In other countries with at least one death, this rate is five times higher. Deaths are easier to count than infections are. The most likely explanation for this gap is that for every person diagnosed in these countries, four more do not know they are infected. ■



冠状病毒统计

追踪隐秘杀手

旅客流量和病死率显示新冠肺炎病例存在漏报【新冠报道】

最近几周，新型致命疾病新冠肺炎的疫情在中国放缓，却在其他国家广泛传播。中国的严格隔离措施使得新增感染病例下降了90%，而意大利和伊朗的疫情却迅速加剧。在2月最后一周，70%的新增确诊病例都在中国境外。随着新冠肺炎扩散至那些不愿或无法监控疫情的国家，官员们必须运用有理据的猜测来追踪疫情进展。

每个国家公布的病例数取决于感染人数及实际接受过检测的人数。截至3月1日，韩国已经检测了超过十万人，而美国仅检测了472人。

学者们可以利用较完整的数据所呈现的模式来估计未检出病例的数量。哈佛大学的一个研究团队构建了一个模型，利用从疫情最初爆发地中国湖北省飞往各国的人数来预测输入病例。但鉴于湖北省已经封锁了一个月，这些数据现在已不太适用了。

为了得出新的估计，本刊构建了一个类似的模型。我们测试了经合组织（其成员主要为富裕国家，应该具有较强的检测能力）国家在2019年来往中国的旅客数字与新冠肺炎确诊数字之间的关联。正如所料，与中国有大量旅客往来的经合组织国家（如瑞士）报告的感染率往往高于旅客往来量小的国家（如比利时）。

应用于全球范围时，我们的模型发现了较大的异常值。在病毒正在内部传播的伊朗、意大利和韩国，确诊病例超过了根据旅客流量得出的预测。而另一个极端是，像新加坡这样的国家可能因为采取了强有力的防控措施而使得确诊数字少于模型预测。但菲律宾、俄罗斯、缅甸和印尼与中国的人员和旅客往来庞大，却总共只有八宗确诊病例。实际可能还有几千个病例未被检测出来。

另一个数据模式支持了这一结论。韩国和中国经常性地检测排查病例，两国（除去湖北省，该省在官方制定防控措施前已经发生死亡病例）确诊病例的病死率都在0.5%至1%之间。但在至少出现一起死亡病例的其他国家中，病死率却是这个数字的五倍。病死人数比感染人数更易统计。对于这种差距的最可能解释是，在这些国家，每一个确诊病例意味着还有四个未知的已感染病例。 ■



Headhunters

Take me to a leader

The industry tasked with finding bosses is more powerful than ever, even though the value it provides remains hard to measure

FOR A FEW months last year Matthieu (not his real name) was on the most important team in finance. SWIFT, a global payments-messaging service owned by 11,000 banks, was looking for a new chief. So was CLS, an institution that settles four-fifths of worldwide foreign-exchange turnover. Each had hired Matthieu's firm to find one. He was aware of the stakes. Both outcomes were going to "impact everything" that money touches, he told *The Economist* at the time. His voice barely rose over the mellow music of a Manhattan hotel's bar but nonetheless it carried a bass note of self-importance.

The firm got the job done. Javier Pérez-Tasso, SWIFT's former Americas head, took over as boss in July. Marc Bayle de Jessé, an official at the European Central Bank, started at CLS in December. The placements testify to the brokering brawn of executive-search firms. The industry's top tier is busier than ever. The bosses of 311 of America's 3,600 listed firms left their jobs in 2019—the highest share on record. Someone needs to find their replacements.

Like Matthieu, the search industry is secretive, and numbers are hard to pin down. Estimates from AESC, a trade body, suggest that the business has enjoyed strong growth for much of the past 30 years—with the exception of slumps after the dotcom bust in 2000 and the financial crisis of 2007-09 (see chart 1). AESC reckons global executive-search revenues grew by 12% in 2018 and that many firms had their best year ever in 2019 (for which it is still crunching the numbers).

Today, the biggest search firms hold sway over who rules many of the world's most potent organisations. The best deserve their hefty fees, clients say. But the industry is facing increased scrutiny, amid suspicions that it may be holding back performance and diversity at the top.

Executive search—headhunting, in the vernacular—emerged in the post-war boom, when fast-growing firms in Europe and America began fighting over experienced leaders. The battle intensified in the 1970s as the internationalisation of business turned a consulting backwater into a mainstream profession. One recruiter's ex-boss recalls opening 30 outposts that decade, from Singapore to Sydney.

Just as quickly, the business earned a reputation for sloppiness. Recruiters were “golf-course, back-slapping sales guys”, as one veteran admits. Candidates in their Rolodexes were lazily recycled. Criteria for drawing up shortlists were often a mystery, says Angeles Garcia-Poveda of Spencer Stuart, a search firm.

Fifty years later they have become tightly woven into the fabric of corporate life, and are seen by most multinationals as indispensable. Five giants—Spencer Stuart, Heidrick & Struggles, Russell Reynolds Associates, Egon Zehnder and Korn Ferry—dominate CEO search. This quintet, known as the “Shrek” firms, earned fees of \$4.8bn in 2018, 14% more than the year before and 43% more than in 2014, according to Hunt Scanlon Media, a trade publisher. Spencer Stuart places an executive in a leadership role or boardroom 11 times a day, says Ben Williams, its boss. (The Economist Group has recently employed Egon Zehnder and Heidrick & Struggles to fill senior roles, including CEO and chairman.)

Interviews with more than 50 insiders suggest that 80-90% of *Fortune* 250 or FTSE 100 companies pay headhunters to find their CEO, even when the successful candidate is likely to come from within a firm's own ranks.

Among the next tier of companies, perhaps half do. Universities, sports clubs and officialdom enlist them, too. Last year their clients included English football's Premier League and the International Paralympic Committee.

As the big headhunters have grown bigger, boutique firms have struggled to keep up. Nonetheless, some with deep expertise in specific industries or corporate functions have thrived, says Nancy Garrison Jenn, who helps multinationals headhunt the right headhunters. True Search, a tech-focused outfit, saw its revenues jump by 64% in 2018. Lower down the scale, the rise of online social networks has clobbered recruiters specialising in mere mortals like department heads and middle managers—since, as one puts it, “anyone can buy a computer, get a LinkedIn licence and call themselves a search expert”.

The big headhunters have benefited from the confluence of four forces. First, boards are looking for an ever broader skillset in modern CEOs. Bosses should be physically fit to withstand the brutal workload, comfortable dealing with the media and, increasingly, woke. They must grapple with complexity as big firms get bigger and industries converge—giants like Apple or Amazon are at once retailers, consumer-goods companies and tech firms—and with new threats, such as cybercrime.

Second, the rise of private equity (PE) means greater management churn at firms subject to buy-outs. America has some 8,000 PE-backed companies, double the number in 2006. Headhunters hustle in the hope of supplying bosses for PE firms' entire portfolios. A partner at a buy-out giant says it works with just three providers because it wants VIP treatment.

The third reason for the headhunting boom lies in emerging markets. Scions of business dynasties in places like India increasingly want to

devolve control of subsidiaries to professional managers, says Dinesh Mirchandani of Boyden, one of the oldest search firms. Startups like Ola, a ride-hailing firm, are looking for executives to help them conquer foreign markets. China, too, has champions keen to expand abroad but lacks managers with international expertise.

Lastly, boards and regulators are increasingly urging firms to plan for succession years in advance—and not, as in the past, to rely on a name in an envelope, to be unsealed should the boss be hit by a bus. Headhunters gladly help by benchmarking internal stars against potential external candidates. The pressure to plan ahead has led to the growth of all sorts of other ancillary services too, from leadership development to board-effectiveness assessment. Those now account for 43% of revenue at Korn Ferry, the largest Shrek.

Growth in demand has affected headhunting's supply-side. Nobody has ever studied to become a headhunter but the profession is becoming more diverse. Those serving in its ranks include ex-engineers, a former Olympic gymnast and an erstwhile neuroscientist. The big five are big employers of former McKinsey consultants. New recruits like the fast pace and the opportunity to interact with boards.

They also enjoy the money. A median partner at the Shrek five typically earns \$600,000 a year, according to industry veterans. The top 1% get \$3m-4m, most of it bonus. Those hiring for finance usually earn the most.

| *Seven-figure slice*

Generous pay comes courtesy of eye-watering fees. For decades headhunters charged one-third of the chosen candidate's first-year compensation (including any bonus). Caps became more common over the past decade as CEOs' salaries climbed into the stratosphere, fees more often exceeded \$1m—and clients started to rebel. Now fees at the top end are

typically limited to between \$500,000 and \$1m, though the boom in ancillary fees means overall revenues continue to grow fast.

The search for a CEO takes anywhere from 90 days to a year. The board forms a committee to oversee the process, which the headhunter helps shape. It then helps directors crystallise what they want the new boss to achieve, such as boosting profits or expanding into new markets, and draws up a list of required competencies.

Once the actual headhunting begins, recruiters hire armies of researchers to comb through databases containing millions of profiles; gone are the days when a cabinet full of CVs and organograms of superstar firms like IBM would suffice. Lists of candidates who look good on paper are then compared against tips from informants, who are typically former colleagues or chatty middlemen.

To whittle down a longlist of 15 or so people, consultants quiz candidates' suppliers, clients, ex-bosses and subordinates. They check Glassdoor, a website which lets workers rate employers. The phone is fine, but visits are better—valuable information can emerge in the last minutes of a meeting, or on the way to the lift.

It is often only at this point that candidates are contacted. Since the most desirable hires typically already hold plush posts, and are constantly wooed by rival recruiters, headhunters must fight hard for their attention. They look to breakfast regularly with high-fliers, and mark their job anniversaries and dates when bonuses are due—discreet inquiries may elicit news of a disappointing payout, and signal that an executive may be looking for a change. They offer a shoulder to cry on when the going gets tough. Denis Marcadet of Vendôme Associés, a search firm in Paris, remembers humbled financiers weeping for hours in his office during the subprime meltdown.

In interviews headhunters deploy their charms to get candidates to lower their guard. But face-to-face assessment can be “a bit of voodoo”, says one. (It can also go awry if the chemistry is wrong. In his memoir, Robert Iger, Disney’s boss, recalls his interview for the job with Gerry Roche of Heidrick & Struggles as “one of the most insulting experiences of my career” because he viewed the questions as irrelevant and, worse, there was no food.) So recruiters have acquired tools to make it more scientific. They administer psychometric tests. Questionnaires gauge candidates’ norms and values. Synthesis, an advisory firm inspired by the recruitment of elite units in the Israeli army, even has shrinks dissect candidates’ answers to seemingly innocuous questions about their life stories.

Boards or headhunters sometimes outsource deeper probing to specialists such as Hakluyt or StoneTurn, two British firms staffed with former spies, journalists and cops. (Paul Deighton, The Economist Group’s chairman, also chairs Hakluyt.) These corporate sleuths aim to tease out how bosses do deals, how they behave under pressure and whether they have ever crossed any ethical lines.

Simulations are also becoming increasingly popular with clients (if not with candidates). Frontrunners might, for instance, be sent reports about an imaginary company, then asked to run mock board meetings, calm down emotional managers of troubled divisions or weather earnings calls with aggressive analysts.

In the end, though, closing a big deal still often requires the human touch. Jill Ader, the chairwoman of Egon Zehnder, recalls taking an ideal but hesitant candidate off-site for three days to discuss the purpose of his life.

For the headhunters, their candidate’s signature on a new contract equals success. For their clients, it’s more complicated. Plenty of data exist on would-be CEOs. Korn Ferry estimates that 87% of all executives aspire to

become bosses; over one-third of applicants had career blow-ups before winning a top role, reckons ghSMART, an advisory firm; and so on. Yet it is trickier to measure the wisdom of choosing one candidate over another; it is impossible to know whether one of the rejected candidates might have done the job better.

Getting it wrong can be costly. The Conference Board, a think-tank, finds that the costs of changing bosses (severance, search, lost productivity during the transition, and so on) are generally equivalent to 5% of annual profit.

Lacking objective measures on which to judge headhunters' performance, board members often rely on their own impressions. And although some praise the service they receive, among others frustration is mounting.

Plenty of the things that hamper the industry are no fault of its own. Many companies make exasperating demands of headhunters and candidates. Some, for instance, want would-be CEOs to have a tête-à-tête with each member of the board, which in America and Britain typically numbers at least ten people. They may also demand regular testing of in-house candidates, which can poison a firm's internal politics. Others request assessments that seem bizarre to candidates. After being asked to take a graphology test, one contender for the top job at Alstom, a French engineering giant, asked sarcastically if he would also be subjected to an intrusive medical examination, recalls a recruiter.

Another problem stems from contracts that bar headhunters from poaching people from firms they have previously recruited for, usually for at least a year. As the Shrek firms grow, in other words, their hunting-ground shrinks. It is clients who demand such clauses, but it does not stop those shortchanged by them from getting irate. "They tell me the candidates aren't there," fumes an executive who has chaired several companies. "Then

I find there's an ideal candidate at PepsiCo, but they already work for PepsiCo so they can't touch it."

Some of the big recruiters' problems, though, are of their own making. Growth, especially at the Shreks, also leaves senior partners with less time for any one client. They jet around to sign contracts, but leave underlings who have less access and experience to do most of the heavy lifting. Moreover, since the rainmakers pocket the largest cut of the fee, their subordinates have less incentive to do a fine job. "Clients pay for haute couture but they get prêt-à-porter," says a former chief of a Shrek firm.

And although headhunters have grown less languorous since the easy-going 1970s, in one way they remain as lazy as before: many still seek to score easy wins by rehashing past work. A PE partner recounts being sent the same shortlist for two different finance-chief searches. A disproportionate share of CEOs are old-timers from a handful of blue chips, not all of which have had a stellar run (think of GE, several of whose past executives went on to Boeing).

Senior headhunters admit the industry is sometimes too quick to recommend the safe option when boards are reluctant to gamble on unconventional candidates. Despite progress in recent years, just 38 of the bosses of America's 675 largest listed firms are women, and 59 non-white. It has grown harder for bright young things to get a look in. The average age of incoming CEOs has risen sharply, to 58, since 2005 (see chart 3). A survey by AESC, which represents 16,000 search professionals, ranks "attracting diverse talent" as the seventh-most-pressing issue for their firms in 2019, behind such things as "attracting digital talent" or "creating a culture of innovation".

| *The search within*

Growing doubts about the value headhunters bring has led some clients to

take the work in-house. An expanding list of corporate titans, including all of the tech giants, are building private squads of headhunters—often by poaching from the Shrek firms. Having focused at first on junior hires, these are working their way up to the C-suite, says Ms Garrison Jenn.

Some company chairmen may wonder why they need an outside recruiter at all, when the ideal candidate is often staring them in the face. A recent Conference Board survey of executives and corporate secretaries found that 73% thought there was no need for a firm with a strong internal candidate for CEO to conduct an outside search. There appears to be no shortage of such talent within. Last year almost four-fifths of new S&P 500 bosses came from inside the firm, including that of Intel, a chipmaker. IBM recently picked the head of its cloud division to replace Ginni Rometty.

Yet most large companies will continue to use search firms—even if they do not fully buy the science, or harbour other doubts. That is because external validation has a value all of its own. Recruiters can be crucial in helping build consensus when, as is so often the case, boards are split. It is as diplomats that the best headhunters earn their keep. ■



猎头

带我去见老大

猎头这个行业当前所未有地强大，但其提供的价值仍难以衡量

去年有几个月，马修（化名）在金融界最重要的团队里工作。环球同业银行金融电讯协会（以下简称SWIFT，是11,000家银行使用的全球支付结算电文服务系统）当时在寻找新舵手。处理全球五分之四外汇交易结算的CLS也有同样的需求。两家机构都雇请了马修的公司来物色人选。他清楚其中的利害。两个最终人选都将对金融界的“方方面面带来影响”，他当时这样告诉本刊。在曼哈顿一家酒店的酒吧里，他说话的声音勉强压过柔和的音乐声，但其中带着一丝自命不凡的低沉。

他的公司完成了任务。SWIFT前美洲区负责人哈维尔·佩雷斯-塔索（Javier Pérez-Tasso）于去年7月接任该公司CEO。欧洲央行官员马克·贝莱·德耶西（Marc Bayle de Jessé）则在12月开始接任CLS的CEO。这两起“新官到位”体现了猎头公司的中介实力。猎头行业里的佼佼者们如今最是繁忙。美国3600家上市公司中有311家的老板在2019年离职，是有记录以来的最高比例。总得有人来寻找他们的替任者。

和马修一样，这个行业行动隐秘，相关数据难以掌握。据行业组织高级行政管理人士搜寻顾问联合会（以下简称AESC）的估计，过去30年里，除了2000年互联网泡沫破裂后及2007年至2009年金融危机期间，猎头业务基本保持强劲增长（见图表1）。据AESC估计，2018年全球猎头业务收入增长了12%，许多公司在2019年取得了前所未有的佳绩（AESC仍在统计具体数字）。

如今，在决定由谁来管理全球许多最具影响力的机构时，那些最大的猎头公司起着关键作用。客户表示，给顶尖猎头公司付高额费用是值得的。但外界质疑这类公司可能拖累了企业高层的表现和多元化，令该行业面临更多的审视。

俗称“猎头”的高管搜寻服务诞生于二战后的繁荣时期，当时欧美迅速发展的公司开始争抢经验丰富的领导人才。在70年代经营国际化的大潮下，人才争夺战愈演愈烈，原本停滞不前的人力资源咨询服务变成了一个热门行业。一家招聘机构的前高管回忆，在那十年间，他的公司在新加坡、悉尼等地开设了30个分支机构。

几乎以同样快的速度，这个行业落得个马虎敷衍的名声。一位资深人士承认，猎头顾问就是些“在高尔夫球场上拍肩膀拉关系的推销员”。推荐的人选来来回回就是名片盒里那些人。确定最后人选名单的标准往往是个谜，猎头公司史宾沙（Spencer Stuart）的安杰利斯·加西亚-波菲达（Angeles Garcia-Poveda）说。

五十年后，猎头们已深深融入企业运营，大多数跨国公司都认为它们不可或缺。史宾沙、海德思哲（Heidrick & Struggles）、罗盛咨询（Russell Reynolds Associates）、亿康先达（Egon Zehnder）和光辉国际（Korn Ferry）这五大巨头目前雄霸CEO猎头业务。据行业出版商亨特斯坎隆传媒（Hunt Scanlon Media）的数据，这五大公司（它们的首字母合起来正好是“Shrek”，因而被合称为“史莱克”公司）在2018年的收入为48亿美元，同比增长14%，较2014年增长43%。史宾沙的老板本·威廉姆斯（Ben Williams）表示，史宾沙平均每天成功推荐11人成为高管或董事。（经济学人集团近期通过亿康先达和海德思哲物色高管，包括CEO和董事长。）

对50多位业内人士的访谈显示，财富250强公司或富时100指数公司中有八九成会请猎头物色CEO，即便最后的入选者很可能来自公司内部。在次一级的公司中有约一半是如此。大学、体育俱乐部及政府部门也会使用猎头。去年，猎头的客户就有英超联盟和国际残奥会。

大型猎头公司规模越来越大，小型精品公司则苦苦维持。不过，在特定行业或企业职能方面拥有深厚专业能力的小公司仍然大展身手，帮助跨国公司选择合适猎头的南希·加里森·詹恩（Nancy Garrison Jenn）表示。以技术立足的猎头公司True Search 2018年收入增长了64%。再往下一层看，随着在线社交网络的兴起，专门找寻部门主管和中层管理人员等普

通人才的招聘公司大受打击。正如有人说的，“买台电脑，在领英上弄个许可，谁都可以自称专业猎头”。

大型猎头公司受益于四股力量的融合。首先，董事会在寻找具备更广泛能力的现代CEO。高管要身体健康，能承受繁重的工作，不怕与媒体打交道，还要愈发警觉。随着大公司变得更大以及跨行业融合（像苹果或亚马逊这样的巨头同时是零售商、消费品企业、科技公司），高管们必须努力应对这种复杂度，以及网络犯罪等新威胁。

其次，私募股权（PE）的兴起导致被收购公司的管理层流失率更大。美国约有8000家由私募股权公司投资的公司，是2006年数字的两倍。猎头公司忙于为私募股权公司投资组合内的各个公司寻找高管。某并购巨头的一位合伙人表示，自己公司只与三家猎头公司合作，因为想要获得VIP待遇。

促成猎头热潮的第三个原因是新兴市场。最老牌猎头公司之一的博伊登（Boyden）的迪内希·默克达尼（Dinesh Mirchandani）表示，在印度等地，越来越多家族企业的接班人想放权把子公司交由职业经理人管理。网约车公司Ola这类创业公司正在寻找高管来帮助自己征服外国市场。中国也有一些领军企业希望在海外扩张，但缺少具有国际业务能力的管理人员。

最后，董事会和监管机构日益敦促企业提前几年为高管接班做规划，而不是像过去那样，把继任人的名字封在信封里，到老板因故无法继续统领企业时再拆封。猎头公司乐于协助公司比较机构内部的明星候选人和潜在的外部候选人。提前规划的压力促进了各种辅助服务业务的增长，包括领导力培养和董事会效力评估等。这类业务如今占了“史莱克老大”光辉国际收入的43%。

需求增长也对猎头公司的供给侧产生了影响。做猎头的人没有谁接受过专门的猎头培训，但这个行业正变得越来越多元化。如今的猎头顾问曾经做过工程师、奥运会体操运动员或神经科学家。五大猎头公司聘用了很多麦

肯锡的前咨询顾问。新入职者喜欢这个行业的快节奏和与公司董事会打交道的机会。

他们也爱这一行的报酬。据行业资深人士称，“史莱克”的合伙人年薪中位数一般是每年60万美元。收入在前1%的人可赚得300至400万美元，其中大部分为奖金。金融业猎头通常收入最高。

| 分走七位数

高额报酬来自令人肉痛的服务收费。几十年来，猎头公司的收费一般是中选候选人第一年薪酬的三分之一（包括各种奖金）。过去十年，随着CEO的薪水变得高不可攀，猎头服务收费往往超过一百万美元，客户开始反抗，设置收费上限变得愈加普遍。现在，最高端猎头的收费通常限制在50至100万美元间，但由于辅助服务收费激增，猎头的总体收入还在快速增长。

寻找一名CEO怎么也要90天到一年的时间。流程由猎头公司帮助制订，由董事会成立委员会监督。接着，猎头帮助董事们明确对新掌门人的业绩期望，如提升利润或开拓新市场，然后拟出清单列明所要求的能力。

猎头行动真正开始后，猎头公司会聘用大量研究人员，从包含数百万份个人档案的数据库中筛选候选人，只靠一柜子简历和IBM这类明星企业的组织架构图就足够的日子已经一去不复返了。之后，猎头公司会把从档案看来合适的那些人选与知情人士（通常是旧同事或健谈的中间人）提供的信息做比对。

为得出一份15人左右的初选名单，猎头顾问会询问候选人的供应商、客户、前上司及下属。他们会在员工评价雇主的网站Glassdoor上查询。打电话固然可以，但直接见面更好——会面的最后几分钟或者去电梯的路上可能拿到有价值的信息。

通常只有到了这个节点，猎头顾问才会联系候选人。由于最受觊觎的招聘目标往往已身居高位、待遇优厚，而且对手猎头公司也是紧追不舍，因此他们必须使出浑身解数争夺候选人的关注。他们定期与之共进早餐，记下

这些人的入职周年紀念日和獎金發放日。小心謹慎地探聽，也許就會套出對獎金失望的消息，發現某個高管想要另尋高枝的跡象。世道艱難的時候，他們還提供了哭訴的肩膀。巴黎的獵頭公司Vendôme Associés的丹尼斯·馬卡德（Denis Marcadet）回想說，次貸危機期間，受挫的金融家會在他辦公室里哭訴幾個小時。

在面談中，獵頭顧問會施展個人魅力令候選人放鬆提防。但一位獵頭說，面對面的評估可能“有點玄乎”。如果雙方气场不合，也會坏事。迪士尼的老板羅伯特·伊格爾（Robert Iger）回憶說，自己接受海德思哲的格里·羅奇（Gerry Roche）的面試是“我職業生涯中最受侮辱的經歷之一”，因為被問的盡是些離題的問題，更糟糕的是沒有東西吃。因此，獵頭公司已採購新工具，令過程更科學。它們會進行心理測驗，用問卷調查評估候選人的行為準則及價值觀。諮詢公司Synthesis受以色列軍方精銳部隊招募方法的啟發，甚至請來心理醫生分析候選人對那些有關其個人經歷的看似無甚玄機的問題給出的回答。

董事會或獵頭公司有時會把更深入的查訪工作外包給Hakluyt或StoneTurn之類的商業情報公司，這兩家英國公司雇用了前間諜、記者及警察。（經濟學人集團董事長保羅·戴頓[Paul Deighton]同時也是Hakluyt的董事長。）這些“企業偵探”的目標是弄清高管們做交易的風格、在壓力情境下的行為方式，以及是否曾經越界失德。

客戶也越來越喜歡採用模擬測試的方式（候選人可能不喜歡）。例如，可以向中意的候選人發送有關一家假想公司的報告資料，請他們主持模擬董事會會議，安撫面臨困境的部門情緒激動的經理，或者主持業績電話會議，應付咄咄逼人的分析師。

但到最後，要談成大單往往還是需要一點人情味。億康先達的董事長吉爾·阿德（Jill Ader）回憶說，她把一名理想但猶豫不決的候選人帶到外面待了三天，暢談人生目標。

對獵頭公司而言，候選人簽署新合同就算大功告成。但對其客戶來說，事

情要更复杂。关于未来的CEO们，已经有大量数据。光辉国际估计，所有高管中有87%渴望成为CEO。而据咨询公司ghSMART估算，超过三分之一的申请人在登上最高位前都有职场污点。还有其他种种数据。然而，更棘手的是，对候选人的取舍是否英明无从衡量，谁也不知道被刷下的候选人实际上是不是更胜任。

选人不当可能要付出高昂代价。智库世界大型企业联合会（The Conference Board）发现，更换CEO的成本（遣散费、猎头费、过渡期生产率损失等）一般相当于年利润的5%。

由于缺乏客观指标来评判猎头公司的表现，董事们往往只是依赖个人观感。对于猎头服务，虽有人称赞，失望之情也与日俱增。

阻碍该行业发展的因素中有许多并不是该行业本身的错。许多公司对猎头和候选人提出的要求令人恼火。例如，有些公司希望CEO候选人与所有董事分别面谈，而在英美两国，公司通常至少有十名董事。它们可能还要求定期对内部候选人做测试，而这可能会毒害公司内部的政治环境。还有一些公司要求对候选人展开的评估让人感到荒诞不经。一位猎头顾问回忆说，某位应聘法国工程巨头阿尔斯通（Alstom）CEO的候选人在被要求进行笔迹测试后，语带讽刺地问，接下来是不是还要接受什么侵入性医学检查。

另一个问题是有些合同禁止猎头公司从之前服务过的公司挖角，禁止期限通常至少为一年。也就是说，随着“史莱克”不断扩大，它们的狩猎范围逐渐缩小。要求加上此类条款的是客户，但无法阻止另一些因此而吃了亏的客户大为光火。“他们跟我说找不到合适人选，”曾在多家公司担任董事长的某位高管怒气冲冲地说，“后来我发现百事公司里有一个理想人选，但因为猎头公司已经服务过百事了，所以他们不能推荐这个人。”

不过，某些大型猎头公司的问题是它们自己造成的。猎头公司不断壮大，尤其是“史莱克”，令高级合伙人能分配给每位客户的时间变少。他们穿梭飞行于各地签合同，却把大部分复杂工作留给了资源和经验都欠缺的下属

来完成。此外，由于收费的大头落入了这些呼风唤雨者囊中，下属们缺少动力去出色地完成任务。“客户付的是‘高级定制’的价钱，拿到的却是‘批量成衣’。”一家“史莱克”公司的前老板说。

尽管上世纪70年代的轻松光景过去后猎头公司已不再那么懒散，但在一个方面它们惰性如前：许多猎头仍想靠“炒冷饭”轻松过活。一家私募的合伙人称，他们有两三次让猎头搜寻不同的财务高管，收到的却是同一份最终名单。CEO队伍中有太多人都是来自少数几家蓝筹公司的老将，而且并非人人都往绩卓越（看看GE，它的好几位高管后来去了波音）。

高级猎头顾问承认，有时候，当董事会不大愿意押注于非常规候选人时，猎头很快就会改为推荐保守人选。尽管近年来有所改进，但在美国675家最大上市公司的CEO中，只有38人是女性，59人为非白人。年轻才俊要闯入圈子已经变得越来越难。自2005年以来，新任CEO的平均年龄已急升至58岁（见图表3）。拥有16,000名猎头顾问会员的AESC的一项调查显示，“吸引多元化人才”被列为2019年猎头公司的第七大紧迫问题，排在“吸引数字技术人才”或“营造创新文化”之后。

| 内部搜索

猎头公司带来的价值日益受到质疑，部分客户遂转为自助式。包括所有科技巨头在内，越来越多的大公司正在组建自己的猎头队伍——往往是从“史莱克”公司挖来的。加里森·詹恩表示，起初这些内部猎头只负责初级员工的招聘，现在正逐步扩展到高管层面。

有些公司董事长可能会感到不解：理想人选往往近在眼前，为什么还要请外面的猎头？世界大型企业联合会近期对高管和公司秘书的调查发现，73%的受访者认为，内部已有强力CEO候选人的公司没必要再从外部搜罗人选。而企业内部似乎并不缺这类人选。去年，标普500指数公司中，几乎五分之四的新老板由公司内部晋升，包括芯片制造商英特尔。IBM最近就挑选了其云计算部门负责人接替罗睿兰。

然而，大多数大公司还是会继续使用猎头，即便它们并不完全信任其科学

性，或仍怀有其他疑虑。这是因为外部验证独有的价值。鉴于董事会往往意见分裂，猎头可以在协助达成共识上发挥关键作用。最优秀的猎头们行走江湖靠的就是像外交官那样纵横捭阖。■



Go north, young woman

The glass-ceiling index

Women continue to face barriers to equality in the workplace

TO MARK International Women's Day on March 8th we have updated our glass-ceiling index, which ranks 29 countries on ten indicators of equality for women in the workplace: educational attainment, labour-force participation, pay, child-care costs, maternity and paternity rights, business-school applications, and representation in senior positions in management, on company boards and in parliament. East Asian women face a ceiling that appears to be made of bulletproof glass. In South Korea they earn on average 35% less than men and occupy only one in seven managerial jobs and one in 30 board seats. In Iceland, which topped the league table this year, women claim nearly half of all executive and board positions. As usual, Nordic countries perform best overall. America, which granted women the right to vote a century ago this year, continues to frustrate the ambitions of female workers. It comes a dismal 22nd on The Economist's list, a little ahead of Britain and below the average for the OECD club of industrialised countries. Full results can be found at economist.com/glassceiling2020 ■



年轻女性，往北去吧

玻璃天花板指数

女性继续面对职场平等方面的障碍

为庆祝3月8日国际妇女节，我们更新了玻璃天花板指数。这一指数对29个国家的女性职场平等度做了排名，基于以下10项指标：受教育程度、劳动力参与度、薪资、育儿成本、产妇权利和陪产权利、商学院申请，以及女性在高管层、公司董事会和议会中的比例。东亚女性面对的天花板似乎是防弹玻璃制成的。在韩国，女性薪资平均比男性低35%，在管理人员中仅占七分之一席，公司董事中仅占三十分之一。在今年排名第一的冰岛，女性在高管和董事中的占比接近一半。和以往一样，北欧国家整体表现最好。美国在整整一百年前给予了女性选举权，但它如今仍在挫伤女性劳动者的梦想。它在本刊排名中仅列第22位，刚刚高过英国，低于经合组织各工业化国家的平均水平。完整排名结果参见economist.com/glassceiling2020 ■



Jean history

Rhapsody in blue

How American denim conquered the world

HE WAS BORN in a Bavarian village in 1829, fleeing anti-Semitism with his family at 17. From New York he caught a steamer to California, a newly minted American citizen, with a view to expanding the family's dry-goods business. But these were the heady days of the Gold Rush, and the young man dreamed of making it big. His initiative paid off so well that you may be wearing his invention now: his name was Levi Strauss.

Technically, the entrepreneur who went by "Uncle Levi" didn't invent the copper rivets on denim "waist overalls" that became his firm's stock-in-trade. The idea came from a tailor in Nevada who bought cloth from Strauss to make work clothes for labourers. In 1872 Jacob Davis persuaded him to jointly file for a patent for an "improvement in fastening pocket openings", and to shift from selling fabric to finished trousers. The rest is a history of marketing genius—documented in the largest-ever public display of artefacts from the Levi Strauss & Co. archive.

"Levi Strauss: A History of American Style" at the Contemporary Jewish Museum in San Francisco deftly weaves together corporate, cultural and social trends to tell the story of one of the country's most famous exports. When Strauss died in 1902 he was eulogised as one of San Francisco's foremost philanthropists and a pillar of the Jewish community. Nobody could have anticipated that the firm he bequeathed to four nephews would define America's style and become a global juggernaut. It did that by cannily roping its product to two mythic American figures: the cowboy and the rebel.

Levi's 501 jeans were tough. The oldest pair on display dates to 1890;

another was used to tow a car. Marketed originally to farmers, mechanics and miners, they became the garb of choice for Western horsemen. It wasn't long before John Wayne and Clark Gable were wearing them into the sunset, followed by glamorous hoodlums played by Marlon Brando and James Dean.

The brand's advertising rode the countercultural wave, capitalising on its status as a badge of coolness and freedom. Marilyn Monroe wore Levi's; Andy Warhol immortalised them. Even Albert Einstein was spotted in a Levi's bomber jacket. Jeans that graced the haunches of the famous—including Patti Smith, Madonna and Beyoncé—fill the gallery and span the decades.

At any given moment a big chunk of humanity is wearing blue jeans, the show's curators observe. Levi's have been coveted behind the Iron Curtain and fetishised in Japan; they have been ripped, embroidered and covered in ink. Not too shabby for a kid from Bavaria. ■



牛仔裤的历史 蓝色狂想曲

美国牛仔服饰如何征服世界

他1829年出生在巴伐利亚的一个村庄，17岁在反犹潮中随家人逃亡。新获得美国公民身份的他搭上了一艘汽船从纽约前往加州，想扩展自家的纺织品业务。但当时淘金热正如火如荼，这个年轻人也梦想着把生意做大。他的冲劲收获了非常可观的回报，你现在说不定正穿着他的发明。他的名字就是李维·施特劳斯（Levi Strauss）。

严格说来，这位人称“李维大叔”的企业家并不是牛仔“齐腰工装裤”上的铜铆钉的发明者（这个物件后来成了他公司产品的常用件）。这个主意是内华达州的一名裁缝想出来的，他从施特劳斯那里购买布料，制成体力劳动者穿的工作服。1872年，雅各布·戴维斯（Jacob Davis）说服施特劳斯共同为一个“加强口袋开口牢固度的方法”申请专利，并从卖面料转向卖成品裤子。接下来便是一段天才营销的历史。李维斯公司档案馆有史以来最大的文物公开展记录了这段历史。

“李维·施特劳斯：一部美国风格史”在旧金山的当代犹太博物馆展出。它巧妙地将企业、文化和社会三方面的趋势编织在一起，讲述了美国最著名的出口品之一的故事。施特劳斯在1902年去世时被誉为旧金山最杰出的慈善家之一和犹太社区的支柱。没有人会预料到他留给四个外甥的公司会定义美国的风格，并成为—一个全球巨头。它精明地将自家产品挂钩于美国赫赫有名的两类人物形象——牛仔和反叛者。

李维斯501牛仔裤很结实。此次展出的最古老的一条于1890年生产，还有一条曾被用来牵引—辆汽车。这款牛仔裤最初面向农民、机修工和矿工销售，后来成了西部牛仔的首选服装。没过多久，西部片中有了约翰·韦恩和克拉克·盖博穿着这款裤子走进夕阳的画面，之后它又被马龙·白兰度和詹姆斯·迪恩饰演的魅力十足的小混混穿上身。

这个品牌的广告宣传搭上了反主流文化的浪潮，充分利用了其自身标志着“酷”和自由的地位。玛丽莲·梦露穿过李维斯，安迪·沃霍尔令李维斯牛仔裤声名不朽。就连爱因斯坦也穿过李维斯的飞行员夹克。曾经勾勒过一众名人（帕蒂·史密斯、麦当娜和碧昂斯等）身形曲线的牛仔裤也出现在展馆，跨越了几十年的时光。

此次展览的策展人说，任何时刻都有一大群人穿着蓝色牛仔裤。铁幕背后的人们对李维斯梦寐以求；在日本，人们对它迷恋成痴。它们被撕破、绣上图案、以墨泼染。对于一个从巴伐利亚出走的孩子来说，这算相当不赖了。■



Schumpeter

Bob Iger's magic kingdom

Three lessons from one of Hollywood's most successful bosses

"I DON'T KNOW if the word disrupter was the right word to use back then, but I've always been willing to take some chances." That is how Bob Iger recently explained his approach to running Disney. In his 15-year tenure Mr Iger's bets have turned the American entertainment company from a moderately profitable business threatened by digital upstarts like Netflix and Amazon into one of the world's most formidable content-and-technology powerhouses. Profits quadrupled from \$2.5bn in 2005 to \$10.4bn in 2019. Disney's market capitalisation rocketed from \$48bn to over \$230bn. This track record has made Mr Iger one of the most lionised (and best-paid) corporate bosses on Earth.

On February 25th Mr Iger once again displayed a fondness for disruption by announcing his departure from the corner office, effective immediately. He had toyed with the idea of retiring several times, only to change his mind. In 2016 his heir apparent was pushed out. Mr Iger has extended his own contract twice since then, and was expected to remain CEO for another couple of years. He will remain as executive chairman, focusing on the firm's creative process, until the end of 2021 but has handed day-to-day running of the firm to Bob Chapek, a safe pair of hands who most recently ran Disney's amusement parks.

The abrupt move sent the firm's share price tumbling by 4%. To ease investors' nervousness, Mr Chapek would be wise to heed three lessons from his predecessor. Other executives, in Tinseltown and elsewhere, should pay attention, too.

Mr Iger's first insight was that quality products matter—or, in Hollywood

lingo, content is king. Mr Iger had no truck with the notion, espoused by some pundits, that content would become commoditised as power shifted irreversibly from creators to distributors. This belief in content led Mr Iger to collect one beloved franchise after another, in a buying spree that verged on the foolhardy. Soon after taking over in 2005 he spent \$7.4bn to buy Pixar, the animation studio famous for “Toy Story” movies. Three years later he bought Marvel Entertainment, with its stable of comic-book superheroes such as the Avengers, for \$4bn. In 2012 he pipped Rupert Murdoch, boss of the Fox media empire, by acquiring Lucasfilm, home of “Star Wars”, for another \$4bn or so. The three acquisitions alone have so far earned Disney revenues of \$36bn. Last year alone Disney’s billion-dollar blockbusters included “Avengers: Endgame” (Marvel), “The Lion King” (Walt Disney Pictures), “Frozen 2” (Pixar) and “The Rise of Skywalker” (Lucasfilm). They helped Disney grab over a third of the American film market, and global box-office takings of over \$10bn. His fourth purchase, of Mr Murdoch’s 20th Century Fox in 2019 for \$71bn, is by far his most ambitious (and potentially most problematic).

The second thing to learn from Mr Iger’s reign is to trust acquired talent. At most firms in most industries, when a big company buys a small, nimble one, the buyer’s managers defend their turf and foist headquarters culture onto the acquisition. Mr Iger’s Disney instead let Pixar lift its middling in-house animation team. This hands-off approach and respect for the achievements of others helped persuade control freaks like George Lucas, the founder of Lucasfilm, and Isaac Perlmutter, the reclusive chairman of Marvel, to hand over their cherished possessions.

The third lesson is also the most important. A bit of paranoia can be productive. No boss succeeds without supreme self-confidence, and Mr Iger is no exception. However, he has shown time and again that he is willing to question his own judgment and to revise strategies as the business landscape evolves. When on a visit to Disneyland in Hong Kong

around the time he took over as CEO Mr Iger noted that Chinese crowds preferred newer Pixar character's to Mickey Mouse, he set reverence for Walt Disney aside and went about modernising the firm's roster.

Nowhere was this clearer than in his embrace of digital streaming. Convinced that digital disruption was "not a speed bump" but an existential threat, he bet Disney's future on a shift from its historic business-to-business model of distribution to the fast-growing direct-to-consumer model pioneered by Netflix. This shift was driven in part by the decline in the traditional approach of bunching content into pricey bundles for pay television, a trend that has hit Disney's ESPN sports division hard. But it was a huge gamble. He needed to persuade his board, which had to accept putting existing profitable businesses at risk, and investors, who had to swallow big outlays today in exchange for uncertain digital dividends tomorrow.

On November 12th the firm launched Disney+, a streaming service, in America and a handful of other markets. By the end of the day it had 10m subscribers. Since then it has chalked up another 20m. Add a further 30m people who pay to watch Hulu, an older streaming service Mr Iger took control of in 2019, and more people fork over money to Disney every month than pay for cable TV from Comcast or AT&T.

| *The Iger sanction*

Mr Iger leaves his successor a company in good shape, but also in the midst of two transformations: digital and, with 20th Century Fox to fold in, organisational. Both will soon test whether Mr Chapek has learned Mr Iger's lessons. He certainly appears to share his mentor's belief in the importance of brands and content, dating back to childhood visits to Walt Disney World. A big test of his respect for talented types with strong opinions will be convincing Kevin Mayer, the go-getting head of Disney's direct-to-consumer business whom many expected to get the top job, to stay put. The

even greater challenge of integrating a behemoth like 20th Century Fox, a bigger acquisition than Pixar, Marvel and Lucasfilm combined, will require a degree of adaptability that would have strained the old boss himself. As it is, Mr Iger has bowed out before his most epic plot has unspooled. ■



熊彼特

鲍勃·艾格的魔幻王国

好莱坞最成功掌门人之一的三点经验

“我不知道在那个时候用颠覆者这个词合不合适，但我一直都愿意冒点风险。”鲍勃·艾格（Bob Iger）最近如此解释他对迪士尼的经营之道。在他执掌这家公司的15年里，艾格多次押注，让这家盈利平平的美国娱乐公司摆脱了奈飞（Netflix）和亚马逊等数字新贵的威胁，成为世界最强大的内容和科技巨头之一。公司利润从2005年的25亿美元增至2019年的104亿美元，翻了两番。迪士尼的市值也从480亿美元飙升至2300多亿美元。这一骄人业绩让艾格成为世界上最受推崇（也是薪酬最高）的公司掌门人之一。

上月25日，艾格再次展示了他对颠覆的偏爱，宣布自己卸任CEO，立即生效。以前他也曾几次想过退休，但最后都改变了主意。2016年他当时公认的接班人被迫离职。从那以后，艾格已经两度与公司续约，原本预计他在未来两年还将继续担任CEO。如今，他在2021年底之前将只担任执行董事长，集中监督公司的内容创意工作，但公司的日常经营已经交给了一个稳妥的人选——此前掌管迪士尼乐园的包正博（Bob Chapek）。

突然换帅的消息传出，公司股价应声大跌4%。要缓解投资者的紧张情绪，包正博应该从他的前任身上汲取三点经验。而好莱坞和其他地方的高管也应多加留意。

艾格的第一点洞见就是高品质的产品至关重要——或者用好莱坞的行话来说，内容为王。有些行业权威认为随着权力不可逆转地从创作人转移到发行人，内容将变得商品化，但艾格从不认可这种观点。在内容为王的信念驱动下，艾格近乎鲁莽地大举收购，将一个又一个大众喜爱的系列电影收入囊中。2005年上任后不久，他斥资74亿美元收购了以《玩具总动员》系列电影而闻名的动画工作室皮克斯。三年后，他以40亿美元收购了拥有《复仇者》等众多漫画超级英雄的漫威娱乐。2012年，他又以40亿美元左

右的价格力压传媒帝国福克斯的老板默多克，收购了出品《星球大战》的卢卡斯影业。迄今为止，仅这三项收购就为迪士尼带来了360亿美元的收入。仅去年一年，迪士尼就有多部票房超十亿美元的卖座大片，包括《复仇者联盟：终局之战》（漫威）、《狮子王》（华特迪士尼影片）、《冰雪奇缘2》（皮克斯）和《天行者崛起》（卢卡斯影业）。凭借这些大片，迪士尼占据了美国电影市场的三分之一以上，全球票房收入超过100亿美元。他的第四笔收购是在2019年以710亿美元买下默多克旗下的二十世纪福克斯，这是他最雄心勃勃（可能也是问题最多）的一笔交易。

从艾格年代可得出的第二点经验是信任所收购公司里的人才。在多数行业的大多数公司里，当一家大公司收购了灵活敏捷的小公司后，收购方的管理层都会捍卫自己的领地，并将总部文化强加到被收购公司上。但艾格掌管的迪士尼却放手让皮克斯去提升自己原本平庸的内部动画团队。这种不干涉和尊重他人成就的做法也有助于在收购时说服那些控制狂“割爱”，包括卢卡斯影业创始人乔治·卢卡斯（George Lucas）和深居简出的漫威董事长艾萨克·帕尔马特（Isaac Perlmutter）。

第三点经验最重要。一点偏执也许是有用的。没有哪个成功的老板不是极端自信，艾格也不例外。然而，他也一次又一次地表现出愿意质疑自己的判断，并随着商业格局的演变而调整战略。他刚接任CEO时去视察香港迪士尼乐园，注意到中国游客更喜欢新鲜的皮克斯角色而不是米老鼠，于是他撇开对华特·迪士尼的敬畏之情，着手对公司的角色阵容展开现代化改造。

这一点在他对数字流媒体的积极态度上表露无遗。他深信数字化颠覆“不是一时的小路障”，而是关系到生死存亡的威胁，因而认定迪士尼的未来要靠转型，从原来的B2B发行模式，转变为奈飞率先倡导而迅速发展的直接面向消费者的模式。推动这一转型的原因之一是将内容打包后高价卖给付费电视的传统业务开始下滑，这种趋势已经严重冲击了迪士尼旗下的ESPN体育业务。但这是一场豪赌。他需要说服董事会和投资者，董事会必须接受拿现有的盈利业务冒险，而投资者则必须承受拿今天的巨额支出换取尚不确定的明天的数字红利。

去年11月12日，公司在美国和其他少数几个市场推出了流媒体服务Disney+。上线第一天就吸引了1000万订户。自那以后又新增了2000万订户。再加上艾格在2019年获得控股权的早期流媒体服务Hulu的3000万付费用户，现在每个月为迪士尼掏钱的人数已经超过了康卡斯特（Comcast）或AT&T的有线电视付费用户。

| 艾格的约束

艾格留给继任者的公司状态极佳，但也正处于两大转型之中：数字转型，以及涉及整合二十世纪福克斯的组织转型。两者都将很快考验包正博是否汲取了艾格的经验。他显然与导师一样深信品牌和内容的重要性，这可以追溯到童年时游览迪士尼世界的经历。他是否尊重极有主见的人才，这一点将在他能否说服凯文·梅耶尔（Kevin Mayer）留任的问题上经受重大考验。满怀抱负的梅耶尔掌管迪士尼直接面向消费者的业务，此前许多人看好他将接棒上位。整合二十世纪福克斯这样的庞然大物更是巨大的挑战，毕竟它比皮克斯、漫威和卢卡斯影业加起来还大，这需要高度的应变能力，即使是前老板亲自上阵也可能要殚精竭虑。事实上，艾格最宏大的剧情尚未上演，他却已躬身谢幕。 ■



Business education

MBAs with Chinese characteristics

Chinese management schools are thriving, thanks to a mixture of Western and local traits

WHEN THE China Europe International Business School (CEIBS) was established in Shanghai's Pudong district in 1994, its campus abutted mostly nondescript warehouses and tracts of marshy farmland. Today the area is among the city's ritziest—and gives it its iconic skyline. CEIBS, too, has become something of an icon in the quarter-century since its founding as a joint venture between the European Union and the Chinese government. Last month it held on to its fifth place in the annual ranking of the world's 100 best MBAs by the *Financial Times*, a newspaper. Only heavyweights such as Harvard Business School, Wharton, Stanford's Graduate School of Business and INSEAD of France scored better.

Business education in China is booming, and not just at CEIBS. When the *FT* first published its list in 1999, no Asian school made the cut. This year 17 have done, nine of them Chinese. Seven Chinese institutions are among the 90 or so worldwide to boast the coveted "triple crown" of accreditations—from bodies in America, Belgium and Britain. In 2012 the American one, AACSB International, accredited 13 Chinese schools, seven of them in Hong Kong. Today it certifies 39, including 31 on the mainland (see chart). Between them, China's home-grown business schools—not counting branches of Western ones it also hosts—offer more than 200 MBA programmes. Competition for places is fierce. Nearly 200,000 people applied last year, close to twice the number in 2016. Fewer than one in four typically get in.

In many ways, the best Chinese business schools look a lot like their Western rivals. CEIBS has aped foreign peers like INSEAD, which has

branches in Singapore, Abu Dhabi and, since last year, San Francisco, by creating satellite campuses—at home, in Beijing and the southern boomtown of Shenzhen, and abroad, in Ghana and Switzerland. Many professors possess Western experience. Chen Fangruo, dean of Antai College of Economics and Management at Shanghai's Jiaotong University, taught at Columbia Business School in New York for 25 years before returning to China. Their classroom manner is no different from their Western counterparts': sleeves rolled up, approachable, engaging, witty. (When, in response to a question about cost allocation in producing an MBA degree, a student suggests that staff salaries are a considerable expense, a CEIBS professor quips that “we would rather be treated as assets”.)

| *Teaching to the test*

Crucially, programmes have Western rigour—a must for those prized global accreditations, says Zhao Ying, who runs WhichMBA.net, a big Chinese tracker (not to be confused with Which MBA?, *The Economist's* own annual ranking, which places only one Chinese school, at Sun Yat-sen University in Guangzhou, in the world's top 100; CEIBS stopped submitting data for our list in 2016). “Our curriculum must meet international standards,” says the dean of one top institution.

Perhaps recognising this, the Communist party has allowed business schools to grow unfettered. Although, as the same dean adds, “we need to please the ministry of education”, institutions like his have been mostly spared from curbs on the use of imported textbooks which the authorities have imposed on other places of higher learning. They are not expected to teach Xi Jinping Thought, as the Chinese president's philosophy, enshrined in the country's constitution three years ago, is officially known. The ministry does oversee the Chinese management schools' governing committee, which consists of 30 deans, two or three officials and a few

business executives. But meetings are sporadic and contentious topics rare, according to an insider. The last big directive came down in 2014, when Mr Xi forbade bureaucrats and bosses of state-owned firms to attend “high-priced training courses” as part of a broad crackdown on graft. MBAs had previously been all the rage among party cadres.

In important ways, however, China’s management schools are growing more distinct from those in the West. This is true both in terms of what they teach and the career boost they offer.

The teaching first. In the past, Chinese students saw an MBA as a path to joining a foreign company and launching an international career. No local firm was prepared to pay the salary a good MBA commanded. Now China Inc has become “global, richer and ready to recruit our students”, says Ding Yuan, dean of CEIBS. Roughly half of full-time MBAs from CEIBS join Chinese firms. Some go on to Chinese companies that have either recently expanded abroad or acquired a foreign business. Others are young heirs taking charge of family firms as the country’s first generation of entrepreneurs retires. These have often gone to university in the West and want to “recharge themselves” in China, in Mr Ding’s words. The last big group are bosses who missed out on a business degree in their youth. CEIBS has 700 of these enrolled at its MBA for active executives, compared with around 170 students for its regular MBA course—inverting the proportions typical at Western schools. Applications for its English-language Global Executive MBA are growing by 20% a year.

Courses cater to this Sinocentric student body. At Antai some professors use ancient Chinese texts (and not just Sun Tzu’s “The Art of War”) to teach their own brand of management theory. Marxism, which many schools still include among their foundation courses, is used as a way to tell students how to navigate capitalism with Chinese characteristics. Schools do not offer explicit modules on relations with the government, which still

dominates the commanding heights of China's economy. Few students, many of whom are in their mid-30s, with a startup or two under their belt or some other real-world experience, think that would be useful. As entrepreneurs, they know far more about dealing with officials than any professor can. But they are still keen to learn how to make the most of regulations. This "policy dividend", as one prominent dean calls it, is "embedded in everything that we teach".

Not all divergences from Western MBAs are so subtle. Mr Chen is changing Antai's syllabus to organise courses by industry—with modules on fintech, health care, self-driving cars and other thriving Chinese industries—rather than by discipline (accounting, marketing and so on), as in the West. CEIBS's Beijing campus is located in the capital's Zhongguancun district, which is China's answer to Silicon Valley.

Above all, students want professors to teach case studies on home-grown firms, not some "old Southwest Airlines case", Mr Ding explains. "It's even worse if you bring up GE." Instead, they want to know how Western theories apply to China's buzzy native firms. Schools are churning out new local cases about firms such as Ichido, a 20-year-old bakery chain, or Luckin Coffee, a Starbucks wannabe set up in 2017. CEIBS leads a consortium of a dozen or so Chinese institutions aimed at creating common criteria to write them.

| *Wealth management*

Like MBA students everywhere, Chinese ones expect the degree to confer advantages besides pure knowledge. One is a boost to career prospects. Graduates of Western schools typically double their pre-MBA pay. Antai and Fudan University's School of Management, also in Shanghai, triple it (albeit from a lower base and adjusted for living costs). Both boast near-perfect job-placement rates. CEIBS runs a course for corporate human-resources managers on how to make the most of their graduates.

Many business schools now also run startup incubators to help students with a clever idea for a business. Some graduates co-found startups. Fellow alumni also benefit from the schools' unusually close ties to China's leading entrepreneurs. A stamp of excellence from a leading school is a good way to impress deep-pocketed domestic investors. A Chinese MBA has become "one of the real secrets of entrepreneurs' success", observes Rupert Hoogewerf, compiler of the Hurun Rich List, a Who's Who of the ultra-wealthy.

A chance to rub shoulders with captains of China's private sector is a big draw even for seasoned executives. Ye Kai, a serial entrepreneur from Shanghai who runs a restaurant chain and a group of urban ski schools, and who attended an executive MBA in the late 2000s, says he still meets up with old classmates every other month.

CEIBS claims to have the "largest and most prestigious network" of alumni in China—over 22,000, including more than 3,000 chief executives. Among them are Dong Mingzhu of Gree, a maker of air-conditioners, and Richard Liu of JD.com, a big e-merchant. In Beijing the Cheung Kong Graduate School of Business, founded in 2002 by Li Ka-shing, Hong Kong's richest tycoon, claimed in 2016 that former students ran one-fifth of the 103 Chinese firms then in the Fortune Global 500 list of the world's biggest corporations by revenue. They included Jack Ma, the now-retired boss of Alibaba, China's e-commerce titan and its largest listed firm. The local press has dubbed the school "the rich club". Members certainly enjoy rich benefits. Jia Yueting, founder of LeEco, an indebted tech giant, was able to rustle up \$600m from about a dozen classmates in 2016.

But graduates say that the network's true value lies in the intangible perks that other groupings do not offer. "In the classroom entrepreneurs are allowed to be weak, and nobody will look down on them," explains Ms Zhao of WhichMBA.net. "Classmates tell you the truth." Mr Ye thinks that, in

terms of trust, it has no equivalent in China's business world. Members swap inside details which they would normally never share, he says. After-hours get-togethers can be especially useful to compare notes on delicate subjects like dealing with officials or state-run firms. There is "no textbook to manage this kind of relationship", says Mr Ye.

Given all these blessings, going abroad for an MBA is increasingly seen as a "huge opportunity cost" by Chinese students, says Mr Chen. In some sectors it can be a liability, by keeping them out of China's fast-changing market for too long. Henry Zhan, a 29-year-old manager at Fangduoduo, a booming online service connecting homebuyers and sellers, chose CEIBS over top American schools because of its ranking and popularity among Chinese property moguls (including Fangduoduo's founders). He thinks CEIBS's 428,000 yuan (\$60,000) tuition fee, excluding a monthly boarding fee of \$400, will be a better investment than Columbia Business School, which he also considered, and which would set him back well over \$100,000.

| *Luring laowai*

Foreign students are taking note. Even as international applications fell at seven out of every ten American business schools in 2018—in part because of stricter visa requirements—Asian schools reported a 9% rise in the number of applicants. Demand has risen for immersive Chinese modules taught in China itself. CEIBS recently educated a crop of South Korean executives from Hyundai, Japanese ones from Toyota and French from Michelin and Total. Already over a third of its MBA students are foreign. Rose Luo of INSEAD (which opened a campus in Singapore in 2000) says that several Western schools have enhanced their offerings with double degrees, popular with domestic and overseas students alike—and boosted the prestige of their Chinese partners. She runs one in Beijing, at Tsinghua University's School of Economics and Management.

The chasm in quality between China's most prominent schools—Tsinghua's counts the bosses of Tesla, Microsoft and Facebook among its board members and, since last year, Tim Cook of Apple as chairman of its advisory committee—and its dozens of hangers-on is much wider than in the West, Ms Luo notes. Those unable to get into the best Chinese schools may prefer a decent one abroad. Some of the most ambitious executives at Chinese firms going global will still often plump for a renowned Western institution. But with the rise of CEIBS, Tsinghua, Antai and others, the decision is no longer the no-brainer it once was. ■



商科教育

具有中国特色的MBA

中国的商学院正在蓬勃发展，这要归功于中西方特质的融合

中欧国际工商学院（以下简称中欧）于1994年成立于上海的浦东新区，当时校园周围大多是不起眼的仓库和一片片水田。如今，这里已成为上海最繁华的地区之一，并勾勒出了该市标志性的天际线。由欧盟与中国政府联合创立的中欧经过四分之一世纪的发展，也已成为某种标志。上个月，它在《金融时报》年度全球MBA百强排名中保持了第五的位置，仅次于哈佛商学院、沃顿商学院、斯坦福大学商学院和法国的欧洲工商管理学院（以下简称INSEAD）这几所重量级商学院。

中国的商科教育正在蓬勃发展，中欧并非一枝独秀。《金融时报》于1999年首次发布排名时，没有一所亚洲商学院跻身百强。今年已有17所学院上榜，其中九所来自中国。全球约有90所商学院拥有令人觊觎的“三冠认证”（指同时获得美国、比利时和英国机构的认证），其中七所在中国。2012年，三冠认证机构之一的美国国际商学院协会（AACSB International）认证了13所中国学校，其中七所在香港。今年它在中国认证了39所，大陆占了31所（见图表）。中国的本土商学院共有200多个MBA项目，这还没算上西方商学院在华的分校。报考竞争激烈。去年有近20万人申请，是2016年的近两倍。录取率一般不到四分之一。

从许多方面来看，那些顶尖的中国商学院与其西方竞争对手看上去大同小异。中欧在北京和深圳以及加纳和瑞士开设了国内外分校区，这是效仿了国外商学院的做法，例如INSEAD就在新加坡、阿布扎比设有校区，去年还成立了旧金山校区。许多教授都有在西方工作的背景。上海交通大学安泰经济与管理学院（简称安泰）院长陈方若在回国之前曾在纽约的哥伦比亚大学商学院任教25年。他们的授课风格也与西方同行无异：袖子卷起，平易近人，魅力十足，机智风趣。（在被问及MBA学位的成本构成时，一名MBA学生说教职工薪水是一笔可观的支出。对此，中欧一位教授打趣道：“我们宁愿被看作资产。”）

| “应试教育”

至关重要的是，这些顶尖MBA项目与西方一样严谨。这是获得那些宝贵的全球认证所必须的，商学院大百科的执行主编赵鹰说。商学院大百科是中国一个追踪商学院的大型平台（英文名为WhichMBA.net，请不要和本刊的Which MBA?年度排名混淆。在我刊的排名中，中国只有中山大学的管理学院一家位列全球百佳；中欧自2016年起不再向我刊排名提供数据）。“我们的课程必须达到国际标准。”一所顶级商学院的院长说。

也许是因为认识到这一点，共产党没有对商学院的发展加以限制。尽管上文那位院长也说“我们需要让教育部满意”，但包括他的学院在内的商学院大都可以使用进口教材，而其他高等教育机构在这方面已经受到政府限制。商学院不需要讲授三年前载入中国宪法的习近平思想。全国MBA教育指导委员会的确要受教育部监督，该委员会由30名院长、两三名官员以及几名企业高管组成。但知情人士表示，委员会很少开会，也基本不讨论有争议的问题。最近一次发出重要通知是在2014年，当时，作为反腐行动的一部分，习近平禁止党政和国企领导干部参加“高收费培训项目”。读MBA曾在党员干部中风靡一时。

但是，在一些重要方面，中国的商学院越来越有别于西方。在教学内容上，以及学位对职业发展的推动上，都是如此。

先说教学。过去，中国学员把MBA学位视为加入外企及开启国际职业生涯的途径。没有一家本地企业出得起优秀MBA学位要求的高薪。中欧的院长丁元说，现在中国的企业已经“全球化了，更有财力，乐于聘用我们的学员”。中欧全日制MBA课程约一半的学员毕业后进入中国企业。有些人去的是那些近期将业务扩展到海外或收购了外国业务的中国公司。其他人则是在中国第一代企业家退休后接管家族企业的年轻继承人。这些人往往是在西方上的大学，然后想在中国——用丁元的话说——“再充电”。最后一类学员是在年轻时错过了拿商科学位机会的企业高管。中欧的在职高管MBA课程有700名这样的学员，而常规MBA课程的学员仅约170名，这和西方商学院的常见比例正相反。中欧全英语教学的Global EMBA课程的申请人数每年增长20%。

课程设计迎合了这种主要在中国发展的学员群体的需求。安泰的一些教授在讲授他们自己那套管理理论时会借用中国古代经典（不限于《孙子兵法》）。许多学校的基础课程仍包括马克思主义的内容，以此告诉学生该如何驾驭具有中国特色的资本主义。学校没有明确开设政府关系的课程模块，而政府仍然占据着中国经济的制高点。很少有学员认为这类课程能有什么帮助，他们中许多人都在35岁上下，已经有过一两次创业经历或其他一些实际经验。作为企业家，他们远比任何教授都更懂得如何与官员打交道，但他们仍然很想学习如何充分利用法规。这种“政策红利”，如一位知名院长所说，被“嵌入到我们的所有教学模块中”。

并非所有与西方MBA的差异都那么微妙。陈方若正在调整安泰的教学大纲，变成按行业安排课程（教学模块涉及金融科技、医疗保健、无人驾驶汽车和其他在中国蓬勃发展的行业），而不是像西方那样按学科（会计、营销等）来设计。中欧的北京校区位于中国的硅谷——中关村。

学员最希望教授做本土企业的案例分析，而不是那些“西南航空的旧案例”，丁元解释说。“要是你聊起了通用电气的案例，就更糟了。”相反，他们想知道如何将西方的理论应用于中国蓬勃发展的本土企业。商学院正在大量撰写与本地企业有关的新案例，例如有20年历史的蛋糕连锁店宜芝多，或是在2017年成立、有志于成为中国星巴克的瑞幸咖啡。中欧已经牵头联合了十几所中国商学院，制定编写案例的共同标准。

| 财富管理

和世界各地的MBA学员一样，中国的学员也希望学位能够带来纯知识以外的好处。一是提升职业前景。西方商学院的学员毕业后的薪水通常比之前高一倍。安泰和同在上海的复旦大学管理学院的MBA毕业生薪水能提高两倍（尽管基数较低，且根据生活费用做了调整）。这两家商学院都宣称有近乎完美的就业率。中欧为企业人力资源经理开设了如何利用其毕业生的课程。

许多商学院现在还开设了创业孵化器，帮助有好创业点子的学员。一些学员毕业后会共同创业。校友们也受益于学校与中国知名企业家之间异常紧

密的联系。一流商学院的学位很能打动财力雄厚的国内投资者。推出胡润百富榜的胡润（Rupert Hoogewerf）认为，中国商学院的MBA学位已经成为“企业家成功的真正秘诀之一”。

能有机会与中国私营领域的舵手们往来是一个很大的吸引力，即使对经验丰富的高管而言也是如此。来自上海的叶凯经营着一个连锁饭店和多所城市滑雪学校，有多次创业经验，在十多年前参加了EMBA课程。他表示现在每隔一个月仍然会和老同学聚会一次。

中欧声称拥有“中国最庞大、阵容最强的校友网络”，校友人数超过2.2万，包括3000多名CEO。空调制造商格力电器的董明珠和大型电商京东的刘强东都是中欧校友。在北京，由香港首富李嘉诚于2002年创立的长江商学院在2016年宣称，在入选当年《财富》世界500强（按收益排名）的103家中国企业中，其校友领导的企业就占了五分之一。其中包括中国电商巨头、最大的上市公司阿里巴巴已退休的老板马云。国内媒体将这所学校称为“富人俱乐部”。成为其中一员当然有极大的好处。2016年，负债累累的科技巨头乐视的创始人贾跃亭从十几个同学那里筹得6亿美元。

但毕业生说，校友网络的真正价值在于其他圈子无法提供的无形的好处。“在教室里，企业家可以表现出软弱的一面，而不会被人轻视。”商学院大百科的赵鹰解释说。“同学会跟你说实话。”叶凯认为，说到信任，商学院校友圈子在中国的商业世界中是无与伦比的。他说，学员之间会交流他们通常不会与人分享的内情。课余的聚会尤其有助于他们在敏感话题上交流经验，例如如何与官员或国企打交道。“没有教科书能教你处理这种关系。”叶凯说。

陈方若说，鉴于所有这些好处，中国学员越来越觉得出国读MBA要付出“巨大的机会成本”。在某些行业，长期离开瞬息万变的中国市场可能非常不利。29岁的詹志超在发展迅速的在线房地产服务供应商房多多担任经理，他在中欧和美国的顶尖商学院之间选择了前者，这是因为中欧的排名以及它在中国房地产大亨（包括房多多的创始人）中的受欢迎程度。他认为从投资的角度看，花42.8万元人民币的学费（不包括每月400美元的住

宿费)上中欧,是比去哥大商学院更划算的一笔投资。他也考虑过后者,但学费要10万美元以上。

| 诱惑老外

外国学生也注意到了这种变化。2018年,七成美国商学院的国际申请人数下降(部分原因是签证审查更严格了),而同期亚洲商学院的申请量增长了9%。对在中国国内授课的沉浸式汉语教学模块的需求增加了。中欧最近培训了一批来自韩国现代、日本丰田、法国的米其林和道达尔的高管,目前该校超过三分之一的MBA学员是外国人。INSEAD(于2000年在新加坡成立分校)的罗小薇说,有几所西方商学院推出了双学位课程以加强项目的吸引力,在国内外学生中都很受欢迎,同时也提升了中方合作学校的声誉。罗小薇在北京管理着一个与清华大学经济管理学院合作的双学位项目。

罗小薇指出,中国最著名的商学院(清华大学经管学院顾问委员会的委员包括特斯拉、微软和Facebook的老板;苹果的蒂姆·库克从去年开始担任顾问委员会主席)和几十家跟风而起的三流商学院之间的质量差距要比西方国家的这种质量差距大得多。那些无法进入中国顶尖商学院的人可能宁愿选择一所还不错的国外商学院。一些正在走出去的中国企业里最雄心勃勃的高管仍然常常会选择著名的西方学府,但随着中欧、清华、安泰等商学院的崛起,该如何选择不再是一件明摆着的事。■



Tech regulation

The Brussels effect, continued

The European Union wants to set the rules in the tech world

MARK ZUCKERBERG might not have liked everything he heard, but Facebook's boss got the timing right for a recent visit to Brussels. He was among the first outsiders to hear about the European Union's ambitious plans to keep the technology industry in check, outlined in a series of documents made public a few days later, on February 19th. His visit is an admission that political paralysis in Washington, DC, has handed the EU the opportunity to become the world's most important source of tech regulation.

Europe is both gnome and giant in the tech world. The continent has lots of cutting-edge technology but hardly any significant digital platforms. It accounts for less than 4% of the market capitalisation of the world's 70 largest platforms (America boasts 73% and China 18%). At the same time, the EU is a huge market, with a population of more than 500m, which no tech titan can ignore. It contributes about a quarter of the revenues of Facebook and Google.

This combination has given rise to what Anu Bradford of Columbia Law School calls, in a new book of the same name, the "Brussels effect". Digital services are, in her words, often "indivisible". It would be too expensive for big tech firms to offer substantially different services outside the EU. As a result, most have adopted the General Data Protection Regulation, Europe's strict privacy law, as a global standard. Governments, too, have taken more than a page from the EU's data-protection book. About 120 countries have now passed privacy laws, most of which resemble the GDPR and its predecessors.

The European Commission wants to repeat the trick in other areas. The main document presented last month, a white paper on artificial intelligence, is a grab bag of measures to foster the use of AI in Europe and to limit its perceived dangers. The commission also released a “strategy” to promote the use of data, the most important input for AI applications. The idea is to create a “single European data space” in which digital information flows freely and securely. To make that happen, the commission wants, among other things, to eliminate legal barriers that keep firms from sharing data, as well as investment in cloud services that facilitate sharing.

Both papers are part of the EU’s overall “digital strategy”, which was also presented. Later this year the commission will put forward a draft of a “Digital Services Act”. Dominant tech firms should expect stricter rules not only about how they police the content that users generate, but the extent to which they can discriminate against rivals that use their services. All this is rounded up by a review of competition policy. Details are scarce, but proposed legislation in Germany indicates the direction of travel: data will become far more important for determining whether a company is dominant and whether it has abused its market power.

There are signs that the Brussels effect will work its magic again. Facebook is not the only tech giant to accept Europe as the world’s main source of tech regulation for some time to come. Sundar Pichai, the boss of Alphabet, Google’s parent, recently paid a visit to the Belgian capital. He called for “sensible regulation” of AI. Brad Smith, Microsoft’s president, is a regular guest. America’s tech titans also increasingly use the EU to influence the debate at home. It saves some lobbying there, if they can help shape widely adopted regulations that emanate from Europe.

But the Brussels effect may be less effective than in the past. The ground on which the debate over privacy legislation was conducted had been long established before the GDPR, but regulation in AI is nascent. Experts still

quarrel over such basic questions as what AI actually is. And the EU, where politicians tend to favour stricter regulation, may overdo it. This could push the tech giants to differentiate their regional offerings after all (and stymie Europe's startups). Worse, the data strategy could easily turn protectionist.

If the EU's digital plans became restrictive policy driven by protectionism, that would limit Europe's ability to set global rules which could help to give its firms a much-needed leg up. It would also make it much harder for the EU to establish what the digital world will badly need, should regulation of tech remain stalled in America even after the presidential election. At risk is Europe's role as a third "techno-sphere"—one that is not controlled by a handful of tech titans, as it is in America, or by the Chinese state. ■



科技监管

布鲁塞尔效应持续

欧盟希望制定科技业的规则

虽然有些言论可能会让扎克伯格听得如芒在背，但这位Facebook老板近期访问布鲁塞尔的时机很恰当。他是第一批听取欧盟旨在约束科技业的宏伟计划的外部人士之一。在他到访几天后的2月19日，欧盟以一系列文件的形式公布了计划的大致内容。他的访问向大家确认了一点：处于政治瘫痪中的美国政府给了欧盟机会，令它可能成为世界上最重要的科技监管源头。

欧洲既是科技世界的侏儒，也是巨人。欧洲有许多尖端技术，但几乎没有什么重要的数字平台。在全球70个最大的数字平台的总市值中，欧洲仅占不到4%（美国占73%，中国占18%）。与此同时，欧盟是一个巨大的市场，人口超过五亿，没有哪个科技巨头能忽视它。它为Facebook和谷歌贡献了四分之一的收入。

这样的组合催生出了哥伦比亚大学法学院的阿努·布拉德福德（Anu Bradford）所说的“布鲁塞尔效应”，他在同名新书中探讨了这一现象。用她的话来说，数字服务往往是“不可切分的”。对于大型科技公司来说，在欧盟之外提供迥乎不同的服务，代价将过于高昂。因此，它们大都已经采用了欧洲严格的隐私法规《通用数据保护条例》（General Data Protection Regulation）作为全球标准。各国政府也从欧盟的数据保护条例中借鉴了不少。目前已经有约120个国家通过了隐私法规，其中大多数都与《通用数据保护条例》及其前身相似。

欧盟委员会还想把同一招用到其他领域。上月发布的主要文件是一份关于人工智能的白皮书，其中包含多种措施，目的在于促进人工智能在欧洲的应用，并限制这种技术可能存在的危险。欧盟委员会还发布了一项促进数据使用的“战略”，数据是人工智能应用最重要的输入。它的理念是创建一个“单一的欧洲数据空间”，让数字信息在其中自由安全地流动。为了实现

这一理念，欧盟委员会除了其他的措施之外，还希望消除阻碍企业共享数据的法律障碍，以及投资云服务来促进数据共享。

这两份文件都是欧盟提出的整体“数字战略”的一部分。今年晚些时候，欧盟委员将提出一份“数字服务法案”草案。占据主导地位的科技公司将预期将面临更严格的规定，不仅针对它们如何看管用户生成的内容，还会限制它们区别对待使用自家服务的竞争对手的程度。所有这些都汇总在一份关于竞争政策的报告中。具体细节尚不清楚，但德国提出的立法建议预示了发展的趋势：在确定一家公司是否占据主导地位 and 滥用了市场权力时，数据这个衡量因素将变得重要得多。

有迹象表明，布鲁塞尔效应将再次发挥魔力。在未来一段时间内，Facebook不会是唯一一家将欧洲视为全球科技监管主要来源的科技巨头。谷歌的母公司Alphabet的老板桑达尔·皮查伊（Sundar Pichai）最近也访问了这个比利时的首都。他呼吁对人工智能进行“明智的监管”。微软总裁布拉德·史密斯（Brad Smith）是那儿的常客。美国科技巨头也越来越多地利用欧盟来影响国内的争论。如果他们能帮助制定被广泛采用的欧洲法规，会省去一些在美国游说的功夫。

但布鲁塞尔效应可能不会像过去那样有效。关于隐私立法的争论早在《通用数据保护条例》之前就有了基础，而人工智能的监管还处于萌芽阶段。专家们仍然在一些基本问题上争论不休，比如人工智能到底是什么。欧盟也可能会做得过火，那里的政客们倾向于支持更严格的监管。这可能最终会促使科技巨头在各个地区推出不同的产品（还会阻碍欧洲的创业公司）。更糟糕的是，欧盟的数据战略可能很容易转向保护主义。

如果欧盟的数字计划变成由保护主义驱动的限制性政策，它将限制欧洲制定全球规则的能力，而这种规则本可以让欧洲企业获得急需的助力。它也会大大增加欧盟建立数字世界急需的规则的难度（如果美国在大选过后科技监管仍然停滞不前，这样的规则将是急需的）。欧洲作为第三“技术区域”的地位将面临风险——这个区域既不像美国那样由少数科技巨头控制，也不像中国那样受政府掌控。 ■



The pandemic

Going global

The virus is coming. Governments have an enormous amount of work to do

IN PUBLIC HEALTH, honesty is worth a lot more than hope. It has become clear in the past week that the new viral disease, covid-19, which struck China at the start of December will spread around the world. Many governments have been signalling that they will stop the disease. Instead, they need to start preparing people for the onslaught.

Officials will have to act when they do not have all the facts, because much about the virus is unknown. A broad guess is that 25-70% of the population of any infected country may catch the disease. China's experience suggests that, of the cases that are detected, roughly 80% will be mild, 15% will need treatment in hospital and 5% will require intensive care. Experts say that the virus may be five to ten times as lethal as seasonal flu, which, with a fatality rate of 0.1%, kills 60,000 Americans in a bad year. Across the world, the death toll could be in the millions.

If the pandemic is like a very severe flu, models point to global economic growth being two percentage points lower over 12 months, at around 1%; if it is worse still, the world economy could shrink. As that prospect sank in during last week, the S&P 500 fell by 8%.

Yet all those outcomes depend greatly on what governments choose to do, as China shows. Hubei province, the origin of the epidemic, has a population of 59m. It has seen more than 65,000 cases and a fatality rate of 2.9%. By contrast, the rest of China, which contains 1.3bn people, has suffered fewer than 13,000 cases with a fatality rate of just 0.4%. Chinese officials at first suppressed news of the disease, a grave error that allowed the virus to take hold. But even before it had spread much outside Hubei,

they imposed the largest and most draconian quarantine in history. Factories shut, public transport stopped and people were ordered indoors. This raised awareness and changed behaviour. Without it, China would by now have registered many millions of cases and tens of thousands of deaths.

The World Health Organisation was last week full of praise for China's approach. That does not, however, mean it is a model for the rest of the world. All quarantines carry a cost—not just in lost output, but also in the suffering of those locked away, some of whom forgo medical treatment for other conditions. It is still too soon to tell whether this price was worth the gains. As China seeks to revive its economy by relaxing the quarantine, it could well be hit by a second wave of infections. Given that uncertainty, few democracies would be willing to trample over individuals to the extent China has. And, as the chaotic epidemic in Iran shows, not all authoritarian governments are capable of it.

Yet even if many countries could not, or should not, exactly copy China, its experience holds three important lessons—to talk to the public, to slow the transmission of the disease and to prepare health systems for a spike in demand.

A good example of communication is America's Centres for Disease Control, which issued a clear, unambiguous warning on February 25th. A bad one is Iran's deputy health minister, who succumbed to the virus during a press conference designed to show that the government is on top of the epidemic.

Even well-meaning attempts to sugarcoat the truth are self-defeating, because they spread mistrust, rumours and, ultimately, fear. The signal that the disease must be stopped at any cost, or that it is too terrifying to talk about, frustrates efforts to prepare for the virus's inevitable arrival. As

governments dither, conspiracy theories coming out of Russia are already sowing doubt, perhaps to hinder and discredit the response of democracies.

The best time to inform people about the disease is before the epidemic. One message is that fatality is correlated with age. If you are over 80 or you have an underlying condition you are at high risk; if you are under 50 you are not. Now is the moment to persuade the future 80% of mild cases to stay at home and not rush to a hospital. People need to learn to wash their hands often and to avoid touching their face. Businesses need continuity plans, to let staff work from home and to ensure a stand-in can replace a vital employee who is ill or caring for a child or parent. The model is Singapore, which learned from SARS, another coronavirus, that clear, early communication limits panic.

China's second lesson is that governments can slow the spread of the disease. Flattening the spike of the epidemic means that health systems are less overwhelmed, which saves lives. If, like flu, the virus turns out to be seasonal, some cases could be delayed until next winter, by which time doctors will understand better how to cope with it. By then, new vaccines and antiviral drugs may be available.

When countries have few cases, they can follow each one, tracing contacts and isolating them. But when the disease is spreading in the community, that becomes futile. Governments need to prepare for the moment when they will switch to social distancing, which may include cancelling public events, closing schools, staggering work hours and so on. Given the uncertainties, governments will have to choose how draconian they want to be. They should be guided by science. International travel bans look decisive, but they offer little protection because people find ways to move. They also signal that the problem is "them" infecting "us", rather than limiting infections among "us". Likewise, if the disease has spread widely,

as in Italy and South Korea, “Wuhan-lite” quarantines of whole towns offer scant protection at a high cost.

| *Scrub up*

The third lesson is to prepare health systems for what is to come. That entails painstaking logistical planning. Hospitals need supplies of gowns, masks, gloves, oxygen and drugs. They should already be conserving them. They will run short of equipment, including ventilators. They need a scheme for how to set aside wards and floors for covid-19 patients, for how to cope if staff fall ill, and for how to choose between patients if they are overwhelmed. By now, this work should have been done.

This virus has already exposed the strengths and weaknesses of China’s authoritarianism. It will test all the political systems with which it comes into contact, in both rich and developing countries. China has bought governments time to prepare for a pandemic. They should use it. ■



【首文】全球瘟疫

走向世界

病毒来袭。各国政府任务极为繁重【新冠报道】

在公共卫生领域，“诚实”远比“希望”更有价值。过去一周的情况表明，在12月初开始袭击中国的新型传染病新冠肺炎将传播至全球各地。多国政府纷纷表示它们会遏制住这种疾病。但实际上，它们需要开始让国民做好应对病毒猛烈来袭的准备。

官员们将不得不在信息不全的情况下行动，因为关于该病毒的许多情况尚属未知。据大致估计，任何受感染国家中25%至70%的人口可能感染此病。中国的经验显示，在确诊病例中，约80%为轻症，15%需要住院治疗，5%需要重症监护。专家表示，该病毒的致死率可能是季节性流感的五至十倍，而流感的致死率为0.1%，在一个严重的年份里导致六万美国人死亡。全球来看，该病毒的死亡人数可能高达数百万。

如果将发生的全球性瘟疫类似一场非常严重的流感，模型显示未来12个月全球经济增速将下降两个百分点，至1%左右。如果疫情更加严重，世界经济可能萎缩。上周，随着这种可能性显现，标普500指数下跌了8%。

但正如中国的情况所示，结果究竟会如何在极大程度上取决于政府选择怎么做。这一流行病的发源地湖北省拥有5900万人口，至今累计确诊病例超过65,000例，病死率为2.9%。相比之下，有13亿人口的中国其他省份确诊病例不到13,000例，病死率仅为0.4%。中国官员在最初压制有关该疾病的消息，这是大错特错，病毒就此得以扎根传播。但在疾病在湖北以外地区流行之前，政府便实施了人类历史上规模最大、最严厉的隔离措施。工厂关闭，公交停运，民众被要求闭门不出。这提高了人们的防范意识，改变了人们的行为。否则到现在中国可能已经有千百万个确诊病例，数万人死亡。

世卫组织上周对中国的做法赞不绝口。但这并不意味着中国的做法是世界

其他地区的模板。各种隔离措施都有其代价，不仅是产出减少，还会损害被封锁人群的利益，他们当中有些人患有其他疾病却得不到治疗。所付出的代价是否值得，现在下结论还为时尚早。随着政府为求恢复经济而逐步放松隔离措施，中国有可能出现第二波感染潮。考虑到这种不确定性，几乎没有哪个民主国家会愿意采取中国那种程度的对个体的高度管控。而且，从伊朗的疫情乱象来看，也并不是所有威权政府都能做到那样的程度。

不过，即使许多国家不能或不该照搬中国模式，中国的实践仍提供了三大教训：要向民众公开信息，要减缓疫病的传播速度，要让卫生系统为需求激增做好准备。

美国疾控中心（CDC）在2月25日发出毫不含糊的明确警示，就是向民众传达信息的好例子。伊朗则是反例，其卫生部副部长在一次新闻发布会上出现发病症状，而这场发布会原本是要表明政府已经控制住了疫情。

即便是善意的美化事实也会事与愿违，因为这么做只会传播不信任、谣言，最终传播恐慌。如果释放出必须不惜一切代价遏制疫情或者疫情已可怕到不能去谈论的信号，就会挫败为应对必然到来的病毒所做的准备。各国政府犹豫不决之际，俄罗斯传出的阴谋论已引发了各种猜疑，也许会阻碍民主国家应对疫情并让它们的努力不被信任。

向民众通报该疾病信息的最佳时机是在它变成地区流行病之前。一个信息是病死率与年龄相关。超过80岁或患有基础疾病的人是高风险人群，50岁以下人群风险较低。现在这个时候，应该要去说服那些占总病例80%的未来轻症患者留在家中，别急于往医院挤。人们需要学会经常洗手并避免触摸脸部。企业要做好业务连续性计划，让员工在家远程工作，并确保在重要员工生病或需要离岗照顾孩子或父母时有人能顶上。在这方面，新加坡是楷模，它从另一种冠状病毒SARS中吸取了教训，明白及早而清晰地传达信息能减少恐慌。

中国提供的第二个教训是政府可以减缓疾病的传播。控制病例飙升能减轻

医疗系统的重负，从而挽救生命。如果这种病毒变成了像流感那样的季节性疾病，一些病例能推后到明年冬天出现，到那时医生们会更了解该如何应对。而且到时也可能已经研发出新的疫苗和抗病毒药物。

在病例还很少的时候，国家能够追踪每个患者的行动，寻找接触过的人员并将他们隔离。但发生社区传播后，这样做就变成了徒劳。政府需要为转向社交隔离措施做好准备，这可能包括取消公共活动，关闭学校，错时工作等。而由于各种不确定性，政府将不得不选择要采取多严厉的措施。它们应以科学为指导。跨境旅行禁令看似坚决果断，但实际上能提供的保护不大，因为人们还是会找到办法移动。而且这种做法好像在说问题在于“他们”感染了“我们”，而不是限制病毒在“我们”之间传染。同样地，假如疫情已经广泛传播，像在意大利和韩国，“小武汉”式的封城隔离能提供的保护就很有限，却代价高昂。

| 医护准备

第三个教训是医疗系统要为疫情来袭做好准备。这涉及辛苦细致的后勤规划。医院需要防护服、口罩、手套、氧气、药品等物资。它们应该已经在储备这些东西。呼吸机等设备将变得紧缺。医院需要制订计划，为新冠肺炎患者划出专门的病房和楼层，为医护人员染病做好准备，以及确定在医院超负荷时救治患者的轻重缓急。到此刻，这项规划工作应该已经完成。

新冠病毒已经显露出中国威权主义的强弱项。它将考验所到之处的各种政治制度，不论是富裕国家还是发展中国家。中国为各国政府备战一场全球性瘟疫赢得了时间，它们应该好好把握住。 ■



Chaguan

Putting faces to the numbers

With much of China still on virus lockdown, how are migrant workers surviving without pay?

“FAMILY IS HAPPINESS,” reads the motto over the front door of a village house in the north-west of Sichuan province. From the mahjong table beneath a velvet dust-cloth, to the child-sized chair facing a television flanked by pink plastic speakers, all is ready for a family reunion. The home’s owners, grandparents in their 50s, have had six weeks to clean and tidy, their longest break in years from lives of toil in Beijing. Alas, the couple did not choose this extended holiday, nor the loss of pay it involves. In common with many of China’s 173m long-distance migrant workers, their jobs have been halted by the new coronavirus. Worse, during this subdued lunar new year they have not seen their only child, a 32-year-old chef. Curbs on travel have left him stuck in the next-door province of Shaanxi with his wife and eight-year-old son.

In medical terms, covid-19 has largely spared this corner of Sichuan. As *The Economist* went to press there were 22 confirmed cases and no deaths in the nearest large city, Mianyang, and in the villages that surround it, with their fir trees and duck ponds and fields of yellow rapeseed. Still, quarantine restrictions have shut down bus services. Villages are closed behind checkpoints guarded by local officials and volunteers in masks and red armbands, wielding digital thermometers and disinfectant sprays.

China is a country of half-idled factories, of office towers emptied of white-collar staff, and restaurants without diners. Chaguan last week travelled to Sichuan, 1,700km south-west of Beijing, to meet a few of the blue-collar workers who are suffering the consequences. He found people who are at once more resilient and more vulnerable than their peers in the rich world.

Migrants hunkered down in home villages talk of picking free vegetables, or bartering with neighbours. Less happily, meat prices are high. Pork prices have soared since herds were devastated by African swine fever, an animal pandemic that reached China in 2018. None of those who spoke to Chaguan questioned strict government controls, for the virus scares them. Neither they nor their village are named here. These are jumpy times in which Communist Party leaders have demanded that news reports should be filled with “positive energy”.

Chaguan chatted with workers on plastic stools outside a three-storey home built in 2008 at a cost of about 120,000 yuan (\$17,130). It sits on land owned by a 54-year-old grandfather who works in Beijing as a casual painter and decorator. He is paid 3,000 yuan in a good month. His wife, also 54, cleans an insurance company’s offices, earning about two-thirds of that. Their combined earnings make them middle-income workers in China, but they watch every yuan. They rent a room in a shared apartment for a little over 1,000 yuan a month. They make packed lunches and take buses to work. The wife explains that, with underground train tickets starting at three yuan, “If I take the metro I won’t have any money left.” They have lived in Beijing since 2004 but have barely explored the city, apart from a visit to the Great Wall and another to see Mao Zedong in his mausoleum.

Each morning now, they check for a smartphone message from the cleaning firm that employs the wife, telling her to return to Beijing. As out-of-town arrivals to the capital they will have to spend two weeks in self-isolation, or face legal penalties. Loneliness does not worry them. “Quarantine isn’t that different from what we usually do, we just stay put,” shrugs the husband. Money is more of a concern, for he will earn nothing while isolated. In a good month the couple save just over 1,000 yuan after rent and living expenses. For years, their savings went towards building their house, which they will leave to their son. Now they regularly send

money to help fund their grandson's studies in Mianyang. "We have to. That's how it is in the countryside," says the wife.

Chinese savings rates are high by world standards—even the poor routinely save 20% of their disposable income. In contrast, a study in 2017 by America's Federal Reserve found that 44% of Americans lack the savings to pay an unexpected \$400 bill. China's skimpy pensions and health insurance, notably in rural areas, explain much of that thrift. Westerners are helped with lots of costs, says a young man visiting the village from Mianyang. "Chinese people, we're on our own," he laughs. Life under lockdown is cheaper here than usual because social visits are banned. Every three households have been given a ticket, allowing one person to buy supplies for them all from the local market. For now, the grandparents who normally work in Beijing are spending savings. They could survive another half a year, they think, but no more.

| *Needed but seldom heeded*

A sense of powerlessness can hurt as much as dwindling funds. A visit to Mianyang's almost-deserted railway station found a middle-aged couple heading, unhappily, back to Zhejiang province, where infection rates are rather high. They both work in Jiaxing, near Shanghai, at a factory that makes linings for much-needed face-masks, and so have been ordered to return. They do not know if they will be paid for the two-week quarantine that awaits them, which they have heard will be monitored via the GPS function on their phones. They do not even know whether their landlord will let them back into the room that they rent from him. Reports abound of migrants being denied entry to residential compounds, as local officials and property managers impose harsh rules, some of their own invention. If they are barred from their home the factory has offered dormitory beds, says the wife. "There is no option. We have to go back," sighs the husband.

In truth, China's economy needs migrant labour just as much as those

workers need their pay. Hard, solitary lives explain why the average age of such workers is now over 40. The young often prefer to work nearer home. Though covid-19 would test any country, the epidemic is casting fresh light on a Chinese society divided by cruel inequalities of wealth, political clout and urban versus rural class. This is a crisis with many sorts of victim. ■



茶馆

数字背后的面孔

中国大部分地区仍因病毒而处于封锁状态，无工可打的外地务工人员境况如何？【新冠报道】

“阖家幸福”，四川省西北部一户村舍的大门上贴着四个大字。麻将桌上铺着丝绒防尘布，电视对面摆着一张儿童椅，电视机两侧是粉红色的塑料音箱。一切就绪，只待团聚。这家的户主是一对50多岁的夫妇，已经做了祖父母的他们一下子有了六周的时间整理屋子。在北京辛苦打工多年，这次是他们休息时间最长的一次。可惜，这史无前例的长假不是这对夫妇主动选择的，更别提因此而损失的收入。和中国1.73亿远离家乡的外地务工人员中的许多人一样，新型冠状病毒让他们的工作停摆了。更糟糕的是，在这个气氛沉闷的农历新年，他们没能见到自己做厨师的32岁独生子。限制出行让他和妻子及八岁的儿子滞留在了邻省陕西。

从医学角度看，新冠病毒对这个偏居四川一隅的村庄没有太大影响。在本期《经济学人》于上周四付印之时，距离这里最近的大城市绵阳及其周边遍布杉树、水塘和黄色油菜田的村庄共有22例确诊病例，无死亡病例。但是，隔离措施停止了公交车服务。村庄封闭，当地政府人员与志愿者戴着口罩和红袖章，挥动着数字体温计和消毒喷雾剂，把守着村口的检查站。

中国的工厂开工不足，写字楼里没有白领来上班，餐厅也无人光顾。本专栏作者上周去了北京西南向1700公里之外的四川，采访了一些正在承受苦果的蓝领工人。作者发现，和富裕国家里的蓝领工人相比，他们有更强的适应力，同时却也更容易受影响。窝在乡下家里的农民工说他们可以摘地里的菜吃，不用花钱，或者和邻居以物易物。可惜肉价仍居高不下。2018年非洲猪瘟传至中国，生猪数量急剧减少，之后猪肉价格一路飙升。接受采访的人都没有质疑政府的严格控制措施，因为这种病毒让他们很害怕。本文隐去了受访者的姓名和村名。现在是敏感时期，共产党领导人要求新闻报道要充满“正能量”。

在一栋三层楼房的外面，作者和农民工们坐在塑料凳子上聊天。这栋房子是在2008年花了大约12万元盖的。它占用的土地在一位54岁的祖父名下，他在北京做刷油漆和装修散工，活多的时候一个月能赚3000块。与他同龄的妻子在一家保险公司做清洁工，工资大概2000元。两人的收入加起来在中国属中等收入群体，但他们对每一块钱都精打细算。他们在一套合租的公寓里租了一个房间，每月租金1000多一点，午餐自己带饭，上班坐公交车。妻子解释说，地铁票价三元起，“如果我坐地铁，就啥钱也剩不下了。”他们自2004年来一直住在北京，但除了去过一次长城，在毛主席纪念馆瞻仰过毛泽东的遗体之外，几乎没有探索过这座城市。

现在，每天早晨他们都会在智能手机上查看雇用妻子的清洁公司有没有发信息让她回北京上班。作为从外地入京人员，他们将必须自我隔离两周，否则将面临法律惩处。他们倒是不怕寂寞。“隔离跟我们平常的生活也没什么两样，就是哪儿也不去。”丈夫耸耸肩说。更担心的是钱，因为他在隔离期将完全没有收入。活多的月份里，除去房租和生活费，夫妻俩能存下1000块多一点。多年来，他们的积蓄都拿来盖那栋房子了，它以后是要留给儿子的。现在他们又定期汇钱，贴补在绵阳上学的孙子。“必须的啊，农村就是这样的。”妻子说。

按全球标准衡量，中国的储蓄率很高，即使是穷人通常也会把20%的可支配收入存起来。相比之下，美联储在2017年的一项研究发现，如果出现意外情况需要支付400美元的账单，有44%的美国人会因储蓄不足而付不起。中国的养老金和医疗保险不足，在农村地区尤其如此，这是中国人节俭的主要原因。西方人很多花费都不用自己出，一位从绵阳到村里的年轻人说。“我们中国人得靠自己。”他大笑说。封村状态下的生活成本比平时低，因为走亲访友都被禁止了。每三户发一张通行证，允许一个人出门在当地市场为三家人采购。正常情况下现在应该在北京工作的这对祖父母正在靠积蓄生活。他们估计自己可以再撑半年，再长就不行了。

| 被需要却不被关注

无力感带来的难受可能不比渐瘪的钱袋少。作者在异常冷清的绵阳火车站碰到了一对中年夫妇，他们正怏怏不乐地准备返回感染率很高的浙江。两

人都在嘉兴的一家工厂工作，厂里为紧缺的口罩生产衬里，因此他们被要求复工。他们不知道接下来两周的隔离期有没有工资，听说会有人通过手机上的GPS监控他们的隔离情况。他们甚至都不知道房东是否会让他们回到租住的屋子。有很多报道称，由于地方官员和物业公司实施了严格的管控规定（其中也有他们自创的规定），大量返回的外地人员被拒绝进入住宅区。妻子说，如果他们进不去，厂里说了会提供宿舍床位。“没得选，必须得回去。”丈夫叹道。

实际上，外地务工人员需要工资，中国经济同样需要他们。打工生活艰辛而寂寞，所以现在外出务工的人平均年龄在40岁以上。年轻人通常更愿意在离家较近的地方工作。尽管新冠病毒对任何国家都会是个考验，但这次疫情让我们对被财富、政治影响力和城乡阶层之间的严重不平等所分割的中国社会有了新的认识。这场危机之中，受害者岂止一种。■



The Economist Film

Techs and the City | The Disrupters

By 2050, two-thirds of the world's population will live in cities. Cities are growing faster than at any time in history, straining services and infrastructure. Technology-driven advances are at the forefront of solving this age-old problem.



经济学人视频

科技与智慧城市 | 颠覆者系列

到2050年，全球三分之二的人口都将住在城市。前所未有的城市化进程对服务和基础设施提出了极限挑战，技术推动的进步成为了解决这些顽固问题的关键。



Banyan

Belt and roadblock

Indonesia wants to deal with China on its own terms

WHEN CHINA'S president, Xi Jinping, launched the Belt and Road Initiative (BRI) in 2013, Indonesia was seen as essential to its success. So much so that he went to Jakarta, its capital, to launch the maritime dimension of his world-girdling programme of infrastructure investments. But then a funny thing happened: very little. Nearby Cambodia has been overrun by Chinese involvement in its economy and politics. In Pakistan BRI and its local iteration, the China-Pakistan Economic Corridor (CPEC), are held up as proof of a relationship “as close as lips and teeth”—even as CPEC goes off the rails. In contrast, most Indonesians have never heard of China's signature foreign policy. Banyan's recent informal poll of residents of Jakarta was nearly unanimous: BRI is a financial institution, Bank Rakyat Indonesia.

China's involvement in Indonesia is growing, but it got going late. One reason is the long slow process of getting any project off the ground. Public consultations drag on, land is a nightmare to acquire, bureaucrats block licences and sleazier ministers wonder what is in it for them. One minister under President Joko Widodo, or Jokowi, admits that the Indonesian way is hardly ideal, but at least the country avoided many of the reckless, grandiose projects and poor financial terms embraced by faster-moving neighbouring countries. The only real albatross, a planned high-speed railway from Jakarta to Bandung, is a cautionary tale. In 2015 China beat Japan in the bid for its construction by not insisting on government guarantees for its loans. Quickly the usual problems emerged: even the air force, with a base in the path of the train, objected. Last year all the land was at last acquired. But the project is years late and over budget. Since no

broader high-speed network is envisaged that offers economies of scale, the 150km line will never pay for itself. The railway is China's flagship project in Indonesia, but Indonesian ministers do not want to talk about it.

The railway is also a lesson in the sometimes ugly sensibilities over the nearly 3m Indonesians of Chinese origin, which in turn shape Indonesia's engagement with China. Chinese have been doing business in Indonesia for centuries, and today form a big part of the entrepreneurial class. Anti-Chinese antagonisms date back at least to colonial times, when the Dutch appointed ethnic Chinese as tax farmers even as they encouraged occasional pogroms against Chinese traders, builders and sugar-mill workers. In the 20th century some Indonesian nationalists defined themselves in part by their anti-Chineseness. After independence, hatred boiled over in 1965 following an alleged left-wing coup attempt. Ethnic Chinese were seen by many as communist sympathisers. Chinese Indonesians were among those targeted in army-directed massacres in which hundreds of thousands of people died. Anti-Chinese riots erupt around the archipelago from time to time. And in 2017 the ethnic-Chinese and Christian governor of Jakarta, Basuki Tjahaja Purnama, or Ahok, an ally of Jokowi, was jailed on trumped-up charges of blasphemy. A rabble-rousing politician, Prabowo Subianto, who said Ahok should "know his place lest the Indonesian Chinese face the consequences of his action", is now the minister of defence.

The railway was also criticised, caught in a broad surge of anti-Chinese sentiment. The government has drawn its own conclusions. All the other big projects backed by China are to be built far from the Javanese heartland where, one official explains, "a lot of the religious conservatives and Muslim hardliners are collected". They include an oil refinery in northern Sumatra near the Malacca Strait, a smelter on Sulawesi that allows Indonesia to process its nickel ore for the first time, and planned hydropower plants in northern Kalimantan to encourage aluminium

smelters to move from China.

Indonesia, then, mostly engages with China on its own terms—and a Chinese commitment for a training college to teach Indonesians about nickel processing is further proof of that. At times it will even be seen to stand up to China, as in a maritime spat last month in which the navy and coastguard expelled a Chinese fishing fleet from Indonesia's exclusive economic zone. The move led some observers to imagine that Indonesia will unite its South-East Asian neighbours against China in the South China Sea. But that is wishful thinking. Jokowi must appear robust to anti-China forces at home. But, for the economy to grow, he must court Chinese money. ■



榕树

一带一路障

印尼希望按自己的方式和中国打交道

中国国家主席习近平在2013年发起了“一带一路”（BRI）倡议，彼时印度尼西亚被视为该倡议成功的关键。为此，他亲自前往印尼首都雅加达，发布了这一环状全球基础设施投资计划的海上部分。但后来发生了一件有趣的事，很小的事。在邻国柬埔寨，中国已经大举参与到其经济和政治中。在巴基斯坦，“一带一路”倡议及其地方版本“中巴经济走廊”（CPEC）被视为两国关系“唇齿相依”的证明——即便CPEC偏离了轨道。然而，大多数印尼人却从未听说过中国这一标志性外交政策。本专栏近期对雅加达居民的非正式民意调查显示，他们几乎一致认为BRI是一家金融机构——印尼人民银行（Bank Rakyat Indonesia）。

中国在印尼参与的项目越来越多，但都步履缓慢。原因之一是任何一个项目的启动都漫长而迟缓。民意征询拖延不决，征地堪比噩梦，官僚阻挠许可发放，卑劣的部长们琢磨能从中捞到什么好处。总统佐科威手下的一位部长承认，印尼的做法很难说理想，但至少避免了那些快速行动的邻国积极接受的许多鲁莽、浮夸的项目以及糟糕的融资条件。唯一真正造成麻烦的是计划建设的从雅加达至万隆的高铁，它成了一个让人警醒的例子。2015年，中国因未坚持要求政府为其贷款提供担保，在建设项目竞标中击败了日本。很快，常见问题便浮现出来：就连在铁轨路线上设有基地的空军也跑出来反对了。去年，所需土地终于征齐。但这个项目已经晚了好几年，而且超出了预算。由于没有更广泛的高铁网络前景可以提供规模经济，这条150公里长的高铁将永远无法收回成本。这条铁路是中国在印尼的标杆项目，但印尼的部长们都不愿对它发表意见。

这条铁路还提供了一个教训，就是印尼对其近300万华裔人口怀有一种有时危险的敏感，而这种敏感反过来又塑造了印尼与中国的交往。中国人在印尼经商已有几个世纪，如今他们是印尼企业家阶层的一个重要部分。反华对立至少可以追溯到殖民时代，当时荷兰人一边让华裔承包收税，一边

又偶尔鼓励对中国贸易商、建筑工人和糖厂工人实施大屠杀。在20世纪，一些印尼民族主义者一定程度上把反华作为自己的标签。印尼独立后的1965年，在一个被指为左翼分子政变图谋的事件发生后，仇恨爆发。许多人认为华裔是共产主义的支持者。军方主导的屠杀导致数十万人受害，印尼华人也身陷其中。排华骚乱时不时在这个群岛的各处爆发。2017年，身为华裔和基督徒的雅加达省长钟万学（Basuki Tjahaja Purnama）被扣上亵渎神明的罪名入狱。他又名阿学（Ahok），是佐科威的盟友。现任国防部长的普拉博沃·苏比安托（Prabowo Subianto）是一位颇具煽动力的政客，他当时表示阿学应该“明白自己的位置，以免印尼华人承担他的行为带来的后果”。

这条铁路也卷入了广泛的反华情绪涌动中，遭到了批评。政府已经得出了自己的结论。所有中国支持的其他大型项目的选址都将远离爪哇腹地。一位官员解释说，“那里聚集了很多宗教保守派和穆斯林强硬派”。这些项目包括苏门答腊岛北部、靠近马六甲海峡的一家炼油厂，苏拉威西岛（Sulawesi）上印尼首家可以加工镍矿的冶炼厂，以及为鼓励炼铝厂从中国迁出而计划在加里曼丹岛（Kalimantan）北部兴建的水电站。

所以，印尼主要是按自己的意愿与中国打交道。中国承诺建一所培训学院，向印尼人传授镍加工方面的知识，进一步证明了这一点。有时印尼甚至会被视为奋起抵抗中国，比如在上个月的一次海上争端中，印尼海军和海岸警卫队将一支中国渔船队驱逐出了印尼专属经济区。此举导致一些观察人士猜测，印尼将联合东南亚邻国，在南海与中国对抗。但这只是一厢情愿的想法。面对国内的反华势力，佐科威必须表现得很强硬。但是为了经济增长，他必须追逐中国的资金。■



Infrastructure

Spreading out

Should data-crunching be done at the centre or at the edge?

ONCE A YEAR the computing cloud touches down in Las Vegas. In early December tens of thousands of mostly male geeks descend on America's gambling capital in hope not of winnings but of wisdom about Amazon Web Services (AWS), the world's biggest cloud-computing provider. Last year they had the choice of more than 2,500 different sessions over a week at the shindig, which was called "Re:Invent". The high point was the keynote featuring AWS's latest offerings by Andy Jassy, the firm's indefatigable boss, who paced the stage for nearly three hours.

But those who dare to walk the long city blocks of Las Vegas to the conference venues can connect to the cloud, and thus the mirror worlds, in another way. Push a button to request a green light at one of thousands of intersections and this will trigger software from SWIM.AI, a startup, to perform a series of calculations that may influence the traffic flow in the entire city. These intersections do not exist just in the physical realm, but live in the form of digital twins in a data centre. Each takes in information from its environment—not just button-pushing pedestrians, but every car crossing a loop in the road and every light change—and continually predicts what its traffic lights will do two minutes ahead of time. Ride-hailing firms such as Uber, among others, can then feed these predictions into their systems to optimise driving routes.

AWS represents a centralised model where all the data are collected and crunched in a few places, namely big data centres. SWIM.AI, on the other hand, is an example of what is being called "edge computing": the data are processed in real time as close as possible to where they are collected. It is between these two poles that the infrastructure of the data economy will

stretch. It will be, to quote a metaphor first used by Brian Arthur of the Santa Fe Institute, very much like the root system of an aspen tree. For every tree above the ground, there are miles and miles of interconnected roots underground, which also connect to the roots of other trees. Similarly, for every warehouse-sized data centre, there will be an endless network of cables and connections, collecting data from every nook and cranny of the world.

To grasp how all this may work, consider the origin and journey of a typical bit and how both will change in the years to come. Today the bit is often still created by a human clicking on a website or tapping on a smartphone. Tomorrow it will more often than not be generated by machines, collectively called the “Internet of Things” (IOT): cranes, cars, washing machines, eyeglasses and so on. And these devices will not only serve as sensors, but act on the world in which they are embedded.

Ericsson, a maker of network gear, predicts that the number of IOT devices will reach 25bn by 2025, up from 11bn in 2019. Such an estimate may sound self-serving, but this explosion is the likely outcome of a big shift in how data is collected. Currently, many devices are tethered by cable. Increasingly, they will be connected wirelessly. 5G, the next generation of mobile technology, is designed to support 1m connections per square kilometre, meaning that in Manhattan alone there could be 60m connections. Ericsson estimates that mobile networks will carry 160 exabytes of data globally each month by 2025, four times the current amount.

The destination of your average bit is changing, too. Historically, most digital information stayed home, on the device where it was created. Now, more and more data flow into the big computing factories operated by AWS, but also its main competitors, Microsoft Azure, Alibaba Cloud and Google Cloud. These are, in most cases, the only places so far with enough

computing power to train algorithms that can, for instance, quickly detect credit-card fraud or predict when a machine needs a check-up, says Bill Vass, who runs AWS's storage business—the world's biggest. He declines to say how big, only that it is 14 times bigger than that of AWS's closest competitor, which would be Azure (see chart).

What Mr Vass also prefers not to say, is that AWS and other big cloud-computing providers are striving mightily to deepen this centralisation. AWS provides customers with free or cheap software that makes it easy to connect and manage IOT devices. It offers no fewer than 14 ways to get data into its cloud, including several services to do this via the internet, but also offline methods, such as lorries packed with digital storage which can hold up to 100 petabytes to ferry around data (one of which Mr Jassy welcomed on stage during his keynote speech in 2016).

The reason for this approach is no secret. Data attract more data, because different sets are most profitably mined together—a phenomenon known as “data gravity”. And once a firm's important data are in the cloud, it will move more of its business applications to the computing skies, generating ever more revenue for cloud-computing providers. Cloud providers also offer an increasingly rich palette of services which allow customers to mine their data for insights.

Yet such centralisation comes with costs. One is the steep fees firms have to pay when they want to move data to other clouds. More important, concentrating data in big centres could also become more costly for the environment. Sending data to a central location consumes energy. And once there, the temptation is great to keep crunching them. According to OpenAI, a startup-cum-think-tank, the computing power used in cutting-edge AI projects started to explode in 2012. Before that it closely tracked Moore's law, which holds that the processing power of chips doubles roughly every two years; since then, demand has doubled every 3.4 months.

Happily, a counter-movement has already started—toward the computing “edge”, where data are generated. It is not just servers in big data centres that are getting more powerful, but also smaller local centres and connected devices themselves, thus allowing data to be analysed closer to the source. What is more, software now exists to move computing power around to where it works best, which can be on or near IOT devices.

Applications such as self-driving cars need very fast-reacting connections and cannot afford the risk of being disconnected, so computing needs to happen in nearby data centres or even in the car itself. And in some cases the data flows are simply too large to be sent to the cloud, as with the traffic lights in Las Vegas, which together generate 60 terabytes a day (a tenth of the amount Facebook collects in a day).

How far will the pendulum swing back? The answer depends on whom you ask. The edge is important, concedes Matt Wood, who is in charge of AI at AWS, but “at some point you need to aggregate your data together so that you can train your models”. Sam George, who leads Azure’s IOT business, expects computing to be equally spread between the cloud and its edge. And Simon Crosby, the chief technologist at SWIM.AI, while admitting that his firm’s approach “does not apply everywhere”, argues that too much data are generated at the edge to send to the cloud, and there will never be enough data scientists to help train all the models centrally.

Even so, this counter-movement may not go far enough. Given the incentives, big cloud providers will still be tempted to collect too much data and crunch them. One day soon, debates may rage over whether data generation should be taxed, if the world does not want to drown in the digital sea. ■



基础设施

铺开

数据处理应该在中心还是边缘进行？【专题报道《数字经济》系列之三】

计算云一年一度降落在拉斯维加斯。12月初，上万名多为男性的极客来到美国这座赌城，不是为了赢钱，而是要汲取关于世界最大的云计算提供商亚马逊云计算服务（AWS）的智慧。去年，在为期一周的名为“Re:Invent”的盛大聚会上有2500多场讲座。最精彩的部分是该公司不知疲倦的老板安迪·贾西（Andy Jassy）介绍AWS最新产品的主题演讲，他在舞台走来走去了近三个小时。

但是，那些敢于走过拉斯维加斯长长的街区来到会议地点的人，也可以通过另一种方式连接到云，从而连接到镜像世界。在成千上万个十字路口中随便选一个，按下按钮请求绿灯，就会触发创业公司SWIM.AI的软件执行一系列可能会影响整个城市交通流动的计算。这些路口不仅存在于真实世界，还有一个孪生的数字路口存在于数据中心。每个路口都从环境中获取信息——不仅是按下按钮的行人，还有每辆越过嵌在道路中的一个线圈的汽车，以及每一次交通信号灯变化——并提前两分钟持续预测信号灯会如何变化。然后，优步等网约车公司可以将这些预测输入自己的系统中来优化行驶路线。

AWS代表了一种集中模式，所有数据都在几个地点（即大型数据中心）收集和处理。另一方面，SWIM.AI则是所谓的“边缘计算”的一个示例：数据在尽可能接近收集位置的地点实时处理。数字经济的基础设施将在这两极之间铺开。用圣达菲研究所（Santa Fe Institute）的布莱恩·亚瑟（Brian Arthur）最早使用的比喻来说，这会很像白杨树的根系。对于地面上的每一棵树，地下交缠的根系都会绵延数里，并与其他树的根相连。同样，对于每个仓库大小的数据中心，将有数不胜数的电缆和连接构成网络，收集来自世界各个角落的数据。

要想搞清楚这一切是怎么工作的，我们来考虑一个典型的比特的起源和旅

程，以及这两点在今后几年中将如何变化。时至今日，比特仍然经常通过人们单击网站或智能手机生成。未来，它会更常由机器产生，这些机器统称为“物联网”（IOT）：起重机、汽车、洗衣机、眼镜等。这些设备不仅可以充当传感器，而且可以在它们嵌入的世界中发挥作用。

网络设备制造商爱立信预测，到2025年，物联网设备的数量将从2019年的110亿增加到250亿。这样的预估听起来可能只是为自我利益服务，但若数据收集的方式发生重大转变，设备数量的爆炸是很可能发生的结果。现在许多设备都是用电缆连接的，日后使用无线连接的会越来越多。下一代移动技术5G设计支持每平方公里100万个连接，这意味着仅在曼哈顿就可以有6000万个连接。爱立信估计，到2025年，移动网络每月将在全球范围内承载160 EB的数据，是当前的四倍。

那个典型比特的目的地也在改变。过去，大多数数字信息都停留在创建它的设备上。现在，越来越多数据流入由AWS运营的大型计算工厂，还有其主要竞争对手Microsoft Azure、阿里云和Google Cloud。规模列全球最大的AWS存储业务的负责人比尔·瓦斯（Bill Vass）说，在大多数情况下，世界上只有这几个地方拥有足够的计算能力来训练某些算法，比如快速检测信用卡欺诈，或是预测机器何时需要检修。他拒绝透露AWS的存储规模具体有多大，只说是最接近的竞争对手（也就是Azure，见图表）的14倍。

还有一件事也是瓦斯不太想说的，就是AWS和其他大型云计算提供商正在全力以赴来深化这种集中模式。AWS为客户提供免费或廉价的软件来轻松连接和管理物联网设备。它提供了不少于14种把数据导入它的云的方式，不但有通过互联网执行这一操作的多种服务，还提供了离线方法，例如用装满数字存储器的卡车来运输数据，可容纳多达100 PB（贾西在2016年的主题演讲中曾让一辆这样的卡车登台亮相）。

使用这种模式的原因不是秘密。数据会吸引更多数据，因为将不同的数据集放在一起挖掘最有利可图——这种现象称为“数据引力”。而一旦一家公司的重要数据存储云中，它就会把更多的业务应用转移到计算天空，为

云计算提供商带来更多的收入。云提供商还提供了越来越丰富的服务选择，让客户可以挖掘自己的数据获得洞见。

然而，这种集中化也有代价。其中之一是企业要将数据移至其他云时必须支付高昂的费用。更重要的是，将数据集中到大型中心的环境成本也可能增加。将数据发送到中心位置会消耗能量。而一旦送达，持续分析处理它们的诱惑就很强烈了。根据创业公司兼智囊团OpenAI的说法，尖端人工智能项目中使用的计算能力在2012年开始爆发。在此之前，它很好地贴合摩尔定律，即认为芯片的处理能力大约每两年翻一番；而从那时起，需求每3.4个月翻一番。

令人高兴的是，一种反向运动已经开始出现——朝着生成数据的计算“边缘”方向。变得更加强大的不仅是大型数据中心里的服务器，还有较小的本地中心和互联的设备本身，让数据可以在更接近源头的地方被分析处理。而且，现在有软件可将计算能力转移到效用最大的地方，而这可能就在物联网设备上或附近。

无人车之类的应用需要能做出快速反应的连接，且无法承受断开连接的风险，因此计算需要在附近的数据中心甚至在汽车本身中进行。在某些情况下，数据流实在是太大了，无法发送到云端，比如拉斯维加斯的交通信号灯每天要产生60 TB的数据（相当于Facebook每天收集的数据量的十分之一）。

这个钟摆会往回摆多远呢？答案取决于你问的是谁。AWS的人工智能负责人马特·伍德（Matt Wood）承认，“边缘”很重要，但“到某些时候，你还是得把数据汇总到一起训练模型”。领导Azure物联网业务的山姆·乔治（Sam George）认为计算会在云和边缘之间均匀分布。SWIM.AI的首席技术专家西蒙·克罗斯比（Simon Crosby）虽承认自己公司的方法“并不适用于所有地方”，但他认为，在边缘生成的数据太多，无法都发送到云中，并且永远不会有足够的数据科学家来帮助集中训练所有模型。

即使这样，这种反向运动可能终究不够。鉴于强大的激励，大型云提供商

仍然会试图收集过多的数据并处理它们。如果世界不想淹没在数字海洋中，很快有一天，关于是否应该对生成数据征税的辩论可能会非常激烈。





Business

The new AI-assembly line

Integrating data is getting harder, but also more important

GEEKS ARE not known for being poets. But sometimes even they have a way with words, for example when trying to describe the main challenge of dealing with data. It is the search, they say, for “a single version of the truth”.

This also nicely describes what has been the goal of corporate information technology since it emerged 60 years ago. And the adage encapsulates the main tension for businesses in the data economy: finding digital truth—that is, identifying and combining data that accurately represent reality—is becoming more difficult and more important. More difficult because data and their sources are multiplying. And more important because firms need to get their data house in order to benefit from AI, which they must to stay competitive. AI boosts revenues and profits, according to a recent survey by McKinsey, a consultancy (see chart).

Happily, technology is coming to the rescue. Data-handling software and cloud computing are increasingly enabling what George Gilbert, an investor and veteran observer of the IT industry, calls the “AI-assembly line”—in reference to what happened a hundred years ago, when electricity replaced steam as the main source of power in factories. Before, machines had to be grouped closely around the power source—a steam engine. Electricity then allowed power to be distributed to where it was needed, which made assembly lines feasible. What is happening now, however, is actually the inverse: the machines of the digital age—a firm’s business applications and software to build these—are virtually regrouping around a new power source: central digital repositories known as “data warehouses” or “data lakes”. In time this may allow companies to build entire digital twins of

themselves.

Finding digital truth is hard because the data come from many sources and in a staggering variety of formats—which makes them hard to integrate. Even simple things such as a customer's name can be defined and stored in many different ways. Companies can have thousands of software applications, each with its own database. Failed attempts to consolidate or link these digital repositories have cost armies of chief information officers their jobs.

Integrating data was already a major problem when IT existed mainly to keep track of a firm's "transactions", such as processing an order or managing the supply chain. It has only become more difficult since. In the 1990s firms started using their data to work out how they have been doing, something called "analytics". A decade ago, they turned to mining their data to make predictions about their business, an approach first dubbed "big data" and now AI. Today a firm's data are often not just spread across many local databases, but live in different cloud services and stream in from third parties and connected devices.

It is the data warehouses and data lakes that are now making it easier to use the digital stuff. They differ in the way they structure information—the first takes a more rigid approach than the second, although the differences are getting smaller—both can now live in the cloud. This makes them not only cheaper to manage, but they can more easily be fed with data from many different sources and used by many different users. One such is made by Snowflake, another startup, which has turned its data warehouse into what it calls a "data platform" that can stretch across different computing clouds. Big cloud providers such as Amazon Web Services and Microsoft Azure offer similar products.

A second improvement is specialised databases, which take care of certain

types of data. Since data often no longer come in the form of static blocks, but rather real-time digital streams, they have to be treated differently, explains Jay Kreps, the chief executive of a startup appropriately named Confluent. It sells cloud services based on Apache Kafka, an open-source program, which analyse these streams and dump them into data lakes. Bosch, a German conglomerate, uses Confluent to gather and mine data from power tools to manage repair services and construction sites.

Yet it is a third group of software and services that turns all this into Mr Gilbert's "AI-assembly line". Some of these tools prepare data for crunching, others make it easy to design and train an AI algorithm, deploy it in an application to automate decisions and continuously improve it. Enel, a utility, has used such tools to develop a service that helps it identify the power thieves it needs to go after first. Shell, an oil company, has designed algorithms that ensure that its thousands of spare parts are always available around the world. And Kiva, a non-profit lender, has built a data warehouse with Snowflake that allows it to make better decisions about who should receive its loans.

Many other firms were not so lucky, forgetting that technology is always only part of the solution. Motivated by studies that found that AI boosts profits and, in some cases, panicked by the possibility of being disrupted by a startup, some tried to cobble together an AI-assembly line themselves, but failed. They did not have the right type of developers and data scientists—or did not want to pay their exorbitant salaries. This has created an opening for IT vendors to sell more or less pre-packaged versions of AI-assembly lines, but each coming at it from a different direction.

| *Meanwhile, at the refinery*

Take incumbents first, which are trying to build on their strengths. In the case of the granddaddy, IBM, this is services. It helps firms build what Arvind Krishna, soon its new boss, calls a "data plane", a collection of

programs to develop AI applications. It has also become a data refiner itself: for example, it collects and sells granular weather data that insurers can use to calculate rates, and utilities to predict where power cuts may occur. And it offers a range of AI services, including visual recognition and translation, that other firms can plug into their products.

Oracle, the world's leading vendor of relational databases, still the workhorses of corporate IT, aims to extend that position by providing what it calls an "autonomous database". This type of service combines and automates all sorts of digital repositories, plus bits of AI, so customers do not have to put together all these programs themselves. "It's many data engines in a single engine," explains Paul Sonderegger, the firm's senior data strategist, adding that such integration will be key to increasing a firm's "data productivity—increasing the dollar output per data input".

As for younger IT firms, they are increasingly offering to help firms to get their digital ducks lined up, too. Salesforce, which grew up as a web-based service to manage customer relations, has spent billions in the past two years to develop its own AI technology, called Einstein, and acquire two big-data companies, MuleSoft and Tableau. The idea, says Bret Taylor, Salesforce's president and chief operating officer, is to allow firms to consolidate and link their data so they can have a "single view of their customers". This makes it easier for firms to anticipate what their customers will do, personalise offers and always recognise them, whether they show up in a retail store or online.

Then there is a host of smaller firms. Databricks has put together an AI platform, complete with tools to cleanse data, build algorithms and deploy them. C3.ai offers something similar, but mainly aims to help big firms through their digital transformation. Qlik is known for analytics and data visualisation, but has recently moved into AI.

But despite such tools, many AI projects still disappoint, says Debra Logan of Gartner, a market-research firm. One big problem is data silos which reflect a firm's internal boundaries. Different departments within a company, afraid of relinquishing power, are loth to share their data or change what they collect and how (making the point that data structures are often just thinly veiled power structures). This has kept many firms from developing a coherent "data strategy" that would ensure they actually collect and analyse the information they need to achieve their business goals.

To overcome such digital divisions, some companies have made organisational changes. A growing number have appointed a "chief data officer" who can knock heads together to ensure that the IT department and business units work together, which they must to build anything resembling an AI-assembly line. Yet changes at the top, as well as in technology, are not worth much, if the rest of the company is not ready. "Poor data literacy" is the second biggest barrier to corporate data projects, preceded only by "cultural challenges to accept change", according to a recent survey by Gartner. Changing this does not mean that all employees have to become data scientists, but that they have a basic grasp of what data can be used for and what not, says Mike Potter, the chief technology officer of Qlik.

Data, he argues, are never neutral and must always be questioned: they may be collected for political reasons or in a way that hides things. "We all think that data are so objective," he says, "but they are actually as interpretable as Shakespeare." Despite all the tech, there may never be a single version of the truth. ■



商业

新AI组装线

整合数据越来越困难，但也越来越重要【专题报道《数字经济》系列之四】

极客们并不以擅长作诗闻名。但有时候，比如在尝试描述处理数据的主要困难的时候，哪怕是这些人的语言也很有一套。他们说，难点在于寻找“唯一版本的事实”。

这也很好地描述了企业信息技术（IT）自60年前出现以来的工作目标。而且这个巧妙的表述还概括了数字经济中企业的主要压力：寻找数字真相（即识别和融合准确反映现实的数据）变得愈发困难和重要。愈发困难是因为数据和数据源都在成倍增加。愈发重要则是因为公司需要把自己的数据仓库打理好才能从AI中受益，而这是保持竞争力的必需。咨询公司麦肯锡最近一项调查显示，AI可以增加收入和利润（见图表）。

所幸，技术来帮忙了。数据处理软件和云计算正在日益实现“AI组装线”（AI-assembly line）。IT行业投资者和资深观察家乔治·吉尔伯特（George Gilbert）创造的这个词暗指了100年前发生的事，当时电力取代了蒸汽，成为工厂的主要动力来源。过去，机器必须紧密围绕动力源也就是蒸汽机来布局。然后，电力可以把能源输送到任何需要的地方，让装配线变得可行。但是，现在发生的事情实际上是相反的：数字时代的机器（公司的业务应用程序和构建这些应用的软件）正在围绕着一种新的动力源（被称为“数据仓库”或“数据湖”的中央数字存储库）进行虚拟重组。假以时日，这可能会让公司得以建立完整的数字孪生体。

数字真相很难找到，因为数据有许多来源，并且格式五花八门，使得它们难以集成。哪怕是客户姓名这么简单的东西也可以用许多不同的方式定义和存储。公司可能拥有数千个软件应用，每个都有自己的数据库。成批的首席信息官因没能成功地把这些数字存储库整合或连接起来而丢了工作。

当IT的存在主要是为了跟踪公司的“交易”（例如处理订单或管理供应链）

时，集成数据已经是一个大问题。打那时起，它就只会变得越来越困难。在1990年代，公司开始使用自己的数据自我评估业绩，也就是所谓的“分析”。十年前，它们转向挖掘数据来对业务进行预测，这种方法最初被称为“大数据”，现在被称为AI。如今，公司的数据通常不仅散布在许多本地数据库中，而且还存在于不同的云服务中，并从第三方和联网设备不断流入。

正是数据仓库和数据湖让数字资源的使用变得更加容易。它们在组织信息的方式上有所不同——前者比后者更为严格，但差异越来越小。两者现在都可以存在于云中。这不仅使它们的管理成本更低，而且可以更轻松地输入来源多样、用户众多的数据。创业公司Snowflake就是如此，它把自己的数据仓库变成了可以跨越多个计算云的所谓“数据平台”。诸如亚马逊的AWS和微软的Azure之类的大型云供应商都提供类似的产品。

第二个改进是处理某些类型数据的专用数据库。创业公司Confluent（“合流”，名字取得挺恰当）的首席执行官杰伊·克雷普斯（Jay Kreps）解释说，由于数据通常不再以静态块的形式，而是以实时数字流的形式出现，它们必须被区别对待。该公司销售基于开源程序Apache Kafka的云服务，分析这些数据流并将其转存到各个数据湖中。德国企业集团博世使用Confluent的服务从电动工具中收集和挖掘数据，用以管理维修服务和建筑工地。

然而，将所有这些变成了吉尔伯特所说的“AI组装线”的是第三组软件和服务。这些工具中，有一些可以整理数据以备分析，有些可以轻松设计和训练AI算法，将其部署到应用中自动执行决策并不断改进。意大利国家电力公司（Enel）已使用此类工具开发了一项服务，帮助它确定需要追捕的头号偷电贼。壳牌石油公司设计了算法来确保其成千上万种备件在世界各地始终有货。非营利贷款公司Kiva与Snowflake合作建立了一个数据仓库，使它可以更好地决定应该放款给谁。

许多别的公司就没这么幸运了——它们忘记了技术永远只是解决方案的一部分。AI能提高利润的研究激励了它们，或者有时是因为恐惧被创业公司

颠覆，一些公司试图自己拼凑出一条AI装配线，却失败了。它们没有适合自己业务的程序员和数据科学家，或者不想支付高昂的薪水。这为IT供应商提供了销售在某种程度上预制好的AI流水线的机会，但每种流水线的着眼点都不同。

| 同时，在炼油厂

先说老企业，它们正在努力发挥自己的优势。就拿老祖宗IBM来说，这个优势就是服务。它帮助企业构建即将成为新任老板的阿文德·克里希纳（Arvind Krishna）所说的“数据平面”，即用于开发AI应用的一系列程序。它本身也成了数据炼油厂：例如，它收集和出售精细的天气数据，保险公司可拿来计算费率，公用事业公司可拿来预测可能发生停电的地点。它还提供了视觉识别和翻译等一系列AI服务，其他公司可以直接将它们插入自己的产品中。

世界领先的关系数据库供应商甲骨文仍然是企业IT的主力军，其目标是通过提供所谓的“自治数据库”来强化这一地位。这种类型的服务将各种数字存储库以及零星的AI组合起来并自动化，这样客户就用不着自己去组合所有这些程序了。“这是包含许多数据引擎的单个引擎。”该公司的高级数据策略师保罗·桑德雷格（Paul Sonderegger）解释道。他补充说，这种集成对于提高公司的“数据生产率，即增加每个数据输入的美元产出”至关重要。

至于年轻的IT公司，它们也在提供越来越多的服务，帮助企业把数字事务安排妥当。Salesforce从提供管理客户关系的网络服务起家，它在过去两年中花费了数十亿美元来开发自己的AI技术“爱因斯坦”，并收购了两家大数据公司MuleSoft和Tableau。Salesforce的总裁兼首席运营官布雷特·泰勒（Bret Taylor）表示，公司的思路是让客户能把数据整合并连接起来，以便对自己的客户“一目了然”。这让企业可以更轻松地预测客户的行为，提供个性化服务，并且无论客户出现在零售店还是网店都能识别出来。

然后还有大批较小的公司。Databricks建立了一个AI平台，搭配了用于清洗数据、构建和部署算法的工具。C3.ai提供类似的功能，但主要目标是帮

助大公司进行数字化转型。Qlik以分析和数据可视化闻名，但最近已进入AI领域。

市场调研公司高德纳的黛布拉·洛根（Debra Logan）表示，尽管有这些工具，但许多AI项目仍然令人失望。一个大问题是数据孤岛，这反映了企业的内部边界。企业中的各个部门害怕失去权力，不愿意共享数据或改变收集的内容和方式（这也说明，数据结构通常只是权力结构遮上了一层薄薄的面纱）。这使许多公司无法制定连贯的“数据战略”，以确保它们真正能收集和分析实现业务目标所需的信息。

为了克服这种数字分隔，一些企业进行了组织调整。越来越多企业任命了“首席数据官”，他们可以把人们聚在一起，确保IT部门和业务部门能够合作，而这对于建立类似于AI装配线的任何东西都是必不可少的。但是，如果公司的其他成员还没有做好准备，那么高层以及技术方面的变革就没有多大价值。根据高德纳最近的一项调查，“数据素养不佳”是公司数据项目的第二大障碍，仅次于“接受变革的文化挑战”。Qlik首席技术官迈克·波特（Mike Potter）表示，改变这一点并不意味着所有员工都必须成为数据科学家，而是要对数据可以用来干什么、不可以干什么有基本的了解。

他认为，数据永远都不是中立的，必须始终受到质疑：收集它们可能是出于政治原因，又或者收集的方式会隐瞒某些事情。“我们都认为数据是如此客观，”他说，“但实际上它们和莎士比亚一样，可以有很多种解读。”尽管有了这么多技术，但“唯一版本的事实”可能永远都不会有。■



The belt

Tighten up a notch

Chinese investment along the belt is not always smooth

IF ANYWHERE ALONG the belt and road should be benefiting from Chinese largesse, it is Pakistan. The country counts as China's only real ally, as a partner on China's vulnerable western flank and a balancer against India. China gave Pakistani scientists the know-how and materials to build a nuclear bomb. A joint-venture slogan factory had long churned out declarations of a friendship "higher than the Himalayas". So, although financing for BRI projects everywhere has slowed over the past year (see chart), Pakistan seems like a place where it should naturally have taken hold.

Yet, in Karachi's expo centre, staff from 120 Chinese firms are having little success as they stand, brochures and electronic translation devices in hand, touting everything from hoses to pumps to window frames. Alex Hou, from a firm in Zhejiang province that sells PVC film to factories, says Pakistani officials could have done a lot more to promote the event. More broadly, Pakistan is a lesson in how China can fumble the politics of its prime foreign policy.

When the initiative emerged in 2013 it needed a signature project. The answer was the China-Pakistan Economic Corridor (CPEC)—what China's prime minister, Li Keqiang, called a transformative economic programme that "could wean the populace from fundamentalism".

The timing seemed fortuitous. In 2013 a civilian government came to power with a yen for big infrastructure projects and a promise to fix Pakistan's notorious electricity blackouts. The price tag attached to CPEC grew from \$46bn to over \$60bn. Plans were drawn up for power plants, roads, railways

and the development of a port at Gwadar, a fleapit on the Arabian Sea, that would, as the Pakistani planning minister boasted, “benchmark” Singapore.

Yet as China was helping lay the ground for a boom in Pakistan, it failed to lay the political ground in the region. India in particular was touchy. (It still has not joined the BRI.) Meanwhile, all the talk of a new “corridor” brought opposition from hawks in Washington, DC. Since 2017, the administration of President Donald Trump has developed a pointed narrative: CPEC, it says, is driven above all by China’s long-term strategic objective to link its far western regions to the Arabian Sea, so as to have new energy routes and to project power into the western Indian Ocean. The scheme, the Americans say, will leave Pakistan in debt, littered with white elephants, internally divided and under Chinese sway.

The Chinese government also misread Pakistan’s internal politics, as Imran Khan and his Pakistan Tehreek-e-Insaf (PTI) swept to power having campaigned against corruption, including that in CPEC projects. Soon, the inexperienced PTI faced a full-blown balance-of-payments crisis to which the CPEC frenzy had contributed by pumping up domestic demand, pushing up the value of the currency and sucking in imports. In 2018 the bubble burst, the Pakistani rupee slid and the economy slowed sharply. Mr Khan, cap in hand, garnered help from China with conditions attached.

In truth, CPEC was always a corridor only in name, says Andrew Small of the German Marshall Fund of the United States, a Washington think-tank. Pumping oil or gas over high-altitude passes would cost too much and was never seriously considered. And Gwadar port has future strategic value to China regardless of the hinterland behind it. Rather, CPEC can better be understood as an investment package of roads, rail and power plants, some of which were useful but much of which will never come to pass.

Too much is at stake for China to abandon CPEC. But ambitions have been

pared right back. Only already agreed projects are likely to proceed, notably an \$8bn railway from Karachi to Peshawar that the government can ill afford. The all-weather friendship will carry on, but where CPEC promised to take it to new heights, it has merely defined its limitations.

| *All joined up*

South-East Asia has long been important to China's economy—not least because of its 30m “overseas Chinese”, many with capital and management nous. In electronics and other sectors, the ten-country Association of South-East Asian Nations (ASEAN) is enmeshed in China-centred supply chains. Three-fifths of China's computer imports come from the region, along with a third of its integrated circuits. In the 12 years to 2017, Chinese investment in South-East Asia grew almost 30-fold, to nearly \$40bn.

Historically China's intercourse with South-East Asia has been by sea. That, now, is changing. In recent years China's industrial centre of gravity has shifted away from the coast towards the south-west, centred around Chongqing and Kunming, capital of Yunnan province. A priority of China's belt is to improve cross-border transport. It squares with ASEAN's desire for regional integration. As elsewhere, the soft infrastructure lags the hard, particularly at borders. Hence a new body called the Chongqing Connectivity Initiative, set up with Singapore, to seek a single electronic platform for speeding up customs clearance.

Yet China's growing presence in South-East Asia comes at a price. Its grand projects, such as the high-speed railway under construction from Kunming to Singapore, and hydroelectric schemes along the Mekong river for exporting power, are of enormous importance to the leadership in Beijing. But an obsession with corridors does not always mesh with the interests of those who live along them. In tiny Laos, many villagers have been displaced by the railway and dams that bring little benefit to them.

And, though they rarely say so in public, most ASEAN states have long viewed their big northern neighbour with wary caution. By contrast, Cambodia, under its long-serving strongman, Hun Sen, opened the door to China. In return for goodies, it has proved a staunch ally, frustrating ASEAN's efforts to resist China's assertive maritime claims in the South China Sea.

The impact on Cambodia of Chinese involvement has been immense and baneful. Dam-building threatens the once-abundant fish stocks of the Tonle Sap, Cambodia's giant, seasonably expanding lake on which 1m fishermen's livelihoods depend. The haunting ruins of Angkor Wat now have the feel of a Chinese theme park. Chinese land grabs for forestry concessions are threatening biodiversity. Corruption and Chinese development in the capital, Phnom Penh, go hand in hand. Chinese plans will up Cambodia's carbon emissions by a tenth. And Cambodia's (dollar-based) economy helps to get cash out of China: of its ten airlines, most are Chinese-owned and several reckoned to be laundering fronts.

How this all plays out in Cambodia can be seen in the seaside town of Sihanoukville. It was once a sleepy, beach-flanked city beloved of holidaying Cambodian families and Western backpackers. Then the Chinese came. In 2015 Hun Sen's government designated the city as one of Cambodia's flagship BRI projects. Gambling for foreigners (though not Cambodians) was legalised in Sihanoukville, both online and in new casinos. Firms from China were welcomed. Some 80,000 Chinese—construction workers, investors, casino operators and tourists—arrived.

More buildings are in a state of hasty construction than are completed—last year a high-rise collapsed, killing 28 workers. The city's drains cannot cope. Maggie Eno, who runs the M'Lop Tapang school for street children, shows how monsoon floods turned the ground floor and

playground into seas of raw sewage. Brothels operate out of plywood shanties on construction sites. Thugs murder rivals in gangland killings, dumping victims' bodies out of cars in the middle of town. And Sihanoukville's beaches are piled high with plastic detritus from the Chinese invasion.

Perhaps the worst is over. Last year the Cambodian government, reacting to the chaos at last, banned most gambling. In one of the town's casinos recently, a Chinese construction foreman said he was having one last fling before heading home. The bubble has burst. But it will be many years before the city recovers. ■



一带

收紧一节

中国在“一带”沿线的投资并不总是顺利【专题报道《中国的“一带一路”》上篇】

如果“一带一路”沿线有任何地方会从中国的慷慨大方中获益，那就是巴基斯坦了。该国被视为中国唯一的真正的盟友、中国脆弱的西翼上的伙伴、用以平衡印度的力量。中国向巴基斯坦科学家提供了制造核弹的专门知识和材料。多年来，两国你唱我和，喊出了一个又一个赞美友谊“比喜马拉雅山还要高”的口号。因此，尽管过去一年中“一带一路”项目在各地的投资都已放缓（见图表），在巴基斯坦它似乎理应稳住。

然而，在卡拉奇的会展中心，拿着小册子和电子翻译机的120家中国企业的员工卖力地推销从软管、水泵到窗框的一切，却所获寥寥。亚历克斯·侯（音译）来自浙江一家向工厂出售PVC薄膜的公司。他说，巴基斯坦官员对这次活动宣传得太少了。而从更广泛的视角看，巴基斯坦是中国在自己的首要外交政策中对政治处理失当的一个教训。

当“一带一路”倡议于2013年提出时，它需要一个招牌项目。获选的是“中巴经济走廊”（CPEC）。中国总理李克强称其为一个“可助其民众摆脱原教旨主义”的变革性经济计划。

这个时间看起来挺走运。2013年在巴基斯坦上台的文职政府追求大型基建项目，承诺解决该国臭名昭著的大停电问题。对CPEC项目的投资从460亿美元加码至超过600亿美元。起草的规划案包括发电厂、公路、铁路，以及修建位于阿拉伯海边破落的瓜达尔港（Gwadar）。巴基斯坦规划部长夸口说这个港口将可以媲美新加坡。

然而，在帮助铺设巴基斯坦的繁荣之路时，中国没能在整个西翼地区奠定政治基础。印度尤为棘手。（它还没有加入“一带一路”计划。）与此同时，有关新“走廊”的种种议论招致了华盛顿鹰派的反对。自2017年起，特朗普政府发展出了一套尖锐的叙事。它说，CPEC首先是受到中国长期战

略目标的驱动，是为了将其偏远西部地区与阿拉伯海相连接，从而拥有新的能源路线并将势力投射到西印度洋。美国人说，该计划将使巴基斯坦债务累累，充斥华而不实的工程，内部分裂并被中国操控。

中国政府也误读了巴基斯坦的国内政治。伊姆兰·汗和他的巴基斯坦正义运动党（PTI）在竞选中打出反腐的旗号后大胜上台，其打击目标也包括CPEC项目中的腐败。经验不足的PTI很快就面临全面的国际收支平衡危机，而“CPEC热”是促成危机的因素之一——它拉动了内需，推高了币值，刺激了进口。2018年，泡沫破裂，巴基斯坦卢比贬值，经济急剧放缓。伊姆兰·汗又毕恭毕敬地向中国求援，拿到了附带条件的借款。

华盛顿智囊团德国马歇尔基金会的安德鲁·斯莫尔（Andrew Small）说，实际上CPEC从来都只是一条名义上的走廊。从高海拔通道输送油气的成本太高，从来没被认真考虑过。而瓜达尔港对中国具有潜在的战略价值，无论其背后的腹地如何。将CPEC视为公路、铁路和发电机的投资组合可能更易于理解，其中有些项目有用，而大部分永远不会实现。

对中国而言，放弃CPEC的风险太大。但雄心已经收敛。只有那些双方已经商定的项目可能向前推进——主要是巴国政府无力负担的一条从卡拉奇到白沙瓦的价值80亿美元的铁路。“全天候友谊”仍将继续。但是，尽管CPEC承诺将这友谊推至新的高度，其结果却只是界定了它的局限性。

| 联合起来

长期以来，东南亚对中国的经济都很重要，尤其是因为这里有三千万“海外华人”，其中许多人拥有资本和管理才能。在电子元件等领域，十国组成的东盟（ASEAN）交织成一个以中国为中心的供应链网络。中国计算机进口的五分之三以及集成电路进口的三分之一来自该地区。截至2017年的12年里，中国在东南亚的投资增长了近30倍，达到近400亿美元。

中国与东南亚过去一直靠海路往来。如今这正在改变。近年中国的工业重心已从沿海转移到了以重庆和昆明为中心的西南地区。“一带一路”的一个首要任务是改善跨境运输。这与东盟对区域一体化的愿望吻合。和其他地

方一样，这里的软件基础设施落后于硬件，尤其在边界地区。为此，重庆和新加坡联合成立了名为“重庆互联互通倡议”的新部门，打造单一电子平台来加快通关速度。

但是，中国在东南亚地区与日俱增的影响力有其代价。它那些宏大工程，比如昆明到新加坡的在建高铁和湄公河沿岸的水电输电计划，对于中央领导层来说至关重要。但对这些走廊的迷恋并不总与走廊沿线居民的利益一致。在小国家老挝，许多村民因为兴建铁路和水坝而流离失所，这些项目并没有给他们带来什么好处。

而且，大多数东盟国家对这个北边的大户邻居心存警惕，尽管它们极少公开表达这一点。倒是长期在铁腕强人洪森领导下的柬埔寨向中国敞开了大门。拿着这带来的好处，柬埔寨证明了自己是一个坚定的盟友。它挫败了东盟试图抵抗中国在南中国海宣示主权的努力。

中国走进柬埔寨给这个国家带来了巨大而负面的冲击。修建水坝威胁着柬埔寨庞大的洞里萨湖（Tonle Sap）曾经丰富的鱼类资源，一百万渔民的生计依赖这个季节性扩张的湖泊。吴哥窟那摄人心魄的废墟现在仿佛是某个中国主题公园。中国取得的林业土地特许权正在威胁当地的生物多样性。中国在首都金边的发展项目与腐败齐头并进。中国的规划将把柬埔寨的碳排放量推高十分之一。而柬埔寨（基于美元的）经济辅助了中国的资本外逃：这里的十家航空公司大多数都为中国人所有，有几家被认为就是用来洗钱的。

在位于海边的西哈努克城可以一睹这一切给柬埔寨带来的后果。这里曾是一个宁静的海滨城市，深受柬埔寨家庭和西方背包客喜爱。然后中国人来了。2015年，洪森政府将这座城市指定为柬埔寨的“一带一路”旗舰项目之一。该市将外国人（尽管对柬埔寨人不是）在网上或新建赌场内赌博合法化。它欢迎来自中国的企业。约八万中国人——建筑工人、投资者、赌场经营者及游客——一拥而入。

仓促在建的楼房比已建成的更多。去年一栋高楼倒塌，导致28名工人死

亡。该市的排污系统无法应付。为流浪儿童开设的学校“达邦树荫”（M’Lop Tapang）的主管玛姬·埃诺（Maggie Eno）展示了雨季洪灾如何把底楼和操场变成了污水的汪洋。建筑工地上的胶合板棚屋里开着妓院。黑社会火拼中的暴徒杀死对家，就在市中心把尸体抛出车外。海滩上堆满了这场中国入侵留下的塑料垃圾。

也许最糟糕的时刻已经过去。去年，柬埔寨政府终于对这种混乱做出应对，禁止了大多数赌博活动。最近，在该市的一间赌场里，一名中国建筑工头说，最后再玩一把，他就回国了。泡沫已经破灭。但这座城市要复原还需要很多年。■



The data economy

Mirror worlds

A deluge of data is giving rise to a new economy. Ludwig Siegele asks how it will work

AN ARMY OF doppelgangers is invading the world. Digital copies of aircraft engines, wind turbines and other heavy equipment came first. Now the electronic ghosts of smaller and larger things are joining them in the virtual realm, from toothbrushes and traffic lights to entire shops and factories. Even humans have begun developing these alter egos. In America the National Football League is planning to design an electronic avatar for every player.

These “digital twins”, as geeks term them, are far more than replicas of the original. Think of them more as shadows that are, thanks to a multitude of sensors and wireless connectivity, intimately linked to their physical selves, and every day producing oceans of data. If something happens in the real world, it is rapidly reflected in this shadow realm. Some digital twins already come with the laws of nature programmed in. They double as a database of everything that has ever happened to the original. This makes it possible to look into their future. Sports coaches, for instance, will be able to run simulations, predict when an athlete might get injured and adjust training routines to avoid problems.

Digital twins are just one part of a vast shift in the world’s economy. They populate what David Gelernter of Yale University long ago forecast as “mirror worlds”: a new dimension of human life based on and fuelled by data. Year by year, ever more parts of the physical realm are coming to be represented and simulated in the virtual world—an inversion of Plato’s theory that real-world objects are just imperfect copies of their true being in the spiritual realm. The emergence of these mirror worlds will bring about a distinct economy. This development will require new markets,

institutions, infrastructure, businesses and even geopolitical arrangements. It is the promises and pitfalls of the new “data economy” which will be the focus of this special report.

Mirror worlds are not mere mathematical representations of real ones. They also give new meaning to the adage that knowledge is power. Increasingly, digital copies are taking on lives of their own and acting on the physical world. They can be used to optimise everything, from the acoustics of a headset to an entire national railway network. They will enable all sorts of artificial-intelligence (AI) algorithms to recognise objects and faces, understand speech and even distinguish smells. And they make possible new business models: why buy heavy equipment if its wear and tear can be measured in detail and it can thus be rented by the minute?

A good place to start analysing any economy is by measuring it. A robust methodology has yet to be developed, but the data economy is already large. Statistics Canada, a government agency, last year tried to estimate the value of the country’s data (its stock plus related software and intellectual property in the field). The result was between C\$157bn and C\$218bn (\$118bn and \$164bn). If that number is close—a big “if”—the value of all the data in America, whose GDP is 12 times that of Canada, could amount to \$1.4trn-2trn, which would be nearly 5% of America’s stock of private physical capital.

If the amount of data generated around the world is any guide, this new economy is growing fast. The first human genome (three gigabytes of data, which nearly fills a DVD) was sequenced 17 years ago; in April, 23andMe, a firm which offers genetic testing, claimed more than 10m customers. The latest autonomous vehicles produce up to 30 terabytes for every eight hours of driving (or some 6,400 DVDs). IDC, a market-research firm, estimates the world will generate about 90 zettabytes (19trn DVDs) this year and next (see chart), more than all data produced since the advent of computers.

Yet even more striking than the rapid growth of the data economy are the tensions and trade-offs it produces. Take its economics. In some ways, data are a natural resource, much like oil, which can be owned and traded (this newspaper called data the “world’s most valuable resource” in 2017). But data also have characteristics of a public good, which ought to be used as widely as possible to maximise wealth creation. New institutions must be created to reflect this tension, as was the case for intellectual property.

The infrastructure of the data economy, too, is torn between two poles. Currently, it mainly consists of huge data centres packed with servers where data are stored and crunched. Yet such centralisation has drawbacks, not least because it consumes huge amounts of energy and creates privacy risks. A decentralising counter-movement is already under way: more data are processed at the “edge”, closer to where they are collected.

Businesses are also facing a digital reversal. Many firms want to use data to infuse their corporate applications with AI. They have built central repositories such as “data lakes”, which hold all kinds of digital information. Such systems are of limited use, however, if a firm and its employees lack the required skills, refuse to believe the data or even to share them internally.

Finally, the geopolitics of data will not be simple, either. Online giants in particular have assumed that the data economy will be a global affair, with the digital stuff flowing to where processing is best done for technical and cost reasons. Yet governments are increasingly asserting their “digital sovereignty”, demanding that data not leave their country of origin.

This special report will tackle these topics in turn. It will conclude by discussing what is perhaps the biggest conundrum of the mirror world: the risk is that the wealth it creates will be even more unequally distributed than in its terrestrial twin. ■



数字经济

镜像世界

数据的洪流正在催生一种新经济。记者路德维格·西格勒探究它将如何运作【专题报道《数字经济》系列之一】

一个魂灵大军正在入侵世界。率先抵达的是飞机引擎、风力涡轮机和其他重型设备的数字副本。现在，比它们更小或更大的物品的电子幽灵也加入了“虚拟界”，从牙刷、交通信号灯，到整间商店和工厂。连人类也已开始发展“另一个自我”。在美国，国家橄榄球联盟（NFL）正计划为每个球员设计电子化身。

这些极客口中的“数字孪生体”远不只是其原型的复制品。它们更像影子，依赖众多传感器和无线连接，紧紧跟随实体自我，每天生成海量数据。如果现实世界中发生了某些事，也会迅速地反映在这个影子王国中。一些数字孪生体的内部已经设定了自然法则。它们同时也是记载原型身上所发生一切的数据库。由此就可以窥探它们的未来。例如，体育教练将能够运行模拟实验，预测队员何时可能受伤，并调整训练安排以避免出现问题。

数字孪生体只是世界经济发生巨变的一部分。它们填充了耶鲁大学的大卫·盖伦特（David Gelernter）在很久以前就预言的“镜像世界”：一个基于数据、受数据驱动的人类生活的新维度。时间一年年过去，实体世界中越来越多的部分正在虚拟界中被展现和模拟，这颠倒了柏拉图的理念——柏拉图认为现实世界不过是真实的精神领域的不完美投影。镜像世界的崛起将带来一种独特的经济。其发展将需要新的市场、机构、基础设施、企业，乃至地缘政治布局。这种新“数字经济”的希望和陷阱将是本专题关注的重点。

镜像世界不止是现实世界的数学呈现。它们也赋予了“知识就是力量”这句谚语新的含义。数字副本正在日益壮大自己的生命，并作用于现实世界。它们可被用于优化各种事物——从耳机的音效到整个国家的铁路网。它们将使得各种人工智能（AI）算法能够识别物体和人脸，理解语音，甚至区

分气味。它们也催生了新的商业模式：如果可以细致地测量重型设备损耗的程度，并可以据此按分钟数租用，那又何须购买呢？

要分析任何一种经济类型，一个好的起点是测量它。目前尚未开发出可靠的研究方法，但数据经济的规模已然很庞大。政府机构加拿大统计局去年尝试估算该国拥有数据（数据总量加上相关的软件以及该领域内的知识产权）的价值。结论是介于1570亿加元至2180亿加元之间（1180亿美元至1640亿美元）。如果这个数字接近真实状况（这一点很不确定），那么在GDP是加拿大12倍的美国，所有数据的价值可能达到1.4万亿至2万亿美元，是美国私人有形资本存量的近5%。

如果说全世界生成的数据量给出了任何指引，那就是这种新经济正在快速发展。第一个人类基因组（3GB数据，几乎填满一张DVD）在17年前完成测序。去年4月，提供基因检测的23andMe公司声称顾客超过1000万人。最新的无人驾驶汽车每行驶八小时生成多达30TB的数据（或约6400张DVD）。市场调研公司IDC估计今明两年全球共将生成约90ZB数据（19万张DVD）（见图表），超过自计算机问世以来生成的数据总量。

然而，与数据经济的快速增长相比，更引人注目的是它制造的矛盾局面和权衡取舍。比如它的经济形态。从某些方面来说，数据是一种自然资源，和可以被拥有和交易的石油很像（本刊在2017年曾称数据是“世界上最具价值的资源”）。但数据也具有公共物品的特征，应尽可能广泛地利用它们，以最大程度地创造财富。与知识产权的情况一样，必须建立新机构来反映这种矛盾。

数字经济的基础设施同样分裂为两个极端。当前，它主要由大型数据中心组成，这些数据中心里装满了存储和处理数据的服务器。但这种集中化有其弊端，主要是因为大量消耗能源并造成隐私风险。一种去中央化的反向设计已经在铺开，更多数据在较接近收集它们的位置的“边缘”地带被处理。

企业也面临着数字挫折。许多公司希望利用数据来给自己的企业应用注入

AI。它们建立了中央存储库，比如“数据湖”，其中存储了各种各样的数字信息。但是，如果公司及其员工缺乏所需的技能，拒绝相信数据，甚至拒绝在内部共享它们，那么这种系统用处有限。

最后，数据的地缘政治也不会是桩简单事。网络巨头们尤其已经假定数字经济将是一个全球事务，而数字材料纷纷流向那些出于技术和成本考量最适合处理它们的地方。然而各国政府日益主张“数字主权”，要求数据不离开其“原籍国”。

本专题报告将逐一探讨这些问题。它还会在末尾讨论或许是镜像世界最大的谜题：相比在它的现实孪生体中，它所创造的财富的分配将更不平等。





South-East Asia's special economic zones

Viva Laos Vegas

An influx of investment and workers is creating Chinese enclaves

IN A REMOTE part of northern Laos, the bamboo forest gives way to cranes. A city is being carved out of jungle: tower blocks cloaked in scaffolding loom over restaurants, karaoke bars and massage parlours. The beating heart of Golden Triangle Special Economic Zone (so called because it sits at the point where Laos, Myanmar and Thailand converge) is the casino, a palatial confection featuring faux-Roman statuary and ceilings covered in frescoes. “Laos Vegas” does not cater to Laotians, however. Croupiers accept only Chinese yuan or Thai baht. Street signs are in Chinese and English. The city’s clocks are set to Chinese time, an hour ahead of the rest of Laos.

Over the past decade, China has become one of the biggest investors in South-East Asian countries: in 2018 it was the source of nearly 80% of foreign direct investment in Laos. Some of this capital is flowing along well-worn routes to places like Mandalay, a city in Myanmar where there is a long-established Chinese community. But much of it is flooding into “special economic zones” (SEZs) to take advantage of assorted incentives such as faster permitting, reduced tax or duties and looser controls on the movements of goods and capital.

Chinese businesses don’t need much convincing. The Chinese government began encouraging them to invest abroad in the 2000s. The Belt and Road Initiative, China’s giant scheme to develop infrastructure abroad, has accelerated the trend. In addition to railways, highways and pipelines, it promotes SEZs, which “are now a preferred mode of economic expansion for China”, says Brian Eyster of the Stimson Centre, an American think-tank. Under the banner of belt and road, 160 Chinese companies have poured more than \$1.5bn into SEZs in Laos, according to Land Watch Thai, a

watchdog. Between 2016 and 2018 China invested \$1bn in one SEZ alone: Sihanoukville, a city on Cambodia's coast.

Where Chinese capital goes, labour follows. In Mandalay the Chinese have swelled from 1% of the population in 1983 to 30%-50% today. In places with SEZs the shift has been even sharper. In 2019 the governor of the surrounding province told the *Straits Times* newspaper that the number of Chinese in Sihanoukville had soared over the previous two years to almost a third of the population. The economic clout of Chinese migrants grows with their numbers. In Mandalay 80% of hotels, more than 70% of restaurants and 45% of jewellery shops are owned and operated by ethnic Chinese, according to market research conducted in 2017.

The influx of migrants has fuelled anti-Chinese sentiment across the region. But poor South-East Asian governments court Chinese investors anyway because they hope Chinese money will kick-start their economies. In some respects the investment has borne fruit. In Laos foreign investment has contributed to effervescent GDP growth, which averaged 7.7% a year over the past decade.

But in a study of SEZs in 2017 Focus on the Global South, a think-tank headquartered in Bangkok, concluded that the "legislative and governance structures" underpinning SEZs in Cambodia and Myanmar "have been skewed toward the interests of investors and against those of locals and the environment". Alfredo Perdiguero of the Asian Development Bank agrees that SEZs in Laos, Cambodia and Myanmar "have not yet been able to spread the benefits" to the broader economy.

In part this is because Chinese companies tend not to hire locals. By 2018 Laotian workers had secured just 34% of the jobs created by all 11 SEZs in Laos—a far cry from the 90% the government had promised. Chinese firms argue that local workers lack skills, but civil society groups in Myanmar

respond by pointing to a technical college near Kyaukpyu, a Chinese-inspired SEZ and port; nobody from the college has been hired to work there, according to a report published last year.

There is little local sourcing of other inputs, either. The garment factories of Sihanoukville SEZ, for instance, import their cloth, buttons and thread. The Chinese workers and visitors in South-East Asia's SEZs often patronise Chinese-owned shops and restaurants, and circumvent sales taxes by paying for goods and services via Chinese apps like Alipay. "The money doesn't even leave China essentially," says Sebastian Strangio, author of a forthcoming book on China's growing influence in South-East Asia. That, along with the tax breaks, mean there is little benefit for host governments: in 2017 the Laotian exchequer raised just \$20m from its SEZs—less than 1% of its revenue.

| *Extraterritorial and unreasonable*

As is common with big developments in the poorer countries of South-East Asia, locals are seldom consulted about the construction of SEZs. Golden Triangle SEZ was built over the rice paddies of Ban Kwan village; over 100 households were forced to relocate against their will. And then there is the question of law enforcement within the SEZs, whose light regulation can be as attractive to criminals as to legitimate businesses. In 2018 American authorities declared that the Golden Triangle SEZ was a hotbed of "drug trafficking, human trafficking, money laundering, bribery and wildlife trafficking". They called the company that operates the SEZ a "transnational criminal organisation" and placed sanctions on its chairman, Zhao Wei. He denied the accusations, calling the move "unilateral, extraterritorial, unreasonable and hegemonic". Many South-East Asians might say something similar about the way the region's SEZs are run. ■



东南亚的经济特区

老挝维加斯万岁

大量涌入的投资和工人正在创造中国“飞地”

在老挝北部的一个偏远地区，竹林给起重机让了路。一座城市从丛林中拔地而起：脚手架包裹着的高楼大厦俯瞰着餐馆、卡拉OK厅和按摩院。金三角经济特区（因位于老挝、缅甸和泰国的交汇处而得名）的心脏是一家赌场，这是一座富丽堂皇的精美建筑，里头有仿罗马式雕塑和绘着壁画的天花板。然而，“老挝维加斯”的目标客户并不是老挝人。赌场荷官只接受人民币或泰铢。街道上的标志牌是中英文两种文字。这座城市的时钟被设置成中国时间，比老挝其他地方早一个小时。

过去十年来，中国已成为东南亚国家最大的投资者之一：2018年，中国投资占老挝外国直接投资的近80%。中国投资的一部分正沿着传统路线流向曼德勒（Mandalay）等地，这座缅甸城市有历史悠久的华人社区。但大部分资金正涌入“经济特区”，以利用各种激励措施，如审批更快、税收或关税减免、对商品和资本流动管制的放松。

不需要花多大的力气去说服中国企业。中国政府从本世纪头几年开始鼓励企业展开海外投资。中国发展海外基础设施的宏大计划“一带一路”倡议加速了这一趋势。美国智库史汀生中心（Stimson Centre）的布莱恩·艾勒（Brian Eyer）表示，除铁路、公路和管道外，该倡议也推动经济特区这种“如今中国经济扩张的首选模式”。监管机构“泰国土地观察”（Land Watch Thai）的数据显示，在“一带一路”的旗帜下，已有160家中国企业向老挝经济特区投资了逾15亿美元。2016年至2018年间，中国仅在柬埔寨沿海城市西哈努克城（Sihanoukville）这一个经济特区就投资了10亿美元。

中国的资本流向哪里，劳动力就流向哪里。在曼德勒，华人占总人口的比例从1983年的1%增至今天的30%到50%。在建立了经济特区的地方，这种转变更加急剧。2019年，西哈努克城所在省份的官员告诉《海峡时报》（Straits Times），之前两年该市华人激增至占总人口的近三分之

一。中国移民的经济影响力也随着人数的增长而扩大。2017年的市场调查显示，曼德勒80%的酒店、超过70%的餐厅和45%的珠宝店都由华裔拥有和经营。

移民的涌入加剧了整个地区的反华情绪。但无论如何，贫穷的东南亚国家的政府还是会向中国投资者示好，因为他们希望中国的资金能够刺激本国经济。在某些方面，这些投资确已取得了成果。在老挝，外国投资促进了GDP快速增长，过去十年的年均增速达7.7%。

但总部设在曼谷的智库“聚焦全球南方”（Focus on the Global South）2017年对经济特区的一项研究认为，柬埔寨和缅甸经济特区的“立法和治理结构”基础已“偏向于投资者的利益，不利于当地人及当地环境的利益”。亚洲开发银行的阿尔弗雷多·佩尔狄克罗（Alfredo Perdiguero）也认为，老挝、柬埔寨和缅甸的经济特区“尚未能够将好处惠及”更广泛的经济领域。

这一定程度上是因为中国企业往往不聘用当地人。到2018年，老挝工人仅获得了该国全部11个经济特区所创造岗位的34%——与政府承诺的90%相去甚远。中国企业辩称当地工人缺乏技能，但缅甸的民间社会团体指出，根据去年发布的一份报告，在由中国推动的经济特区和港口皎漂（Kyaukpyu），附近一所技术学院的学生无一被聘用到这里工作。

从本地采购的其他生产资料也很少。例如在西哈努克城经济特区的服装厂，布料、纽扣和线都是进口的。东南亚经济特区的中国工人和游客往往光顾中国人开的商店和餐馆，并通过支付宝等中国应用购买商品和服务以规避销售税。塞巴斯蒂安·史坦吉欧（Sebastian Strangio）表示“实际上钱甚至没离开中国”，他即将出版的一本书探讨中国在东南亚日益增长的影响力。再加上税收减免，这意味着东道国政府几乎没获得什么好处。2017年，老挝财政部门仅从其经济特区获得了2000万美元，还不到其财政收入的1%。

| 域外的，不合理的

正如在东南亚较贫穷国家的重大开发项目中常见的那样，在经济特区的建

设上当地民众很少被征询意见。金三角经济特区就建在了班关村（Ban Kwan village）的稻田上，100多户被迫搬迁。此外还有经济特区内的执法问题，这里宽松的监管既可能吸引守法企业，也可能吸引犯罪分子。2018年，美国当局宣称金三角经济特区是滋生“贩毒、贩卖人口、洗钱、贿赂和贩卖野生动物”的温床。他们称经营该特区的公司为“跨国犯罪组织”，并对其董事长赵伟实行制裁。赵伟否认了这些指控，并称美国此举是“单边的、域外的、不合理的和霸权主义的”。对当地经济特区的运作方式，许多东南亚人可能会表达类似的看法。 ■



Policy

And the winner is...

Data will make the world more productive. But who will benefit?

THE DATA economy is a work in progress. Its economics still have to be worked out; its infrastructure and its businesses need to be fully built; geopolitical arrangements must be found. But there is one final major tension: between the wealth the data economy will create and how it will be distributed. The data economy—or the “second economy”, as Brian Arthur of the Santa Fe Institute terms it—will make the world a more productive place no matter what, he predicts. But who gets what and how is less clear. “We will move from an economy where the main challenge is to produce more and more efficiently,” says Mr Arthur, “to one where distribution of the wealth produced becomes the biggest issue.”

The data economy as it exists today is already very unequal. It is dominated by a few big platforms. In the most recent quarter, Amazon, Apple, Alphabet, Microsoft and Facebook made a combined profit of \$55bn, more than the next five most valuable American tech firms over the past 12 months. This corporate inequality is largely the result of network effects—economic forces that mean size begets size. A firm that can collect a lot of data, for instance, can make better use of artificial intelligence and attract more users, who in turn supply more data. Such firms can also recruit the best data scientists and have the cash to buy the best AI startups.

It is also becoming clear that, as the data economy expands, these sorts of dynamics will increasingly apply to non-tech companies and even countries. In many sectors, the race to become a dominant data platform is on. This is the mission of Compass, a startup, in residential property. It is one goal of Tesla in self-driving cars. And Apple and Google hope to repeat the trick in health care. As for countries, America and China account for

90% of the market capitalisation of the world's 70 largest platforms (see chart), Africa and Latin America for just 1%. Economies on both continents risk “becoming mere providers of raw data...while having to pay for the digital intelligence produced,” the United Nations Conference on Trade and Development recently warned.

Yet it is the skewed distribution of income between capital and labour that may turn out to be the most pressing problem of the data economy. As it grows, more labour will migrate into the mirror worlds, just as other economic activity will. It is not only that people will do more digitally, but they will perform actual “data work”: generating the digital information needed to train and improve AI services. This can mean simply moving about online and providing feedback, as most people already do. But it will increasingly include more active tasks, such as labelling pictures, driving data-gathering vehicles and perhaps, one day, putting one's digital twin through its paces. This is the reason why some say AI should actually be called “collective intelligence”: it takes in a lot of human input—something big tech firms hate to admit.

If history is any guide, the risk is not so much that humans will automate themselves away. Previous technological disruptions have at times even increased labour's share of income, as new types of jobs emerged. The question is rather how much such data workers will be paid. As things stand, their work may become systematically undervalued, reckons Glen Weyl of Microsoft. One reason is the structure of online markets: big platforms are not just monopolies, but monopsonies, meaning that they have the power to hold down wages for data labour. Tellingly, none has ever really considered paying users for the data they generate. The economics of data, too, put pressure on the price of data labour: why, for instance, should a firm pay a high price for an individual's data if it can infer them cheaply from another person's information?

A data economy in which those who produce a large part of the main input are perennially underpaid is unlikely to be a healthy economy. Those with the greatest expertise, such as radiologists who can check the accuracy of an algorithm that recognises medical images, might hold back their knowledge and refuse to participate. Data workers with low pay and no say in the use of the information they generate will increasingly feel alienated, which could lower the quality of their work. And solving the problem through redistribution—as Gavin Newsom, California’s Democratic governor, wants to do with a “digital dividend” to be levied from tech giants and disbursed to the state’s citizens—would be a burden on the data economy and lead to trade conflicts. Such subsidies would be vulnerable to cuts as the political winds change.

All these complications explain why another proposed remedy keeps popping up: creating property rights on personal data to increase people’s bargaining power. Yet this in itself would not help much. If most people understandably ignore the complex privacy policies that come with online services, how can they be expected to shop around for the best price for their data? And property rights could actually make things worse. Since most personal data are fundamentally a social construct to which more than one person has the right, individuals could engage in a race to the bottom. Each member of a family, say, could sell their genetic information and by doing so reveal much of their relatives’ DNA.

Instead of giving citizens individual control over their data, they should hold it collectively, argues Mr Weyl. He and an activist organisation he helped found, RadicalxChange, want everyone to join what they call “data co-operatives”. These would act much like trade unions in the conventional economy. They would, among other things, negotiate rates for data work, ensure the quality of members’ digital output, bill data firms that benefit from this output, and distribute the proceeds.

Like data trusts, robust data co-operatives will not emerge overnight. They need support from all involved. There are early signs that this may be forthcoming. Some Western countries may soon discuss a “Data Freedom Act”, based on a draft by RadicalxChange, which would create a new regulated entity for that purpose. In a first for a tech-giant boss, Satya Nadella, the chief executive of Microsoft, at the World Economic Forum in Davos in January called on the industry to show more respect for “data dignity”—meaning to give people more control over their data and a bigger share of the value these data create. The public, for its part, is getting ever more concerned about what happens with its data. Roughly eight in ten Americans, for instance, now think they have very little or no control over the data which companies collect about them.

Expect debates about such ideas as data co-operatives to become more heated as the data economy grows. Encouragingly, as Mr Arthur points out, humanity has overcome a similar conundrum before. In the 1850s, the Industrial Revolution brought big increases in production, along with Dickensian social conditions. It took 100 years for societies to adapt; some never did. In the data economy, too, it will take a long time to build the appropriate mechanisms and institutions. No one yet worries that revolutions and wars will be fought over data, but there is no guarantee. ■



政策

获奖者是.....

数据将使世界变得更富生产力。但谁会受益呢？【专题报道《数字经济》之六】

数字经济还在发展中。它的经济形态尚未确定：其基础设施和业务需要全面建成，也必须找到自己的地缘政治布局。但还有最后一个重要矛盾：数字经济将会创造的财富与如何分配这种财富之间的拉锯。圣菲研究所（Santa Fe Institute）的布赖恩·阿瑟（Brian Arthur）预测，数字经济——他称之为“第二经济”——无论如何都会让世界变得更富生产力。但谁得到什么、怎么得到还不清楚。“我们将从主要挑战在于提高产量和生产效率的经济，转向另一种财富分配成了最大问题的经济。”他说。

现有的数字经济已经非常不平等。它由一些大型平台主导。最近一个季度，亚马逊、苹果、Alphabet、微软和Facebook的合并利润达550亿美元，超过市值紧随其后的五家美国高科技公司过去12个月的利润总和。这种“企业不平等”主要缘于网络效应——这种经济力量意味着规模会带来更大的规模。例如，一家可以收集大量数据的公司可以更好地利用人工智能并吸引到更多用户，这些用户继而又给它提供更多数据。这样的公司还可能招募到最杰出的数据科学家，也有现金买下最出色的AI创业公司。

同样日渐清晰的是，随着数据经济的扩展，这样的动态效应将越来越多地发生在非科技公司甚至国家身上。在许多领域，成为主导数据平台的竞争已经上演。它是创业公司Compass在住宅地产业务上的使命，是特斯拉在无人驾驶汽车项目中的目标之一。苹果和谷歌则希望在医疗领域复制魔法。至于国家，美国和中国占了全球70个最大平台市值的90%（见图），非洲和拉丁美洲仅占1%。联合国贸发会议最近警告说，后面这两个洲的经济体有可能“沦为单纯原始数据的提供者.....而不得不为生成的数字情报付费”。

然而，收入在资本与劳动力之间的不平等分配可能会成为数字经济最紧迫的问题。随着数据经济的增长，更多劳动力将迁移到镜像世界中，就像其

他经济活动一样。人们不仅会以数字化的方式做更多事，而且还会执行实际的“数据工作”——生成训练和改善AI服务所需的数字信息。为此他们可能只需要在网上到处晃悠并给出反馈，就像很多人已经在做的那样。但它将越来越多地包含更主动的任务，例如给图片加标签、驾驶收集数据的车辆，也许某天还会测测自己的数字孪生体的技能。这就是为什么有些人说AI实际上应被称为“集体智能”：它需要大量人工投入——这是大型科技公司很不想要承认的。

如果历史能够提供任何借鉴的话，那么风险主要并不在于人类会因为追求自动化而把自己淘汰掉。以往发生的技术颠覆有时甚至增加了劳动力在收入中所得份额，因为新的工种出现了。问题更多在于这些数据劳动者会被支付多少费用。微软的格伦·韦尔（Glen Weyl）认为，照目前的样子看，他们的劳动价值可能会被系统性地低估。原因之一是线上市场的结构：大平台不仅是垄断者，还是买方垄断者，也就是说它们有能力压低数据工人的工资。很能说明问题的是，还没有哪个平台真正考虑过为用户生成的数据向他们付费。数据的经济运作也给数据劳动力的价格带来了压力。例如，如果一家公司可以花很少的钱从一个人的信息中推断出另一个人的信息，那么它为什么还要出高价买第二个人的数据呢？

如果那些生产了数字经济的主要输入的一大部分的人常年拿低薪，这种经济就不大可能是健康的。那些最具专业知识的人，比如放射科专家（他们能检查某个识别医学影像的算法的准确性），可能会对自己的知识有所保留，拒绝参与其中。低薪而又不能决定自己生成的信息如何使用的数据工人会日益感到疏离，而这可能会降低他们的工作质量。而通过再分配来解决这一问题（例如加州民主党州长加文·纽森[Gavin Newsom]想向科技巨头征收“数字红利”并支付给该州民众）会给数字经济带来负担，并导致贸易冲突。随着政治风向的改变，这类补贴很容易被削减。

所有这些复杂情形说明了为何另一种修正方案会被反复提出：为个人数据创建产权，以提高人们的议价能力。然而，这本身并没有太大的帮助。如果大多数人都合情合理地忽略了网上服务随附的复杂隐私政策，又如何能期望他们会货比三家来给自己的数据卖个最好的价钱呢？产权实际上还会

让事情变得更糟。由于大多数个人数据从根本上来说是一种社会建构，不止一人对此拥有权利，因此个体可能会投入到一种“逐底竞争”中去。举例来说，一个家庭的每个成员都可以出售自己的遗传信息，而这么做透露了亲属的许多DNA信息。

韦尔认为，与其给予公民对其数据的个人控制权，他们应该集体拥有数据。他和他帮助创建的活动家组织RadicalxChange希望每个人都加入他们口中的“数据合作社”。它们会很像常规经济中的工会那样运作。它们会谈判数据工作的报酬，确保会员数据输出的质量，向那些从这一输出中受益的数据公司收费，并分配收益。

和数据信托一样，强大的数据合作社不会在一夜之间兴起。它们需要参与其中的所有各方的支持。有早期迹象表明这可能即将发生。某些西方国家可能很快就会讨论基于RadicalxChange的一份草案的《数据自由法案》（Data Freedom Act），将为此创建一个新的受监管实体。微软首席执行官萨蒂亚·纳德拉（Satya Nadella）1月在达沃斯举行的世界经济论坛上成为了第一个行业更尊重“数据尊严”的科技巨头老板。“数据尊严”意味着让人们对自己的数据有更多控制权，并分得这些数据所创造价值的更大份额。而公众整体已经越来越关心自己的数据发生了什么。例如，大约八成美国人现在认为，他们对公司收集的有关自己的数据几乎或完全没有控制权。

可以想见，随着数据经济的发展，关于诸如数据合作社之类的方案的辩论会更加激烈。令人鼓舞的是，正如阿瑟指出的那样，人类曾经克服过类似的难题。在1850年代，工业革命大幅提高了产量，同时也带来了狄更斯笔下的那种社会状况。人类社会花了一百年来调整，而有些社会从未适应。在数据经济中，建立适当的机制和机构同样会花费很长的时间。还没有人担心人类会为了数据发生革命和战争，但这一点也说不准呢。■



Geopolitics

Virtual nationalism

How governments are erecting borders in the mirror world

SOMEWHERE DEEP in the bowels of Microsoft's campus in Redmond near Seattle, a jumble of more than 100 buildings, there is a special kind of room. The size of a school gym, its walls are covered with big screens. One shows the "health" of the firm's cloud-computing services, collectively called Azure. Another displays people's "sentiment" about the system, as expressed on social media. A third one, a large map of the world, tells visitors how many "denial-of-service" (DOS) attacks, which amount to flooding a customer's online presence with bits to shut it down, are currently being dealt with. The counters on this Thursday morning in early December show 80 in Asia, 171 in Europe and 425 in the Americas.

It would be fair to assume that the room is a NOC, a "network operations centre", to manage Azure. But nothing gets controlled here; that happens elsewhere. Instead, the room, called the Cloud Collaboration Centre (CCC), serves two other purposes. One is, in the words of Anja Ziegler, who manages the location, to "put a face on the cloud"—giving customers an idea what Azure and the mirror worlds it powers are about. But more important, the room serves as a place for Microsoft employees to discuss how to reshape the cloud in response to legal changes in the data economy.

One of the first projects to be tackled in the CCC was how to make Azure compatible with the General Data Protection Regulation (GDPR), the EU's tough privacy law that went into effect in 2018. The room has only become busier since: privacy and other data-related legislation is multiplying around the world. Sometimes virtual borders need to be erected, so that data do not leave or enter a certain country. Or a new data centre needs to be built to give the digital stuff a local home. If this trend holds, Microsoft

may soon have to upgrade the CCC's world map—to show the planet's many different data zones, rather than just DOS attacks.

The CCC is thus a place where another tension of the data economy is playing out. Data were supposed to float freely around the world to where they are most efficiently crunched. But flows are increasingly blocked by governments which seek to protect their country's people, sovereignty and economy. And these first rustlings of digital protectionism, predicts Ian Hogarth, a noted British entrepreneur and writer, could turn into fully fledged "AI nationalism", as countries go beyond just defending their data assets and try to build a data economy of their own.

Just as with the internet itself, there were not supposed to be any trade-offs in the cloud. The "cosmopolitan ideal" was that the free flow of data would make the world if not a better place, at least a more efficient one, observes Andrew Woods of the University of Arizona, who is writing a book about data sovereignty. It would allow digital stuff to end up in data centres located in places near many users, with lots of connectivity and where land and energy are cheap and the air cool and dry. (Cloud data centres can be several football fields large and consume huge amounts of energy, about half of which is used for cooling.)

| *Whose cosmopolitan ideal?*

In practice this has meant that the biggest clouds have risen over America, which so far has set the rules of the data economy. It not only boasts the biggest and most innovative tech companies, but plenty of potential customers, fibre-optic cables, cheap power and land to build cavernous data centres. To get an impression of the concentration of computing power in America, one need only drive a few hours west of Microsoft's campus to Quincy, Washington, a town with a population of not even 8,000. This is home to two dozen large data centres, many operated by Microsoft.

As long as computing clouds were small, this uneven distribution did not matter much. But, starting with the intelligence leaks by the American security expert Edward Snowden in 2013 which revealed widespread snooping by America's spy agencies, governments have begun to understand the importance of this global infrastructure—and, by extension, the data economy. Citizens' privacy is not the only worry. Data may also reveal things about a country's defences. If digital evidence is stored abroad, law enforcement might be inhibited. Data should be kept close, some governments think, lest other countries benefit from them.

As a result, in recent years virtual borders have been going up in the digital cloud. The GDPR allows personal data to leave the EU only if firms have appropriate safeguards in place or if the destination country has "an adequate level of protection". India blocks payment information from leaving the country and may soon require that certain types of personal data never leave the country. Russia requires that data be processed and stored on servers within its territory. China blocks most international data flows. And the EU is discussing creation of a single market in data, like the one it already has for goods.

These growing and unco-ordinated efforts to regain data sovereignty have already triggered debates at the highest level of international diplomacy. In July the G20, a group of 20 developing and rich countries, launched the "Osaka Track", named after the Japanese city where the decision was taken. The idea, which Abe Shinzo, Japan's prime minister, floated early last year is to come up with some global rules for "data governance", guided by the rather fuzzy concept of "free flow of data with trust".

It is still unclear where all this will lead. What will the world map in Microsoft's cloud centre look like a decade hence? Will it resemble today's global maps, showing as many data zones as there are countries? Or will it display a few digital trade zones (known as "data spheres") or something

completely different?

The first possibility is rather unlikely. To prevent all data from flowing, countries would essentially have to cut their connection to the internet: it would be the only way to ensure that data really stays put. Russia may be willing to accept the huge economic costs of such a digital secession. But most countries will probably shy away from the drawbacks of even less draconian measures. An overly protectionist country could see cloud-computing providers refuse to serve their market because it is too small. Building a domestic cloud is both tricky and expensive.

The second scenario is far more likely. In fact, this is already happening. Coalitions for different types of data have begun to form. The GDPR's adequacy requirement effectively created one: the need to export personal data from the EU pushed a dozen countries, including America and Japan, to agree to strict data-protection rules. America has started a similar club with the Cloud Act, a bill passed in 2018 to allow the government to negotiate reciprocity agreements with other countries. If these allow American law enforcement to access data stored in partner territory more rapidly than is possible today, agencies in those countries can get easier reciprocal access, too. Britain has already signed such an agreement; the EU is expected to do so soon.

Although the Osaka Track talks are meant to come up with global rules, they could end up creating another data coalition. The initiative started life as a proposal by the Japanese government to form an alliance with America and the EU to promote the free flow of data between members and to limit access by countries which indulge in data protectionism, notably China. If that is still the agenda, it could push China and others to create their own data club, warns Justin Sherman of New America, a think-tank. In an early sign of what this may mean, India and a few other developing countries have refused to sign up to the Osaka Track.

The third possible future of the global data sphere is again less likely, but the most intriguing. Somewhat unexpectedly, it is rooted in Germany and comes by the name of GAIA-X, referring to the goddess of Earth in Greek mythology, with the X being a placeholder for future specialisation (GAIA-Health, GAIA-Mobility). Rightly feeling that the country is behind in cloud computing and risks losing control of its data economy, the German government first considered building something like an “Airbus Cloud”, like a repeat of Europe’s successful aeroplane consortium. Realising that this would probably fail, however, the government has settled on another approach. It hopes to assemble what the Federal Ministry for Economic Affairs calls a “federated data infrastructure”, essentially a club of clouds whose members have to comply with a set of rules and standards.

The main aim is still one of industrial policy: seeding the formation of an “über-cloud”, a legal-cum-software layer that would insulate German firms and government agencies from the power of big foreign clouds by minimising “lock-in”. Although details have yet to be worked out, it would probably allow firms to move data and computing workloads between rival clouds more easily. GAIA-X could be a tool to implement granular national data policy, instead of resorting to crude digital protectionism. It could help solve the problem of American or Chinese firms dominating the global data infrastructure. The project also includes an initiative called “International Data Spaces” to make data-sharing between firms and across borders easier.

Yet it is not clear how the German government intends to will this über-cloud into existence, says Stefan Heumann of the Stiftung Neue Verantwortung, a think-tank in Berlin—nor how it does not end up being a lowest common denominator or held up by lengthy negotiations. The plan is to have a “proof of concept” ready by the second quarter of this year, but don’t hold your breath.

Still, the idea may gain momentum. The German government intends to push the concept when it takes over the presidency of the European Council later this year. France has already signalled support; other countries are expected to join. And some 100 firms and organisations have already joined the effort, including the big cloud providers. The only notable exception, until recently, had been Microsoft. This was a surprise: Azure is the most compatible with Germany's vision. Whether because it has always had many governments as customers or the fact that it does not make money by hoarding data, from the start Microsoft has built its cloud for a world with a data space fragmented along national lines.

If the vision of GAIA-X comes to pass, how will Microsoft display this on the screens of its CCC? Rather than showing a few data "blocs" in bright colours—China red, America blue, for instance, as during the cold war—it may need lots of shades and other graphic tricks to represent the new diversity of the data world. ■



地缘政治

虚拟民族主义

政府如何在镜像世界中设立边境墙【专题报道《数字经济》系列之五】

在西雅图附近的雷德蒙德，由杂乱的一百多栋建筑构成的微软园区的深处有一间特殊的房间。它有一座学校体育馆那么大，墙壁上满是大屏幕。其中一个屏幕上显示了该公司统称为Azure的云计算服务的“健康状况”。另一个显示了人们在社交媒体上表达的对该系统的“情感”。第三个是一张巨大的世界地图，告诉访客当前正在处理多少次“拒绝服务”（DOS）攻击，这种攻击相当于用比特来淹没客户的线上业务使其无法工作。在12月初的这个星期四的早上，计数器显示亚洲有80个，欧洲有171个，美洲有425个。

我们可以合理假想这个房间是用来管理Azure的NOC（“网络运营中心”）。但这里没有任何东西受到控制——那是在其他地方做的。这个名为“云协作中心”（CCC）的房间实则有另外两个目的。用这里的主管安雅·齐格勒（Anja Ziegler）的话来说，一个目的是“给云一张脸”，让客户知道Azure以及它所支持的镜像世界是做什么的。但更重要的是，这个房间是微软员工讨论如何根据数字经济中的法律变化重塑云的地方。

CCC中要处理的首批项目之一是如何使Azure符合《通用数据保护条例》（GDPR），这是欧盟于2018年生效的严格的隐私法。自此以后，这个房间变得越来越繁忙：隐私法和其他数据相关法规在全世界四处开花。有时需要建立虚拟边境墙，以使数据不会离开或进入某个国家。有时需要建立一个新的数据中心，让数字内容有一个本地的家。如果这种趋势持续下去，微软可能很快就必须升级CCC的世界地图了——让它显示地球上许多不同的数据区域，而不仅仅是DOS攻击。

因此，数据经济的另一种矛盾也在CCC蔓延。数据本应自由地在世界各地漂流以求被最高效地处理。但是，寻求保护本国公民、主权和经济的政府正日益阻止这种流动。著名的英国企业家和作家伊恩·霍加斯（Ian

Hogarth) 预测，数字保护主义的这些最初的摩擦可能会演变成全面的“人工智能民族主义”，因为各国会从捍卫自己的数据资产发展为试图建立自己的数字经济。

就像互联网本身一样，在云中本不该有任何权衡妥协。亚利桑那大学的安德鲁·伍兹（Andrew Woods）正在撰写一本关于数字主权的书。他认为“国际理想”是数据的自由流通哪怕不能使世界变得更美好，至少也会让它更高效。它会让数字内容最终抵达设在靠近大量用户、连通性强、土地和能源便宜、空气凉爽干燥的地点的数据中心。（云数据中心可以有几个足球场那么大，并且消耗大量能源，其中大约一半用于冷却。）

| 谁的国际理想？

在现实中，这意味着最大的云已经在美国上空冉冉升起，设定了到目前为止的数据经济的规则。它不仅拥有规模最大、最具创新性的科技公司，而且拥有大量潜在客户、光缆、廉价电力和土地来建造巨穴般庞大的数据中心。要想对美国计算能力的集中度有个概念，只需从微软园区往西驱车几个小时，到达华盛顿的昆西，一个不足8000人的城市。这里是20多个大型数据中心的所在地，其中许多由微软运营。

只要计算云的规模小，这种分布不均就不太要紧。但是，自从美国安全专家爱德华·斯诺登在2013年泄露情报，揭露了美国间谍机构的广泛监视之后，各国政府就开始理解这种全球基础设施的重要性——并由此扩展到数字经济的重要性。公民隐私并不是唯一的担忧。数据还可能揭示有关一国国防的信息。如果数字证据存储在外国，执法可能会受到限制。一些政府认为，数据应保管在本国，以免其他国家从中受益。

结果，近年来，虚拟国界已在数字云中兴起。GDPR仅在公司具有适当的保护措施或目的国具有“足够的保护水平”时，才允许个人数据离开欧盟。印度禁止付款信息离开该国，并可能很快要求某些类型的个人数据永远不能离开该国。俄罗斯要求将数据放在领土内的服务器上处理和存储。中国拦截了大多数国际数据流。欧盟正在讨论建立一个单一数据市场，就像已有的单一商品市场那样。

为重获数据主权而展开的这些行动不断增多且毫无协调，已经引发了国际外交最高层面的辩论。由20个发展中国家和富裕国家组成的20国集团（G20）在7月启动了《大阪框架》（Osaka Track），以提出该框架的峰会的举办地命名。日本首相安倍晋三于去年初提出了相关想法，要在“信任的数据自由流动”这一相当模糊的概念的指导下，提出一些有关“数据治理”的全球规则。

目前尚不清楚这一切会走向何方。十年后，微软云中心的世界地图将是什么模样？它会类似于今天的全球地图，数据区的数量和国家一样多吗？还是会显示一些被称为“数据领域”（Data sphere）的数字贸易区？抑或是完全不同的东西？

第一种情景的可能性很小。要防止所有的数据流动，各国实际上必须切断与互联网的连接：这是确保数据真正留在原地的唯一方法。俄罗斯可能愿意接受这种数字分离的巨大经济成本。但哪怕不是这么严厉的措施，其弊端可能也是大多数国家都会去规避的。一个过度保护主义的国家可能会发现，云计算提供商因为它规模太小而拒绝为其市场提供服务。建立国内云既棘手又昂贵。

第二种情景发生的可能性就大多了。实际上，它已经在发生了。不同类型数据的联盟已经开始形成。GDPR对“适当性”的要求实际上就创造了一个这样的联盟：从欧盟出口个人数据的需求促使包括美国和日本在内的十几个国家同意严格的数据保护规则。美国于2018年通过的《云法案》（Cloud Act）成立了一个类似的俱乐部，该法案旨在允许政府与其他国家谈判互惠协议。如果这些措施使美国执法部门能够比今天更快地访问存储在伙伴国家领土内的数据，那么这些国家的政府机构也可以获得更便利的对等访问权。英国已经签署了这样的协议；欧盟也有望在近期达成。

尽管《大阪框架》谈判的目的是要制定全球规则，但它最终可能会创造另一个数据联盟。该动议最初是由日本政府提案，意图与美国和欧盟结成联盟以促进成员间的数据自由流动，并限制沉迷于数据保护主义的国家（尤其是中国）的访问。智库“新美国”的贾斯汀·谢尔曼（Justin Sherman）

警告说，如果目标仍然如此，它可能会推动中国和其他国家创建自己的数据俱乐部。印度和其他一些发展中国家已经拒绝签署《大阪框架》，透露出一些可能的趋向。

全球数据领域的第三种未来情景出现的可能性也不大，但最令人着迷。出乎意料的是，它起源于德国，名叫“盖亚X”（GAIA-X）。盖亚是希腊神话中大地女神的名字，而“X”则用来在日后填上专业化版本（盖亚健康、盖亚移动）。德国政府准确地感觉到该国在云计算方面处于落后地位，并有失去对数据经济的控制的风险。它首先考虑建造“空中客车云”之类的东西，想让欧洲飞机联合企业的成功故事重演。不过在意识到这可能失败后，德国政府决定采用另一种方法。它希望组建德国联邦经济事务部所说的“联合数据基础架构”，实质上就是一个云俱乐部，其成员必须遵守一组规则和标准。

主要目标仍然是一项工业政策：为“超云”（über-cloud）的形成铺平道路。这是一个法律兼软件层，通过最大程度地减少“锁定”，使德国公司和政府机构免受大型外国云的影响。尽管细节尚需推敲，但它可能会使公司更轻松地各个云服务竞争对手之间迁移数据和计算工作负载。盖亚X可以成为实施精细国家数据政策的工具，而不是诉诸于原始的数字保护主义。它可以帮助解决美国或中国公司主导全球数据基础架构的问题。该项目还包括一项名为“国际数据空间”的计划，让公司之间以及跨境的数据共享更为便捷。

不过，德国政府到底准备如何让这个“超云”变成现实尚不清楚，柏林智库新责任基金会（Stiftung Neue Verantwortung）的斯蒂凡·霍伊曼（Stefan Heumann）表示。同样不清楚它会如何避免沦为最低的共识，或是被漫长的谈判拖延。其计划是在今年第二季度之前准备好“概念验证”，但也别报太大希望。

尽管如此，这个想法仍可能势头大增。德国政府打算在今年晚些时候接手欧洲理事会主席时推动这一构想。法国已经表示支持。预计其他国家也将加入。已有约100家公司和组织参与其中，包括大型云提供商。直到最

近，唯一值得注意的例外是微软。这令人惊讶，因为Azure与德国的愿景最为吻合。不管是因为它一直有许多政府客户，还是因为它并不通过囤积数据来赚钱，微软从一开始就是在为一个数据空间沿国家线分裂的世界构建云。

如果盖亚X的愿景得以实现，微软又将如何在CCC的屏幕上显示它呢？与其以鲜艳的色彩显示几个数据“块”（比如像冷战期间那样，中国红色、美国蓝色），它可能还需要很多阴影和其他图形技巧来表示数据世界的新多样性。■



Economics

Digital plurality

Are data more like oil or sunlight?

PASSIONATE GRAMMARIANS have long quarrelled over whether data should be singular or plural (contrary to common usage, this newspaper is sticking with the latter, for now). A better question is why are data so singularly plural? That is, why do they have so many different faces?

For an answer, start with the many metaphors used to describe flows of data. Originally they were likened to oil, suggesting that data are the fuel of the future. More recently, the comparison has been with sunlight because soon, like solar rays, they will be everywhere and underlie everything. There is also talk of data as infrastructure: they should be seen as a kind of digital twin of roads or railways, requiring public investment and new institutions to manage them.

The multiplication of metaphors reflects the malleable economics of data. First, they are “non-rivalrous”: since they are infinitely copyable, they can be used by many people without limiting the use by others. But they are also “excludable”: technologies like encryption can control who has access to them. Depending on where one sets the cryptographic slider, data can indeed be private goods like oil or public goods like sunlight—or something in between, known as a “club good”.

This in turn means that there is not just one data economy, but three more or less distinct ones, each with its own ideology. And the big question is whether one will come to dominate, or whether the mirror world will be as much of a mixture as the real one.

If oil is still the most-used metaphor, it is because comparing data to the

black stuff is easy. Like oil, data must be refined to be useful. In most cases they need to be “cleansed” and “tagged”, meaning stripped of inaccuracies and marked to identify what can be seen, say, on a video. This has spawned a global industry employing hundreds of thousands of people, mostly in low-wage countries. Scale AI, a startup in San Francisco, employs 30,000 taggers around the world who review footage from self-driving cars and ensure the firm’s software has correctly classified things like houses and pedestrians.

Before data can power AI services, they also need to be fed through algorithms, to teach them to recognise faces, steer self-driving cars and predict when jet engines need a check-up. And different data sets often need to be combined for statistical patterns to emerge. In the case of jet engines, for instance, mixing usage and weather data helps forecast wear and tear.

The oil metaphor also rings true because some types of data and some of the insights extracted from them are already widely traded. Online advertising is perhaps the biggest marketplace for personal data: clicks are bought and sold based on a detailed digital profile of each viewer. It was worth \$178bn globally in 2018, according to Strategy&, a consultancy. Data brokers, which can track thousands of data points for each individual, do brisk business with personal information, too. They sell it to everyone from banks to telecoms carriers, generating annual revenue of more than \$21bn, says Strategy&.

Offering insights from mining data can be very profitable, too. On Kaggle, a website owned by Google that hosts machine-learning contests, thousands of teams of data scientists compete against each other to see who can come up with the best algorithms to predict a building’s energy consumption or to detect “deepfake” videos, with prizes sometimes exceeding \$1m. That is also Facebook’s and Google’s way to make money. They hardly ever sell

data, but they do sell insights about who is the best target for advertising.

Yet data have failed to become “a new asset class”, as the World Economic Forum, a conference-organiser and think-tank, predicted in 2011. Most data never change hands, and attempts to make them more tradable have not taken off. To change this, especially in Europe, manufacturers are pushing to secure property rights for the data generated by their products. Others want consumers to own the data they create, so they can sell them and get a bigger cut from their information.

Again, economics gets in the way. Although data are often thought of as a commodity, corporate data sets, in particular, tend not to be fungible. Each is different in the way it was collected, and in its purpose and reliability. This makes it difficult for buyers and sellers to agree on a price: the value of each sort is hard to compare and changes over time. A further barrier to trading is that the value of a data set depends on who controls it. What might simply be data exhaust to one firm could be digital gold to another. “There is no true value of data,” says Diane Coyle of the University of Cambridge.

As for personal data, defining property rights is tricky, because much information cannot be attributed to one person. Who, for instance, owns the fact that a dating site has matched a couple? The couple themselves? Or the service? Complicating matters, data have plenty of externalities, both positive and negative, meaning that markets often fail. Why should a social network, say, buy the data of an individual if it can make quite accurate predictions about him by crunching data from other users?

Although data are unlikely ever to be traded as widely as oil, tech firms keep trying to make this easier. Amazon Web Services (AWS), the cloud-computing arm of the e-commerce giant recently launched a marketplace that aims to make trading in data as easy as possible. It works a bit like an

online store for smartphone apps: buyers subscribe to feeds, agree to licensing conditions, and AWS processes the payment.

| *Light stuff not black stuff*

As the oil metaphor is seen as increasingly problematic, the comparison to sunlight or similar resources, such as air and water, has risen in favour. Many people who prefer this metaphor ask if data do not really lend themselves to be turned into a tradable good, then why even try? Would it not instead be better to ensure that data are used as much as possible? After all, this will maximise social wealth. In other words, nobody puts up curtains and tries to charge for sunlight.

This line of argument has already given birth to what is known as the “open-data” movement. Its champions push organisations and universities to give away their data so they can be widely used, for instance by startups. Today, most governments, national or otherwise, boast an open-data project, although the quality of the data made available varies greatly.

More recently, companies have started to publish their data, too. Several firms that work on self-driving cars have shared some of the information collected by their vehicles. “For researchers to ask the right questions, they need the right data,” according to Dragomir Anguelov, principal scientist at Waymo, a firm owned by Alphabet, Google’s parent, that is one of the companies that has done this. Others are working on technology to make such data-sharing easier: Microsoft and other software makers will soon start to implement what it calls the “open-data initiative”.

Some see such efforts as the beginning of an open-source movement for data, much like the approach that now rules large parts of the software industry. And Microsoft, in particular, is keen to see this happen. “We need to democratise AI and the data on which it relies,” writes Brad Smith, the firm’s president and chief legal officer in his recently published book,

“Tools and Weapons”. Unsurprisingly, this position also smacks of self-interest: Microsoft does not make much money from data directly, but does from tools and services that handle data.

Like the oil comparison, however, the data-as-sunlight analogy breaks down: open data, too, can go only so far. For personal data, the main limitation is increasingly strict privacy laws, such as the EU’s General Data Protection Regulation (GDPR), as well as the California Consumer Privacy Act (CCPA), which will start being enforced in July. For corporate data the checks are economic in nature: generating good data is expensive and they can reveal too much about a firm’s products. “Companies will make very strategic decisions about what data sets they will make public and which ones they will keep to themselves,” explains Michael Chui of the McKinsey Global Institute, a consultancy think-tank.

Separating what can be safely shared from what should be closely guarded will be tricky, but technology should, in time, make such decisions easier. Something called “differential privacy”, for instance, replaces one data set with another that includes different information, but has the same statistical patterns. “Homomorphic encryption” allows algorithms to crunch data without decrypting them. And blockchains, which are the special databases of the sort that underlie many digital currencies, enable people and companies to manage in minute detail who is allowed to access what data and to track who has done so.

Slowly these technologies are being deployed. DECODE, an initiative financed until last year by the European Union, has used a combination of them to create tools that allow people to control the data they generate and collect about their environment, for instance, on noise levels and air quality. They are being tested in Amsterdam and Barcelona. Oasis Labs, another startup in San Francisco, has built something similar for health data. Its first service, which will launch soon, will let users donate genetic

information to research projects.

Such data-dividing technologies are also grist to the mill of those who liken data to infrastructure. You have to travel many digital roads—and combine many data sets and streams—to get to new insights, says Jeni Tennison, who heads the Open Data Institute, a research outfit based in Britain. Some will be private toll roads, others public multi-lane highways, but many need to be operated as shared digital resources managed in a “club” by users.

Yet technology alone will not be enough to create these “club goods”. They also need institutions that provide what Ms Tennison calls “data stewardship”. Data trusts, data co-operatives, personal data stores—all are different in detail, but the idea is essentially the same: they provide a governance structure to organise access to data in a way that takes into account the interests of those producing and using a particular sort of data.

It is early days, but such data clubs have started to pop up in many places. MIDATA is a Swiss co-operative that collects and manages members’ health-care data. In Taiwan Audrey Tang, the digital minister, has created an ongoing “Presidential Hackathon” to set up “data collaboratives”, including several for environmental data. In Finland, Sitra, a policy outfit, has launched a similar competition to help get “fair data exchanges” off the ground.

| *New thing on the old continent*

Most projects are still small and live on the public dime, which raises doubts about whether they will ever be a big part of the data economy. But whether they are successful or not is a question of political will, says Francesca Bria, the founder of the DECODE project. Cities in particular, she argues, need to create alternatives to the big online platforms, which treat data they collect as their own. A former chief technology officer of Barcelona, she turned the city into a model of what is possible, which is

now copied elsewhere in Europe. Not only can Barcelona's citizens control the data the city holds on them, but its suppliers must add the information they gather while delivering services to the municipal data commons.

Given their respective limitations, none of the three sorts of data economies will dominate, but they are likely to have strongholds. In America data are treated like oil: whoever extracts them owns them. China—although it, too, has data-hungry online platforms of its own, including Alibaba and Tencent—is an extreme example of a place where data are public goods. They are ultimately controlled by the government, which is pushing firms to pool certain types, such as health data. In Europe, many regulators have come to see data as infrastructure. The new European Commission in Brussels has big plans to support the creation of data trusts.

This sounds as if the EU is about to condemn itself to remaining a tech laggard. But this need not be the case. A “fair data-economy”—one that takes into account the interests of citizens and consumers, who will generate much of the fuel of the future—may prove to be quite competitive, says Luukas Ilves, the co-author of a report for Sitra in Finland. If people, as well as firms, can trust the continent's data infrastructure, they will be willing to share more and better data, which means better services for everyone. If such a “virtuous cycle” were to take off, it would be quite a reversal of the old world's fortunes. ■



经济形态

数字复数

数据是更像石油还是更像阳光？【专题报道《数字经济》系列之二】

狂热的语法学家已经为“数据”究竟是单数名词还是复数名词争执了很久（与普遍用法相反，本刊在此暂时认同后者）。一个更好的问题是，数据何以如此独一无二地显现为复数？我的意思是，为什么它们有这么多张不同的面孔？

要找到答案，我们可以从用于描述数据流的诸多比喻出发。一开始，数据被比作石油，言下之意它们是未来的燃料。后来，它们被比作阳光，因为很快它们就会像阳光一样无处不在，成为一切的基础。也有人说数据是基础设施：应该视它们为公路或铁路的数字孪生体，需要公共投资，也需要新机构来管理。

比喻的增多反映出数字经济形态的可塑性。首先，它们是“非竞争性的”：由于无限可复制，许多人都可以使用它们，并不会因此而限制其他人的使用。但它们也是“可排他的”：加密之类的技术可以控制谁有访问权。实际上，取决于你把“加密滑动条”放在哪里，数据确实可以是如同石油的私人物品，或是如同阳光的公共物品——也可以是介于两者之间的东西，有人称之为“俱乐部物品”。

这反过来意味着数字经济不止一种，而是或多或少可以区分开来的三种，每种都有自己的意识形态。而核心问题，是否会有其中一种占据主导，还是说，镜像世界会像真实世界那样是它们的混合体。

如果说石油仍是最常用的比喻，那是因为把数据比作这种黑乎乎的东西是一种最容易的联想。和石油一样，数据必须经过提炼才有用处。在大多数情况下，它们需要被“清洗”和“标注”，也就是筛除不准确的数据，并为视频等材料中看到的各种元素做标识。这催生了一个全球性行业，雇用了数十万人，其中大多数人在低薪国家。位于旧金山的创业公司Scale AI在世

界各地雇用了三万名标注工人来查看无人驾驶汽车生成的影像，以确保这家公司的软件正确分类了房屋、行人等物体。

在数据能够驱动人工智能（AI）服务之前，还需要把它们输入算法中，教它们识别人脸、操控无人驾驶汽车、预测喷气发动机何时需要检修。而要生成统计模式往往需要综合不同的数据集。以喷气发动机为例，把使用状况数据和天气数据聚合起来有助于预测磨损。

石油的比喻之所以合适，还因为某些类型的数据以及从中提取的见解已经在广泛交易。在线广告可能是最大的个人数据市场：根据每个用户的详细数字资料来买卖点击。咨询公司思略特（Strategy&）的数据显示，2018年该市场的全球价值为1780亿美元。数据经纪人可以为每个人跟踪数千个数据点，它们的个人信息业务也很红火。思略特称，它们将这类数据出售给从银行到电信运营商的各种机构，年收入超过210亿美元。

提供挖掘数据所得的见解也可以非常有利可图。在谷歌旗下的机器学习竞赛网站Kaggle上，成千上万个数据科学家团队参赛，看谁能拿出最佳算法来预测建筑物的能耗或识别“深伪”视频，有时奖金超过100万美元。这也是Facebook和谷歌的赚钱方式。它们几乎从不出售数据，但出售谁是最佳广告目标的见解。

不过，数据没能像会议组织者兼智库“世界经济论坛”在2011年预测的那样，成为一种“新资产类别”。大多数数据从未易手，那些努力让它们变得更易于交易的尝试也没能大行其道。为改变这种局面，特别是在欧洲，制造商正在推动取得自家产品生成的数据的产权。还有些人则希望让消费者拥有自己生成的数据，这样他们就可以出售数据，从自己的信息中分得更大的一杯羹。

经济运作方式又一次挡了路。尽管数据常被视为大宗商品，但企业数据集尤其不易互换利用。它们的收集方式、目的和可靠性各不相同。这使得买卖双方难以就价格达成共识：各个种类的数据的价值难以比较，且会随时间变化。交易的另一个障碍是数据集的价值取决于谁控制它。对一家公司

是垃圾的数据对另一家却可能是黄金。“数据没有真实价值。”剑桥大学的黛安·科伊尔（Diane Coyle）表示。

至于个人数据，要界定产权很难，因为很多信息无法归属到某一个人。例如，谁拥有约会网站匹配了一对情侣这一事实？这对情侣自己吗？还是网站？让事情变得更复杂的是，数据具有大量外部性，包括正面和负面的，这意味着市场经常失灵。例如，如果一个社交网络可以通过处理其他用户的数据来做出关于某个人的相当准确的预测，那么它为什么还要购买这个人的数据呢？

尽管数据很可能永远都不会像石油那么广泛地交易，科技公司仍然在努力把这件事变得更容易。电子商务巨头亚马逊的云计算部门AWS最近就推出了一个交易市场，希望让数据交易变得尽可能容易。它的运作有点像智能手机的应用商店：买家订阅数据流，同意许可条件，AWS处理付款。

| 轻盈的，而不是黑乎乎的

随着石油的比喻日渐被视为有问题，与阳光或类似的资源（如空气和水）的类比越来越受欢迎。许多喜欢这种比喻的人问，如果数据并不那么适合变成一种可交易商品，那为何还要费劲去尝试呢？确保它尽可能多地被利用不是更好吗？毕竟这会使社会财富最大化。换言之，没人会挂起窗帘，试图叫卖阳光。

这套论述已经催生了“开放数据”运动。其拥护者敦促各种组织和大学院校交出数据，以让它们可被广泛利用——比如被创业公司使用。如今，大多数国家或地方的政府都在吹嘘某个开放数据项目，尽管这些被开放的数据的质量差异很大。

后来，企业也开始公开自家数据了。几家研发无人驾驶汽车的公司共享了自己的车辆收集到的部分信息。谷歌母公司Alphabet是其中之一。它旗下的Waymo公司的首席科学家德拉戈默·安戈洛夫（Dragomir Anguelov）说：“若要让研究人员能提出正确的问题，他们需要正确的数据。”其他公司正在研究能让这种数据共享变得更容易的技术。微软等软件制造商将很

快开始实施微软所说的“开放数据计划”。

一些人将这种努力视为数据开源运动的开始——很像如今统治了软件行业大部分的开源运动。微软对此尤为热衷。公司总裁兼首席法务官布拉德·史密斯（Brad Smith）在他最近出版的《工具和武器》（Tools and Weapons）一书中写道：“我们需要让人工智能及其依赖的数据民主化。”自然，这种立场带着些利己的气味：微软并不直接从数据中赚多少钱，它从处理数据的工具和服务中赚钱。

然而，就像石油的比喻一样，阳光的类比也出了问题：开放数据的范围同样有限。对于个人数据，主要的限制是日益严格的隐私法，例如欧盟的《通用数据保护条例》（GDPR），以及将于7月开始实施的《加州消费者隐私法》（CCPA）。对于公司数据而言，设立关卡天然就更经济：生成优质数据的成本高昂，它们还可能过多地泄露了一家公司产品的信息。咨询智库麦肯锡全球研究所的迈克尔·崔（Michael Chui）解释说：“企业将就哪些数据集要公开、哪些要保密做出非常战略性的决策。”

要把可以安全共享的内容与应严格保密的内容剥离开来会很棘手。不过，假以时日，技术进步应该会让这类决策变得更容易。例如，一种叫“差分隐私”的技术可把一个数据集替换成另一个包含不同的信息，却具有相同统计模式的数据集。“同态加密”则让算法无需解密数据就能分析处理它们。还有区块链这种作为许多数字货币底层技术的特殊数据库，它使人们和企业可以细致入微地管理谁能访问哪些数据并追踪这些访问。

这些技术正在慢慢铺开。直至去年一直受欧盟资助的项目DECODE集结了多种技术来创建工具，让人们可以掌控他们对噪音水平和空气质量这类周遭环境生成和收集的数据。这些工具正在阿姆斯特丹和巴塞罗那测试。旧金山另一家创业公司Oasis Labs为健康数据创建了类似的工具。它的首个服务即将推出，让用户可以把遗传信息捐赠给研究项目。

这样的数据分割技术有利于那些把数据比作基础设施的人。总部位于英国的研究机构开放数据研究所（Open Data Institute）负责人热尼·腾尼森

（Jeni Tennison）说，你必须走过很多条数字公路，结合许多数据集和数据流，才能获得新的见解。它们当中有些会是私人收费公路，另一些是多车道公共高速路，但它们大多需要按共享数字资源来运营，由一个用户“俱乐部”管理这些资源。

但是，仅凭技术还不足以创造这些“俱乐部物品”。他们还需要机构来提供腾尼森所说的“数据看管”。数据信托、数据合作社、个人数据商店在细节上各不相同，但思路是基本一致的：它们提供了一种治理结构，在组织对数据的访问时把某类特定数据的生产者和使用者的利益考虑在内。

目前尚在发展初期，但这类数据俱乐部已经开始在许多地方涌现。瑞士的MIDATA合作社收集并管理会员的医疗数据。台湾的“数字政务委员”唐凤创建了一个仍在进行中的“总统杯黑客松”来建立“数据协作社”，包括几个针对环境数据的协作社。芬兰具政府政策功能的国家研发基金（Sitra）发起了类似的竞赛，以帮助发展“公平的数据交换”。

| 旧大陆上的新事物

大多数项目的规模仍然很小，而且由公家资助，这让人们怀疑它们是否会成为数字经济的重要组成。但DECODE项目的创始人弗朗西丝卡·布里亚（Francesca Bria）说，它们是否成功是一个政治意愿问题。她认为，城市尤其需要创建替代方案来取代那些把收集到的数据据为己有的大型在线平台。这位巴塞罗那前首席技术官把这座城市变成了一个展示可能性的典范，如今已被复制到欧洲其他地方。巴塞罗那市民不仅可以控制该市拥有的有关他们的数据，并且提供数据的各方还必须添加它们在向这片“城市数据公地”提供服务时收集到的数据。

鉴于它们各自的局限性，三类数字经济无一将占据主导，但它们会有各自的据点。在美国，人们把数据等同于石油来处理：谁提炼它们，谁就拥有它们。中国是数据成为公共物品的极端例子，尽管它拥有阿里巴巴和腾讯这样数据量极大的在线平台。这里的数据最终受政府控制，政府正在推动企业合并某些类型的数据，比如医疗健康数据。在欧洲，许多监管机构开始把数据视为基础设施。布鲁塞尔的新一届欧盟委员会制定了支持创建数

据信托的大型计划。

听起来，欧盟似乎是要自我加害，继续做一个技术落伍者。但这并不是必然的。为芬兰的国家研发基金撰写报告的联合作者卢卡斯·伊尔维斯（Luukas Ilves）说，一种“公平的数据经济”把公民和消费者这些将为未来生成大量“燃料”的人的利益考虑在内，可能具有相当大的竞争力。如果民众和企业能够信任欧洲的数据基础设施，他们会愿意共享更多、更好的数据，这继而又会给每个人换来更好的服务。如果这样一个“良性循环”真的腾飞了，那将是旧世界命运的一次大逆转。■



The road

A long game

At sea, commerce and strategy are hard to separate

NO CHINESE REFERENCE to the maritime Silk Road is complete without mention of the voyages of Zheng He. The eunuch admiral, a Muslim at the Ming court, led seven voyages in the early 15th century in a fleet of vast sailing barges known as “treasure ships”. The official narrative is that he went abroad to spread peace, carrying treasures for the potentates he would meet from South-East Asia to east Africa. Back came fabulous curiosities, including a giraffe, which he fashioned as tribute to the emperor. The peaceful nature of Zheng’s trips is greatly embellished—the fleet was well armed and got into scuffles. But few tales better show the mix of hard power and emoluments that embodied imperial China’s tributary relations with others. Barbarians were worthy of engagement if they accepted China’s cultural and military superiority and moved into China’s orbit.

The idea of emissaries bringing peace lingers on in schematic maps of the 21st-century maritime Silk Road. What jumps out is how vague and imprecise are these doodles of desire. The routes themselves chart sinuous curves. The waypoints speak more to exotic places from the old spice trade than to where concrete is being poured (no mention of a military base in Djibouti, for instance). The lines copied out in the Pentagon, by contrast, are harder and firmer. American strategists believe China is sending out modern treasure fleets laden with goodies, such as offers to build ports, that will pave the way for deploying warships in future.

China downplays such notions. Yet it is rarely easy for observers to separate the commercial from the strategic along the maritime road. Nearly everything, potentially, can be used to make money and project power.

The road starts by coursing innocently through the South China Sea. Already the paradox is glaring. This is a seat of heightened geopolitical contest on account of disputes among littoral states over maritime claims in the sea—none more hyperbolic than China's. It is aggressively asserting its claims (and disregarding others'), through a large naval, coastguard and fishing-fleet presence, as well as huge terraforming around reefs and rocks to create runways, quays and military bases.

The approach is at odds with protestations of peace and mutual co-operation embodied in the BRI. But the contradiction is resolved if you consider that by enmeshing neighbours in ports and other projects, and by increasingly dominating the sea lanes with Chinese vessels, China hopes to settle the matter of sovereignty by giving neighbours little choice but to be drawn into its embrace.

So far, most Chinese investment has gone into commercial ports. The maritime push is being led by a handful of giant state enterprises with close links to the Communist Party's leaders. China Communications Construction Company (CCCC) is the biggest company on the belt and road. COSCO, a shipping behemoth, is the world's third-biggest container line and has investments in 61 port terminals around the world. China Merchants, founded as a patriotic enterprise in 1872 to attract Chinese capital to take on Western shipping lines, manages 36 ports in 18 countries. Since 2010 well over \$20bn of Chinese money has been poured into foreign ports.

One dimension is the "port-park-city" concept: a port is more likely to thrive with a hinterland in the form of industrial zones and a growing city. Following the model are Kuantan on peninsular Malaysia's east coast and Gwadar in Pakistan on the Arabian Sea. In both places, Chinese-built industrial parks are going up close to new port development, with plans for urban expansion. In Colombo in Sri Lanka, next to the busy container port,

controlled by China Merchants, CCCC has won 269 hectares from the sea to extend the business district and build glitzy flats. It is not clear whether such projects are intended more for property speculation by rich locals and Chinese keen to park money abroad, or organic evolutions of an existing city's fabric. The domestic reception often hangs on the answer.

Another plan is for major ports to serve as regional hubs at which the biggest container ships can dock; their cargoes are then unloaded and despatched on smaller vessels serving other regional ports. Colombo is one example. Sri Lanka sits at the crossroads of major shipping lanes in the Indian Ocean, and Colombo is one of the world's busiest—and most profitable—container ports.

The most notable success of a hub port is COSCO's involvement in Piraeus, Athens's ancient harbour. China arrived when the financial crisis of 2008 had brought Greece to its knees. COSCO took a long lease on two terminals of the container port with a promise to build a third. Soon, the contrast in productivity between those and the remaining Greek-run one, plagued by inefficiency and powerful unions, was stark. The left-wing government of the day had refused the sale of that pier. But in 2016, needing funds demanded by the EU in return for a third bailout, it offered COSCO control of the whole port. COSCO has invested \$5bn, with more promised for everything from a ship-repair business to turning warehouses into hotels for cruise passengers.

Under COSCO, container volumes have grown by more than 700%. Next year Piraeus may overtake Valencia in Spain to become the biggest port in the Mediterranean and the seventh biggest in Europe. Its value to Asian exporters is as a trans-shipment hub. Goods arriving in Piraeus via the Suez Canal are quickly shipped to other parts of the Mediterranean. That saves time and money compared with unloading in the giant ports of northern Europe, such as Rotterdam (though COSCO has stakes there too). COSCO is

also investing in a rail route for sending freight from Piraeus to the Balkans and beyond to the German-led manufacturing cluster in eastern Europe. The railway neatly connects the land-based approach with that by sea.

| *Shake Djibouti*

But for every success, there are other strange, stalled or suspicious Chinese port ventures. The merging of commercial and military potential is glaring in tiny Djibouti, guarding the approach to the Red Sea and the Suez Canal. There, China opened its first overseas military base in 2017, ostensibly for Chinese UN peacekeepers in the Horn of Africa as well as to combat piracy. Djibouti has not been fussy about hosting bases, so long as it makes money from them, and China's sits not far from those of the United States, France and Japan.

But a few months later the Djibouti government nationalised the main port, tearing up the long-term deal it had signed with DP World, Dubai's port operator. Soon after, it handed a stake in the port to China Merchants, which has taken over its running. International arbitration courts have ruled in DP World's favour, though that is unlikely to dislodge China Merchants. A Chinese state-owned enterprise, therefore, handles nearly all the incoming supplies for the other bases, a source of alarm for the United States and its allies. Similarly, China may have the upper hand in Djibouti now, but the country's fiscal position is the most parlous of all BRI countries—and more than half of its debt is to China. To hawks it means China holds all the cards. Others point to China's reputational risk should Djibouti default.

Another case is Hambantota, a port at the southern tip of Sri Lanka often cited as a notorious instance of debt-trap diplomacy. Opened in 2010, China Merchants took control of the new port in 2017 on a 99-year lease when the government struggled to service its debt. The debt-trap accusation is off the mark here, for China built the port chiefly to indulge

the president of the time (and now prime minister), Mahinda Rajapaksa, in the region of his family's political base. Chinese enterprises were already making out like bandits at the Colombo port. Besides, given the riskiness of the proposition, Chinese banks made sure to charge commercial rates of interest.

There was, in other words, no well-laid plan. Yet it remains the case that Hambantota sits strategically just a few miles north of one of the world's busiest sea lanes. Moreover, once bunkering facilities are installed, and ships start to call in to refuel, Hambantota may no longer be the white elephant it is today. Thus China will have one more strategic stepping stone in the Indian Ocean in years to come.

Accusations of debt-trap diplomacy are especially rife in the Pacific. In November 2018 America's vice-president, Mike Pence, told Asia-Pacific leaders: "Do not accept foreign debt that could compromise your sovereignty." The perils would be especially acute for its remote and fragile economies. Yet a paper by Roland Rajah, Alexandre Dayant and Jonathan Pryke of the Lowy Institute, a Sydney think-tank, paints a nuanced picture of China's Pacific activities. They conclude that China is not pursuing a policy of deliberate entrapment. Only in Tonga does China account for more than half of outstanding debt. Meanwhile, nearly all official lending comes in the form of concessional loans with low interest rates and long grace periods—a stark contrast to China's lending in the other parts of the world.

Certainly the sheer scale of Chinese lending poses risks in future. But the debt-diplomacy debate should not overshadow more salient problems with China's activities in the Pacific. For Mr Pryke of the Lowy Institute, they include both the quality of Chinese lending, and the way relationships are forged. "They're using corruption to lubricate their engagement," he argues. By striking murky deals with politicians, China undermines already weak

governing institutions.

There are accusations elsewhere of projects that aggravate domestic problems in the countries in which they are undertaken. In January President Xi Jinping became the first Chinese leader to visit Myanmar in 20 years, a trip over which much was at stake. With a deep-sea port being built at Kyaukpyu in Rakhine state, a corridor is to connect landlocked parts of south-west China to the Indian Ocean. Myanmar offers China a crucial energy route from Kyaukpyu to Kunming, capital of Yunnan, its most south-westerly province. One pipeline has the capacity to pump 12bn cubic metres of gas a year from fields in the Bay of Bengal. A second is for oil from the Middle East. A planned railway is to run from Kyaukpyu to Kunming via Mandalay, a city in central Myanmar with a large Chinese presence.

The pipelines have special value to China, whose strategists have long fretted over a “Malacca Strait dilemma”. The strait, which the American navy dominates, is the world’s busiest maritime area, with nearly a third of world seaborne trade passing through it a year—including 80% of China’s energy imports. China’s concern is that at a time of crisis or war, America and its allies could choke off the narrow strait, throttling China.

But the planned corridor in Myanmar runs through a violent and highly complex land, home to over a dozen insurgent armies in the borderlands financed by China-linked drugs, jade and logging rackets. Chinese projects are as likely to throw fuel on the fire of ethnic conflicts as bring peace and development. As for the Myanmar government, China is too big to ignore. But it is also too big to want to be dominated by, and many in the establishment, from Aung San Suu Kyi down, have longstanding ties with the West and Japan. For now, Myanmar is in the doghouse with the West, for its army’s ethnic cleansing of Muslim Rohingyas. Mr Xi certainly does not believe that will last.

Strategic dimensions along the maritime Silk Road are not limited to ports. Chinese engineering companies have lobbied Thailand's army establishment about digging a 100km-long canal across the Kra Isthmus in the country's south. Supporters say vessels heading for East Asia from the Arabian Sea would shave 1,200km off their passage. The Chinese navy could get quickly to the Indian Ocean. A canal would put Thailand at the heart of a regional e-commerce economy built around quick delivery times.

Though the generals want development, they are nervous about the Kra canal. They fear Chinese dominance. And Thailand's south is complicated by a long-running Muslim insurgency—an attack on a security checkpoint in November left 15 dead. The army's sacred mission has always been to hold the country together. Physically slicing it in two and isolating the restive Muslim south makes them queasy.

Not everything, then, is guaranteed to go China's way. Certainly, it is the Eurasian geopolitical force, a combination of economic might and geographic extent. But along both the belt and the road, Chinese-led efforts meet those of other powers. In continental Eurasia, as the Silk Road reconfigures, other former empires make their mark along it. Turkey has long-standing ethnic ties with Turkic peoples in Central Asia, and construction and business expertise to offer. Iran, while facing American hostility and sanctions, has made developing ties with Central Asia a "fundamental policy". As for the Indian Ocean, India remains the regional naval power. In Colombo, alongside China Merchants, India and Japan are jointly to develop a new container terminal.

China claims that "win-win co-operation" is what the BRI is all about. Who would want it any other way? Yet along the fast-emerging digital Silk Road things look increasingly zero-sum. ■



一路

放长线

在海上，商业和战略很难分开【专题报道《中国的“一带一路”》下篇】

“郑和下西洋”是任何中国对海上丝绸之路的介绍中绝对不会漏掉的章节。担任舰队司令的这位明朝太监是朝廷中的一位穆斯林，在15世纪初期率领一支由庞大的平底帆船（称为“宝船”）组成的舰队七下西洋。官方的说法是他出国传播和平，携带珍宝来献给他从东南亚到东非遇到的统治者。他带回了大量奇珍异宝，其中包括一头长颈鹿——他把它包装成贡品献给皇帝。郑和出行的和平性质得到了极大的美化——舰队武装精良，也曾卷入一些小冲突。但是，很少有故事能比它更好地显现中国皇帝与其他国家之间“恩威并施”的朝贡关系。如果野蛮人能接受中国的文化和军事优势并进入中国的轨道，那就值得打交道。

“和平使者”的想法也萦绕在21世纪海上丝绸之路的简图上。但引人注意的是这些欲望的涂鸦非常模糊、不精确。航路本身勾勒出蜿蜒的曲线。所经之处更多是古代香料贸易中的异国领地，而不是正在浇筑混凝土的地方（例如没有提及位于吉布提的军事基地）。相比之下，五角大楼复制版的线条更加清晰明朗。美国战略家认为，中国正在派遣载有各种好东西（例如修建港口的提案）的现代宝船船队，为将来部署军舰铺平道路。

中国对这样的看法不以为然。然而，对于观察者来说，要把海上丝绸之路沿线的商业和战略属性区分开来终归不容易。几乎任何东西都可以一边用来赚钱，一边施加影响力。

这条路先是“人畜无害”地穿过南中国海。这里的自相矛盾已经十分扎眼了。由于沿岸国家之间对这片海域权利主张的争端（没有哪个国家比中国的主张更夸张的了），这里是激烈地缘政治争夺的焦点。通过让庞大的海军、海岸警卫队和渔船队进驻，并围绕岛礁填海来建立跑道、码头和军事基地，中国正在积极地宣示自己的主张（并无视其他国家的主张）。

这种做法与“一带一路”倡议包含的和平与合作的宣言背道而驰。但是，如果你换一种思路，矛盾就迎刃而解了：中国要让邻国卷入港口和其他项目，并用中国船只进一步统治海路，它希望这会让邻国别无选择，只能投入自己的怀抱，从而解决主权问题。

迄今为止，大多数中国投资都是针对商业港口。这一海洋攻势由少数几家与共产党领导人有密切关联的国有巨头领导。中国交通建设公司是“一带一路”上最大的公司。航运巨头中远集团是全球第三大集装箱运输公司，在全球61个港口码头都有投资。招商局集团于1872年作为一家爱国企业创立，旨在吸引中国资本与西方航运公司竞争，如今在18个国家和地区管理着36个港口。自2010年以来，已经有超过200亿美元的中国资金注入了外国港口。

计划之一是“港口-工业园-城市”的概念：港口若配上内陆工业区和扩张的城市，更容易繁荣。沿用该模型的是马来西亚半岛东海岸的关丹，以及巴基斯坦临阿拉伯海的瓜达尔。在这两个地方，中国建造的工业园区都在靠近新港口的地方建设，并有城市扩张的计划。在斯里兰卡科伦坡，在由招商局控制的繁忙的集装箱港口旁，中国交建已经从大海中夺取了269公顷土地，用于扩建商业区并建造豪华公寓。尚不清楚这类项目的意图更多地是方便当地富人和热衷于把钱放在国外的中国人进行房地产投机活动，还是要让现有城市结构发生有机演变。当地的接纳度常常要取决于这个问题的答案。

另一个计划是将主要港口用作可供最大型集装箱船停靠的区域枢纽，卸货后再分装到较小的船只上运往其他区域港口。科伦坡就是一例。斯里兰卡位于印度洋主要航道的十字路口，而科伦坡是世界上最繁忙、利润最高的集装箱港口之一。

枢纽港最耀眼的成功案例是中远集团参与改建的雅典古老的港口比雷埃夫斯。当希腊被2008年的金融危机打垮时，中国人来了。中远集团长期租赁了这个集装箱港口的两个码头，并承诺建设第三个。很快，这两个码头与剩下那个由希腊人经营的码头（饱受低效和强大工会的困扰）的生产率形

成了鲜明的对比。当时的左翼政府拒绝出售第三个码头。但在2016年，由于需要欧盟要求的资金以换取第三次纾困，希腊把整个港口的控制权都交给了中远。中远已投资50亿美元，还承诺投资更多——从修船业务到把仓库改建成面向邮轮乘客的酒店。

在中远的领导下，集装箱的体量增长超过700%。明年，比雷埃夫斯可能会取代西班牙的瓦伦西亚，成为地中海最大的港口和欧洲第七大港口。它对亚洲出口商的价值是充当转运中心。通过苏伊士运河到达比雷埃夫斯的货物会很快送往地中海其他地方。与在鹿特丹（尽管中远也有股份）等北欧大型港口卸货相比，这节省了时间和金钱。中远还投资了一条铁路，将货物从比雷埃夫斯运送到巴尔干地区，再运到德国领导的东欧制造业聚集区。铁路将陆路运输与海路运输简洁地连接起来。

| 震撼吉布提

但是，在每一个成功背后，都会有其他诡异、停滞乃至可疑的中国港口投资项目。商业和军事潜力的融合在小小的吉布提十分显眼，这里扼守通往红海和苏伊士运河的通道。中国于2017年在此开设了它的首个海外军事基地，表面上是供中国在非洲之角的联合国维和人员使用以及打击海盗。吉布提对于建在它这里的军事基地没什么所谓，只要自己能从中获利即可。中国的基地与美国、法国和日本的相距不远。

但是，几个月后，吉布提政府将其主要港口国有化，撕毁了与迪拜港口运营商迪拜环球港务（DP World）签订的长期协议。不久之后，它把港口的一部分股份给了招商局，由后者接管运营。国际仲裁法院裁定迪拜环球港务胜诉，但这不太可能把招商局驱逐出去。就这样，一家中国国企几乎经手了所有其他基地的入港补给，让美国及其盟国大为惊恐。同样，中国现在可能在吉布提占了上风，但吉布提的财政状况是“一带一路”沿线国家中最糟糕的——且一半以上的债务是对中国的。对鹰派来说，这意味着中国拿到了所有的牌。其他人则指出，如果吉布提违约，中国面临名誉风险。

另一个案例是汉班托塔，这是斯里兰卡最南端的港口，常被指为“债务陷阱外交”的一个臭名昭著的实例。这个新港口于2010年开放，2017年当地

政府还不上债务时，招商局以一个99年期租约控制了港口。债务陷阱的指控在这里实则是错的，因为中国建造这个港口的主要目的是为了当时的总统（现任总理）马欣达·拉贾帕克萨在其家族的政治根据地的宣传和利益需求。中国企业当时已经在科伦坡港像土匪一样攻城略地了。此外，鉴于投建汉班托塔港面临的财务风险，中方银行明确了对贷款收取商业利率。

换句话说，并没有周密的计划。然而，汉班托塔港仍然拥有战略性地位，它就位于世界上其中一条最繁忙的海上通道以北数英里处。此外，一旦安装了加油设施，并且船只开始到这里停靠加油，汉班托塔港可能就不再像今天这样只是个昂贵的摆设了。未来中国将由此在印度洋拥有更多的战略跳板。

在太平洋地区，对债务陷阱外交的指责尤其普遍。2018年11月，美国副总统迈克·彭斯对亚太地区领导人说：“不要接受可能危及主权的外债。”这一危险对于那些偏远和脆弱的亚太经济体而言尤为严重。然而，悉尼智囊团劳威研究所（Lowy Institute）的罗兰·拉贾（Roland Rajah）、亚历山大·戴南（Alexandre Dayant）和乔纳森·普赖克（Jonathan Pryke）的论文为中国在太平洋的活动描绘了一幅更微妙的画面。他们得出结论，中国没有蓄意奉行陷阱政策。只有在汤加一国，中国占到了未偿债务的一半以上。同时，几乎所有官方贷款都以低利率和长宽限期的优惠贷款形式提供，与中国在世界其他地区的贷款形成鲜明对比。

当然，仅仅中国庞大的贷款规模就会在未来带来风险。但是，关于债务外交的辩论不应掩盖中国的太平洋活动中更为突出的问题。在劳威研究所的普赖克看来，问题既包括中国借贷的质量，也包括建立关系的方式。他说：“他们利用腐败作为参与的润滑剂。”通过与政客达成暧昧的协议，中国侵蚀了本就薄弱的治理体制。

其他地方还有指责称，这些项目加剧了所在国的国内问题。1月，习近平主席成为20年来首位访问缅甸的中国领导人，这次访问可能影响重大。随着一个深海港口在若开邦的皎漂开建，一条走廊将把中国西南部的内陆地

区连接到印度洋。缅甸为中国提供了一条关键的能源路线，从皎漂通往位于中国最西南端的省份云南的省会昆明。一条管道每年可以从孟加拉湾的油田抽出120亿立方米的天然气。第二条管道用于输送来自中东的石油。一条计划中的铁路将从皎漂经由曼德勒开往昆明，而曼德勒是缅甸中部一个中国人众多的城市。

这些管道对中国具有特殊价值。中国的战略家们长期以来都为“马六甲海峡困境”烦恼。美国海军控制的这个海峡是世界上最繁忙的海域，每年有近三分之一的全球海上贸易经过该海峡，其中包括中国80%的能源进口。中国担心的是，在危机或战争时期，美国及其盟国可能会阻断这条狭窄的通道，从而扼制中国。

但是，计划中的缅甸走廊穿过一片充满暴力而极端复杂的土地，在其边境地区有十几支叛军，由与中国有关的毒品、玉器和伐木勾当提供资金。中国的项目既有可能带来和平与发展，也有可能给种族冲突火上浇油。对于缅甸政府而言，中国太大了，既无法置之不理，也不想被它支配，而且从昂山素季以下，许多当权派与西方和日本有着长期的联系。眼下，缅甸因其军队对穆斯林罗兴亚人的种族清洗而受了西方的冷落。习近平当然不相信这种情况会持续下去。

海上丝绸之路的战略意义不仅限于港口。中国工程企业已经游说泰国军方，打算在该国南部的克拉地峡开挖一条100公里长的运河。支持者说，从阿拉伯海前往东亚的船只可把通行里程缩短1200公里。中国海军可以迅速到达印度洋。一条运河将使泰国成为围绕“快速交货”建立的区域电子商务经济的中心。

尽管将军们想要这样的商务发展，但对克拉运河却很不安。他们担心中国的控制。泰国南部因为长期以来的穆斯林叛乱活动而局势复杂——去年11月对安全检查站的袭击造成15人死亡。军队的神圣使命一直是把国家团结在一起。将国家从物理上一分为二，把不安定的穆斯林南部隔离开来，这让他们心神不宁。

这样说来，并非一切都会照着中国的想法走。当然，中国是欧亚的地缘政治力量，是经济实力和地理疆域的结合。但是，无论是在一带还是一路上，中国引领的活动与其他大国的活动相遇。在欧亚大陆，随着丝绸之路的重塑，其他旧时帝国也沿着它留下自己的印记。土耳其与中亚的突厥民族有着长期的族裔联系，并可提供建筑和商业知识。伊朗面对美国的敌对和制裁，已将和中亚发展关系作为“基本政策”。至于印度洋，印度仍然是该地区的海军强国。在科伦坡，除招商局外，印度和日本也共同开发了一个新的集装箱码头。

中国声称“双赢合作”就是“一带一路”倡议的全部内容。谁会想要任何别的可能呢？然而，沿着迅速兴起的数字丝绸之路，事情似乎越来越趋于零和。■



Histories of the web

Paradise lost

Two dotcom memoirs point to a pressing question: whose internet is it anyway?

IN THE PAST decade the number of people using the internet has leapt from 1.8bn, or a quarter of the world, to 4.1bn, well over half. Internet companies grew with their user bases. Ten years ago Facebook had roughly 2,000 employees; today 45,000 people work for it full-time, mostly in Silicon Valley. Google went from 24,000 staff to 119,000 in the same period. Add in other big firms such as Apple and Netflix, dozens of unlisted “unicorns” and thousands of startups, and the head-count in the valley is equal to a fair-sized city.

Who are these people? A handful are stereotypical wunderkinds, too busy building apps that improve the human condition to waste time on human emotions (or finish their degrees). But many—all the normal folk in sales, marketing, HR, customer support—are like Anna Wiener, the author of “Uncanny Valley”, a memoir about working in the tech industry of the 2010s. Like most people, the condition they mainly want to improve is their own.

In her telling, Ms Wiener, a sociology major who had the misfortune to graduate into the global financial crisis, starts her professional career as an assistant to a literary agent in New York. Tired of being privileged yet “downwardly mobile”, she joins a tech startup on the east coast, flubs it, but fails upwards to a better-paid job in San Francisco. Once there she observes first-hand the absurdities and extravagances of the industry. One of her employers is a meritocracy-obsessed cult with a name-your-own-salary policy that leads to an enormous gender pay gap. It marks its first round of venture-capital funding by building an exact replica of the Oval Office.

Another outfit unironically releases a sinister feature called Addiction which, as Ms Wiener ghostwrites in the blog post announcing it, “allows companies to see how embedded they are into other people’s lives”. She is at her best when describing the carelessness that would give the tech industry its well-deserved reputation for hubris. “Don’t be evil” is a blithe motto if the definition of “evil” is unexamined.

In New York, Ms Wiener recalls, “I had never considered that there were people behind the internet.” But in San Francisco “it was impossible to forget”. After all, she was one of them. Occasionally she has pangs of conscience, asking a friend, “Do you think I work at a surveillance company?” But such concerns fall by the wayside in a cloud of ecstasy and clean air, as she finds the twin millennial grails of a decent salary and comprehensive health care. Ever the ingénue, Ms Wiener does not set out to straddle the world like a colossus. She and legions like her are content merely to peep about from under the legs of digital history’s great men—men like the founder of “the social network everyone hated”, as she periphrastically refers to him.

“Of course, I hate [Facebook]. Who doesn’t?” writes Joanne McNeil in “Lurking”, a memoir of using, rather than making, the internet. She is almost apologetic about this judgment, noting that her lapse from reasoned criticism to diatribe is reserved for this single platform, a “digital cesspool” that is “one of the biggest mistakes in modern history”. The passage comes after more than 200 pages of reminiscences about the internet of yore—a place where people could choose to be “private or public, anonymous or named, factual or make-believe”. Ms McNeil covers niche New York chat rooms; the web’s early suburbs, known as GeoCities; and the proto-social networks of Friendster and Myspace, guiding readers, Virgil-like, to the Zuckerberg inferno.

| *Mon semblable, mon frère*

What happened? How did the web become “a hell that is fun, ruled by idiots and thieves”? The key is the smartphone, which brought the internet into everyday life. When Steve Jobs unveiled the iPhone in 2007, “the internet” and “real life” were still separate domains; people had to “get online” to move from one to the other. That was a disincentive, and anyway many had better ways to spend spare time than sit in front of a screen. A decade later, smartphones in hands, the distinction had evaporated. Suddenly anyone could be online—and they were, everywhere and all the time.

The people behind the internet continued to believe that most users were versions of themselves, “white, male, age 25 to 34, college-educated”. In reality the internet is more diverse, says Ms McNeil, taking in women and users of other ages, LGBT folk, ethnic minorities and all combinations thereof. True—but her idea of diversity is itself a narrow one. In fact, in the period she chronicles, the average internet user became poorer, older, less white and less likely to speak English. Seen through this lens, bemoaning the decline of “the internet” is a bit like complaining that flying has lost its glamour, or that a favourite bar has been overrun by strangers. Nobody goes there any more—it’s too crowded, as Yogi Berra once quipped.

America developed the internet, powerful American companies still run big swathes of it, and jobsworth American workers like Ms Wiener merrily push pixels around inside those behemoths. Yet just 6% of the world’s internet users are American. A vanishingly small proportion ever hung out in the AOL chat rooms or LiveJournal blogs of Ms McNeil’s lost nirvana. And the cultural influence of those early American users is steadily waning.

Perhaps the starkest example of this is the rise of TikTok, an app that lets people create and share short, goofy videos. It is owned by ByteDance, a giant Chinese startup; last year, several American senators speculated that it might pose a national-security risk. TikTok denied allegations that its

moderators took account of Chinese sensitivities, insisting it had never been asked to remove content by China's government (and would not comply if it were).

TikTok is unusual. When your home market is small or poor (as in much of the world), or hived off into a separate silo (like China's), it is hard to build global firms. All the same, even if the business of the internet remains anchored in California, its culture—the movies and music, flirtations and conversations—is expanding all the time, confounding the Silicon Valley types who thought they owned it. There is no longer such a thing as “the internet”, but many internets, belonging to many people, distinct but overlapping. It is not dying, as Ms McNeil fears, just respawning. ■



互联网历史

失乐园

两本互联网回忆录指向同一个紧迫的问题：互联网到底是谁的？【《诡谷》和《潜伏》书评】

过去十年里，使用互联网的人数从18亿、占世界人口的四分之一，激增至41亿，占到一大半。随着用户基数的增长，互联网公司也不断壮大。十年前，Facebook约有2000名员工，如今其全职员工已达45,000人，大多数在硅谷上班。同期谷歌的员工数量也从24,000人增至119,000人。再加上苹果和奈飞（Netflix）等大公司、几十家未上市的“独角兽”以及成千上万家创业公司，硅谷的工作人口已经相当于一个规模不小的城市。

这些人都是谁？当中有少数是典型的天才神童，他们忙着开发应用去改善人类的处境，根本无暇在七情六欲（或者完成学业）上浪费时间。但还有许多像《诡谷》的作者安娜·维纳（Anna Wiener）这样的普通人。维纳在这本书中回顾了过去十年自己在科技行业工作的经历。与地球上的大多数人一样，她和其他在销售、市场、人力及客户服务等部门任职的员工想要改善的主要还是自己的处境。

维纳讲述道，她的专业是社会学，毕业时不幸撞上全球金融危机，职业生涯的开端是在纽约给一个文学经纪人当助理。她厌倦了常感到与有荣焉实际却“向底层沉沦”的生活，于是加入了美国东海岸一家科技创业公司。她搞砸了这份工作，却歪打正着地在旧金山找到了另一个薪水更高的职位。到了那里，她亲眼目睹了这个行业的荒唐和铺张。她的一个雇主极度信奉精英管理，让员工自定薪水，结果导致了巨大的薪酬性别差异。为庆祝获得第一轮风险投资，他们居然完全复刻了一个白宫总统办公室。

她参与的另一个团队则真切地展现了一个邪恶的特征——“上瘾”。正如维纳在为一个博客代笔时宣称，这“让公司看到自己如何深刻地融入了他人的生活”。她对科技圈那种轻率疏忽的作风描述最为精彩，显示这个行业落得狂妄自大的名声也是咎由自取。如果对“恶”的定义不加以检讨，“不作

恶”就只是一句轻佻的口号。

维纳回忆道，在纽约工作的时候，“我从来没有想过互联网背后会有人。”但在旧金山“却无法忘记这一点”。毕竟，她也是其中一员。偶尔她也会突如其来地感到良心不安，问朋友：“你有没有觉得我是在一家监视公司工作？”但是，当千禧一代梦寐以求的两样东西——体面的薪水和全面的医保——摆在她面前，这些担忧就在一阵狂喜和春风拂面中被抛诸脑后。维纳不过是个纯真女孩，从未打算像巨人一样征服世界。她，以及千千万万像她那样的人，满足于躲在数字历史的巨人们脚边悄悄张望。这些巨人就包括了 she 委婉提到的那个“人人都厌恶的社交网络”的创始人。

“我当然讨厌（Facebook）了。谁不讨厌呢？”乔安妮·麦克尼尔（Joanne McNeil）在《潜伏》中写道。这是一本关于使用互联网而不是缔造互联网的回忆录。她对这一断言有些抱歉，声明自己唯独针对这个平台才会放弃一贯理性的批评而改为炮轰，因为这个“数字粪坑”是“现代史上最大的错误之一”。在写下这一段话之前，她用200多页的篇幅追忆了互联网的往昔——那时人们可以选择“私密或公开，匿名或实名，真实或虚构”。麦克尼尔谈到了小众的“纽约”聊天室、互联网早期的边缘地区“雅虎地球村”（GeoCities），以及Friendster和Myspace等原始社交网络。她像古罗马诗人维吉尔那样，带着读者一步步来到今天的扎克伯格地狱。

| *我的同类，我的兄弟*

到底发生了什么？互联网怎么就成了“一个由白痴和小偷统治的好玩地狱”？关键就在于智能手机，它将互联网带入了日常生活。2007年乔布斯发布iPhone时，“互联网”和“现实生活”还是彼此分离的疆域，人们必须先“上线”才能从一个转入另一个。这在当时是个限制因素，而且反正许多人还有比守在屏幕前更好的方式来打发闲暇时间。十年后，智能手机在手，这种分界已不复存在。突然之间，谁都可以上网了。而大家也正是这么做的，随时，随地。

互联网背后的那些人仍然以为大部分用户都是自己的翻版——“白人，男性，25到34岁，受过大学教育”。麦克尼尔说，事实上互联网更加多样

化，有女性、其他年龄段的用户、性少数群体、少数族裔，以及由此形成的种种组合。说得没错。但她对多样化的看法本身仍是狭隘的。实际上，在她记录的那段时期里，互联网用户的主体已经变得更穷、更老、白人比例更少、说英语的比例也更少。从这个角度看，哀叹“互联网”的衰落就有点像叹息坐飞机已经腔调不再，或者抱怨自己喜欢的酒吧已被陌生人挤爆。正如尤吉·贝拉（Yogi Berra）曾经调侃的那样：谁也不去那儿了——实在是太挤了。

互联网诞生于美国，其中很多领域仍由强大的美国公司掌控，像维纳这样的美国员工正在这些巨头公司中愉快而一板一眼地忙碌着。然而，全世界互联网用户中只有6%是美国人。在美国在线（AOL）聊天室里闲逛的人已变得少之又少，麦克尼尔视为失乐园的LiveJournal博客的用户也趋凋零。这些早期美国用户的文化影响力正日渐式微。

也许最明显的例子就是TikTok（抖音国际版）的兴起，这是一个让人们创建和分享各种傻气短视频的应用。它来自中国巨头创业公司字节跳动。去年，几位美国参议员认为它可能威胁美国国家安全。TikTok否认了其管理委员会顾忌中国敏感问题的指控，并坚称从未被中国政府要求删除内容（且即使有，也不会遵从）。

TikTok是个不寻常的例子。如果你的本土市场规模小或贫穷（正如世界大部分地区），或者自成一体（如中国），那么就很难打造出全球性的企业。尽管如此，虽然互联网的业务仍然扎根于加州，但其文化——电影和音乐、风情和对话——却在持续不断地延伸扩展，令那些自以为拥有互联网的硅谷人惊讶迷惘。现在已经不存在所谓的“一个互联网”，而是分属于许多人的许多个互联网，它们迥然不同而又互有交集。互联网并没有像麦克尼尔担心的那样正在消亡，只不过是重生。■



Force majeure

A force to be reckoned with

Chinese firms use an obscure legal clause to wiggle out of contracts

“IT IS GOING to be an almighty legal mess for months and years to come.” That grim prognosis of the potential legal and business consequences of the viral outbreak in China comes from a veteran of the country’s business scene. Dan Harris of Harris Bricken, an American law firm, worries that today’s trickle of mainland suppliers declaring *force majeure* (FM), an obscure legal manoeuvre used to get out of contracts, could turn into a tidal wave.

The crisis has certainly put many firms in a bind. If this were a normal year, most factories would have shut for a week or so in early February so that migrant workers could return to their villages to celebrate Chinese new year. By now, plants would be roaring at full capacity. But because of a lockdown of a large area around Wuhan, the outbreak’s centre, and ongoing restrictions on travel, workers are only slowly trickling back. Morgan Stanley, an investment bank, reckons that production may reach only 60% to 80% of normal levels by the end of February.

The result is that the supply chains of global firms, which often rely on “just in time” deliveries of stocks, are being disrupted. Chinese buyers of imported commodities are also hurt, thanks to weak local demand. Nomura, a Japanese bank, thinks Chinese year-on-year economic growth could plunge to 3% in the first quarter, down from 6% the previous quarter.

China Inc is panicking. Firms are starting to invoke FM to avoid paying non-performance penalties on contracts. On February 17th, the China Council for the Promotion of International Trade (CCPIT), an official body, revealed that it has already issued over 1,600 “FM certificates” to firms in 30

sectors covering contracts worth over \$15bn. These give official support to its invocation. More are likely to come.

All this raises several questions. First, since this clause typically refers to “acts of God” like earthquakes and hurricanes, does it really apply to an epidemic probably caused by humans eating exotic animals and to the heavy-handed government response to it? Second, even if deemed relevant, will FM really work in practice? And finally, is a lengthy legal tangle inevitable?

On the first question, common sense suggests no but precedent and officialdom say yes. David Buxbaum of Anderson & Anderson, a lawyer who has worked in China since 1972, reports that some suppliers successfully invoked FM in local courts in the wake of the SARS virus outbreak of 2003. On February 10th, the National People’s Congress ruled that policies implemented to control the virus (such as production curbs and city lockdowns) that interfere with contracts should be considered FM.

On whether invoking this clause will really work, legal opinion is divided. Many trading contracts fall under international jurisdictions less friendly to this claim than China with courts not overly impressed by FM certificates. Earlier this month, CNOOC, a Chinese state-run oil firm, invoked FM in refusing to accept a shipment of liquefied natural gas from Royal Dutch Shell and Total—a claim rejected by the European oil giants. Traders whisper that mainland firms are using the viral outbreak to try to renegotiate terms, a tactic they deride as “price majeure.”

“FM is a recognised doctrine in civil-law systems like that of China but is not a doctrine of common-law systems, like English law,” observes Simmons+Simmons, a British law firm. It is typically only respected by courts in London and Hong Kong if the contract has a specific FM clause. So local firms are likely to get a more sympathetic hearing in mainland courts.

Mr Harris thinks that even if a foreign firm gets a favourable ruling overseas, it may still need to get it enforced by a Chinese court. That court will see the FM certificate and likely rule for the mainland firm.

Tobias Larsson of Resilience360, a German supply-chain consultancy, thinks that invocation of FM could help make the fallout from the virus the “biggest supply-chain disruption since Japan’s earthquake.” Mayer Brown, an American law firm, worries that use of FM and other legal tactics “may be passed along supply chains around the world, causing firms based in other jurisdictions to seek similar relief.”

Still, there is a reason to think legal chaos might be avoided. Unlike during the SARS epidemic, when multinationals could easily shift sourcing, Chinese firms are now critical (and sometimes the only) suppliers of vital parts to many industries. John Hoffecker of Alix Partners, a consultancy, says that his clients are more concerned about being the first to receive parts as factories restart than about FM. So foreign bosses may agree to renegotiate terms with certificate-waving vendors through gritted teeth rather than risk losing them altogether through bitter legal battles. ■



不可抗力

不可小觑的力量

中国企业利用一项含混的法律条款摆脱合同责任【新冠报道】

“接下来几个月乃至几年里会生出一大堆法律纠纷。”中国商界一位资深人士对新冠疫情的潜在法律和商业后果做出了这样的严峻预测。美国哈里斯-布里肯律师事务所（Harris Bricken）的丹·哈里斯（Dan Harris）担心，目前中国大陆的供应商以不可抗力条款（用来摆脱履约义务的一种含混的法律手段）免责的“涓涓细流”可能会变为“滔滔洪潮”。

这场危机无疑把许多公司推入了困境。如果这是一个一切如常的年份，那么大多数工厂会在2月初关闭一周左右，让农民工返乡过年。而到了此时，工厂本应在热火朝天地满负荷生产。但由于围绕疫区武汉的大面积封锁以及各地对出行的持续限制，工人目前还只是逐渐缓慢地回流。投行摩根士丹利估计，到2月底，工厂产量可能只有正常水平的60%到80%。

结果是那些常常依赖“及时”交货的全球企业的供应链中断。由于本地市场需求疲软，中国的进口商也遭受损伤。日本投行野村证券认为，中国第一季度经济同比增速可能从上季度的6%骤降至3%。

中国企业陷入了恐慌。为避免支付合同违约金，它们开始援引“不可抗力”条款。2月17日，官方机构中国国际贸易促进委员会透露，它已向30个行业的公司出具了1600多份“不可抗力事实性证明”，涉及合同金额超过150亿美元。该证明为企业援引不可抗力条款免责提供官方支持。该机构很可能会开出更多这样的证明。

这一切引发了几个疑问。首先，鉴于不可抗力条款通常是针对地震和飓风之类的“天灾”，它真的适用于可能由人类食用野味而引起的流行病以及政府为此采取的高压防控措施吗？第二，即使被认为适用，但在实际操作上，援引它真能免责吗？最后，冗长的法律纠纷是否在所难免？

关于第一个疑问，从常识来说答案是否定的，但有前例和官员给出肯定的答案。自1972年起在中国工作的安与恩律师事务所

（Anderson & Anderson）的律师大卫·包恒（David Buxbaum）表示，2003年SARS疫情爆发后，一些大陆供应商成功在国内法院援引不可抗力条款免责。2月10日，全国人民代表大会裁定，为遏制病毒传播而实施的、干扰合同履行的政策（如停工停产和封城）应被视为不可抗力。

关于援引该条款是否切实可行，法律界莫衷一是。许多贸易合同属国际司法辖区管辖，对援引该条款的态度不像中国那么友好，法院没那么认可“不可抗力事实性证明”。本月初，中国国有石油公司中海油援引不可抗力条款，拒绝接收荷兰皇家壳牌和道达尔交付的液化天然气，但遭到这两家欧洲石油巨头拒绝。贸易商私下认为这是中国大陆企业试图利用疫情重新谈判合同条款。他们嘲笑这种手段可被叫做“不可抗价格”。

“不可抗力在中国这样的大陆法系中是被认可的原则，但并非英国法律这类英美法系的原则。”英国西盟斯律师事务所（Simmons+Simmons）指出。如果合同包含特定的不可抗力条款，一般只有伦敦和香港的法院会承认。因此，本地企业在中国大陆法院的听审中应该能获得更多同情。哈里斯认为，即使外国公司在海外获得有利裁决，可能仍需要中国法院执行，而中国法院会考虑“不可抗力事实性证书”，很可能裁定大陆公司胜诉。

德国供应链咨询公司Resilience360的托比亚斯·拉尔森（Tobias Larsson）认为，援引不可抗力条款可能令新冠病毒的冲击成为“自日本地震以来最大的供应链中断事件”。美国孖士打律师事务所（Mayer Brown）担心利用不可抗力条款和其他法律手段免责的做法“可能会沿着供应链蔓延到世界各地，导致其他司法辖区的公司寻求类似的解困手段”。

尽管如此，仍有理由认为法律乱局或可避免。在SARS疫情时期跨国公司可以轻松转向别处采购，如今则不同，中国企业已是许多行业里重要零部件关键的、有时甚至是唯一的供应商。咨询公司艾睿铂（Alix Partners）的约翰·霍菲克（John Hoffecker）表示，相比争执不可抗力条款，自己的客户更关心的是能在中国的工厂复工后最先收到零部件。因此，外国老板

可能会咬咬牙同意与挥舞不可抗力证书的供应商重谈条件，而不是冒着完全失去它们的风险大打官司。■



Bartleby

I am Number 0.6

How modern workers are at the mercy of ratings

A CLOSE FRIEND of Bartleby's just got the news that their department was shedding 2.6 workers. At first sight, the concept of 0.6 of a worker sounds pretty odd. But workers who are freelance, on temporary contracts, or in part-time employment register in the headcount as less than a whole number.

Being classed as 0.6 of a worker seems dehumanising. Few people want to be thought of as just a number, let alone a fraction. In "The Prisoner", a cult British television series from the 1960s, the hero, played by Patrick McGouhan, resigns from his job as a secret agent only to be abducted and taken to a village. He is only referred to as "Number 6" and his frequent escape attempts are frustrated.

Although he insists that "I am not a number, I am a free man", the audience never learns his name. The programme has a very 1960s vibe—it focuses on the individual's efforts to assert himself in the face of a repressive, conformist society. At one point, the title character declares: "I will not be pushed, filed, stamped, indexed, briefed, debriefed or numbered. My life is my own."

These days many workers would sympathise. They feel pushed, filed, indexed and numbered. When they apply for a job, they may be assessed by artificial intelligence, which parses résumés for key words without which an applicant's odds of an interview lengthen. Based on works like "Evidence-Based Recruiting" by Atta Tarki, who claims that scores in general-mental-ability tests have a strong 65% correlation with job performance, firms may ask candidates to take an intelligence test.

When they get a job, employees find the indexing and numbering continues. Workers at warehouses have to pick a certain number of items per hour; those at call-centres are assessed by software that monitors their hourly number of calls, and the amount of time spent on each one. Fall behind the target and you may feel unable to take a break. When their task is completed, employees are often rated again, this time by the customers.

Manufacturing workers have long faced these kind of numerical targets, as well as the need to clock in and out of work. The big change is that similar metrics and rating systems are spreading to more and more parts of the economy. Academics get rated by students; nurses may be judged on a “behaviourally anchored rating scale” which assesses how much empathy they showed to patients.

Ratings are at the heart of the gig economy, where workers are connected with employers and customers via the internet. Just as TripAdvisor ratings allow holidaymakers to assess hotels, Uber drivers get a score out of five. The same goes for ratings on services like TaskRabbit (for odd jobs) and Etsy (for arts-and-crafts sellers).

Such systems are understandable in parts of the economy where output is difficult to measure precisely. But they can be arbitrary. People might give an Uber driver a poor rating because they are in a bad mood or because they encountered unexpected traffic disruption (the drivers themselves also rate customers, which is meant to discourage abuse).

The result can be increased insecurity for gig-economy workers. Their income is uncertain when they are at the mercy of the assessment system. Even a tiny fall in their rating—of, say, 0.6—can harm their job prospects. A detailed study* of 65 gig-economy workers found that they relished their independence but it came with a host of personal, social and economic anxieties.

Even full-time workers may find themselves dependent on their score in one category or another. Businesses want to avoid accusations of hiring biases on grounds of gender or ethnicity; using “objective” rating systems can protect them from discrimination lawsuits. And employees need to be concerned about how they are rated.

Gianpiero Petriglieri of the INSEAD business school says that, since firms no longer offer jobs for life, everyone is an independent worker whether they like it or not. The key passage in your CV may not be the universities you attended, but your rating in categories like teamwork, innovation and adaptability.

Heaven forbid, the system even extends to journalists. Some publications reward writers based on the number of clicks their articles attract. Find out more in next week’s Bartleby column: “How the Kim Kardashian diet can boost your IQ and job prospects”.

* “Thriving in the gig economy”, by Gianpiero Petriglieri, Susan Ashford and Amy Wrzesniewski, *Harvard Business Review*, March-April 2018 ■



巴托比

我是0.6号

现代劳动者如何受评分的摆布

本专栏作者的一位密友刚收到消息，他所在的部门打算裁员2.6人。乍一看，“0.6个人”的说法听起来很怪异。但自由职业者、临时工或兼职人员在员工人数统计中本来就不按整数算。

被归为0.6个员工似乎很不近人情。谁也不愿意被当成一个数字，更不用说还是个小数。在上世纪60年代英国另类电视剧《六号特殊犯人》（The Prisoner）里，帕特里克·麦高汉（Patrick McGoohan）饰演的主角辞去了特工的工作，结果却被绑架到一个村庄。在那里他只被称为“6号”，他试图逃走但屡战屡败。

虽然他坚称“我不是数字，我是个自由人”，观众却自始至终不知道他的名字。故事具有鲜明的60年代气息，着重表现一个人在压制的、遵奉的社会中坚持自己的立场。有一次，“6号”宣称：“我不要被推来推去、归档、盖章、标记、训话、盘问或编号。我的人生是我自己的。”

今时今日，许多工人可能对此感同身受。他们感到被推来推去、归档、标记和编号。在应聘时，他们可能先由人工智能评估，人工智能会根据关键词分析简历，如果简历中没有相应的关键词，求职者获得面试的几率就会降低。阿塔·塔尔基（Atta Tarki）的“循证招聘”研究声称，一般心智能力测试的得分与工作绩效的相关性高达65%。公司可能会基于这类研究而要求应聘者接受智力测试。

被聘用后，员工会发现标记和编号的行为仍在继续。仓库工人必须每小时分拣一定数量的货品；呼叫中心的员工由软件评估，监测他们每小时的通话次数以及每次通话的时长。要是还没达到目标，你可能都不敢缓口气。员工完成任务之后，往往还要接受顾客的打分评价。

长期以来，制造业工人在上下班打卡之外一直都要面对这种数值指标。一个重大的变化是如今类似的指标和评分体系已经扩散到越来越多的经济领域。高校教研人员要接受学生的评价；护士可能要根据“行为锚定评分量表”接受考核，测评他们对病人表现出的同理心。

零工经济的劳动者通过互联网与雇主和顾客建立联系，而评分是零工经济的核心。正如度假者可以通过猫途鹰（TripAdvisor）的评分来评价酒店，优步司机也按五分制被打分。零工平台TaskRabbit和手工艺品交易平台Etsy等服务平台上的评分也是一样的操作方式。

在一些难以精确衡量产出的经济领域，使用这样的体系是可以理解的。但评分可能会主观随意。乘客也许会因为心情不好或者意外的交通堵塞给优步司机差评（司机也会给乘客评分，为的是防止滥用打分机制）。

其结果可能是加重了零工经济劳动者的不安全感。由于受制于评价体系，他们的收入变得不确定。即使评分稍微下降——比如0.6——也可能损害他们的工作前景。一份对65名零工经济劳动者的详细调研*发现，虽然他们十分享受自己工作的独立性，但伴随而来的是各种个人、社交和财务上的焦虑。

即使全职员工也可能依赖这样或那样的评分。为了避免被指责在招聘时存在性别或种族偏见，企业使用“客观”评分系统来保护自己免遭歧视诉讼。而员工也需要关心对自己的评分。

欧洲工商管理学院（INSEAD）的詹比耶洛·彼崔格里利（Gianpiero Petriglieri）称，由于企业已不再提供终身雇佣，每个人都成了独立劳动者，不管你喜不喜欢。简历中最重要的段落也许不是你曾就读哪所大学，而是你在团队合作、创新和适应能力等方面的得分。

万万想不到啊！这种体系甚至还能用到记者身上。一些刊物会根据文章的点击量来奖励作者。欲知详情，请留意下周的巴托比专栏：《金·卡戴珊的饮食法如何提升你的智商和就业前景》。

* 《在零工经济中如鱼得水》，詹比耶洛·彼崔格里利、苏珊·阿什福德和艾美·瑞斯尼斯基著，《哈佛商业评论》，2018年3-4月合刊 ■



Free exchange

Shock therapy

The covid-19 outbreak presents policymakers with a new sort of economic threat

THE ONLY thing we have to fear is fear itself, or so reckoned Franklin Roosevelt. In many an economic downturn that is true—an anxiety-induced reluctance to spend is the main threat to prosperity. For now, the world is treating the outbreak of covid-19, a disease caused by a coronavirus that is now responsible for more than 2,000 deaths, as no exception. Central banks across Asia are easing monetary policy while governments prepare spending programmes to limit the economic damage.

Covid-19, however, is not a conventional economic threat. Efforts to contain the virus are limiting activity by shutting factories and disrupting supply-chains. Such shocks to supply are harder to manage than anxiety-induced frugality among firms and investors. When people stop spending, growth slows and inflation falls. But when supply is constrained, prices can accelerate even as the economy wobbles. Economists first grappled with supply shocks in the 1970s, when reductions in food and oil supplies ended three decades of unprecedented growth and ushered in “stagflation”. Supply shocks divided the profession. Predictably, there was a row over whether governments should prioritise fighting rising unemployment or high inflation. In a victory that would shape central banking for decades, the inflation hawks eventually won.

Like the oil and food shocks of the 1970s, the covid-19 epidemic poses an unexpected threat to a mainstay of global production. For as long as the mobility of Chinese workers is limited, shops, offices and factories in the world’s largest exporter will sit idle. As a result, firms dependent on supplies from China are running down inventories and curtailing operations. On February 17th Apple warned investors that supply-chain

problems were limiting iPhone production and would reduce its revenues. Hyundai, a carmaker, has cut production in South Korea because of parts shortages. On February 18th Jaguar Land Rover, a British carmaker, said that it could start to run out of parts in two weeks' time, and that it had flown in emergency supplies from China in suitcases.

But whether the understanding of supply shocks forged in the 1970s still applies is unclear. In practice, the distinction between shocks to demand and those to supply is fuzzy. In a paper published in 2013 that revisited the era of stagflation, Alan Blinder of Princeton University and Jeremy Rudd of the Federal Reserve argue that supply alone cannot explain the soaring unemployment of the 1970s. In fact, they say, price increases had demand effects that mattered more. They raised uncertainty, reduced households' disposable income and eroded the value of their savings.

Subsequent experience supports this more nuanced view of the effect of supply shocks. Soaring oil prices in 2007 gutted household consumption in America and helped push its economy into recession. The earthquake, tsunami and resulting nuclear disaster that struck Japan in 2011 dealt a blow to Japanese industry which, like China's, occupies important supply-chain niches. The catastrophe led to a sharp decline in output and exports (and a long-term shift in economic activity away from the most affected regions), but despite the disruptions Japan remained in deflation. Higher tariffs should, in theory, disrupt supply and boost prices. But to date the main economic effect of the trade war being fought by America and China has been dented confidence, derailed business investment and tumbling interest rates. The covid-19 outbreak is hitting China's demand for commodities and its tourists' travel plans. Both effects drag down global demand in a conventional way, as they did after the outbreak of SARS in 2003.

Circumstances today are also very different from the 1970s. Crucially, global

inflation remains oddly subdued. That means policymakers can provide stimulus without exacerbating an ongoing inflation problem. Support seems warranted in China, where lost sales could give way to lay-offs, further cuts to spending, and a deep slump. Economies with close links to China are also moving, rightly, to shore up spending. Japan's decision to raise consumption tax last year, a move that contributed to an annualised decline in GDP of 6.3% in the fourth quarter of 2019, looks spectacularly ill-timed in hindsight.

Should covid-19 sweep across the world, the global economy as a whole will surely need a dose of stimulus, much as China does today. The main complication then would be a lack of central-bank ammunition, as interest rates are already low. But even if the virus stays contained, governments of less affected countries could have their hands full. Policymakers facing temporary supply shocks must reassure the public that growth and inflation will eventually return to normal—as modern central banks now try to do when oil prices spike. Continued disruption, though, requires adjustment. New suppliers must be tracked down, new contracts written and new customers found. Frustrated firms could decide the time is right to wash their hands of China. The effects of such changes are hard to predict.

| *Ill at ease*

If China's economy slumps further in response, it could exert a deflationary pull on economies in the West. But if decades of economic integration, which many economists credit with holding down global inflation for the past two decades, goes into reverse, then dormant price pressures could awaken. Macroeconomic policymakers could once again be confronted with the painful decision of whether or not to fight rising inflation during an economic downturn.

For policymakers beset by unknowns, both overreaction and underreaction present serious risks. The time to build more resilience into production

chains and financial systems has sadly passed. Perhaps the most important lesson of the 1970s is one the world ought to have appreciated before the arrival of the epidemic—shocks happen, and can transform well-worn economic terrain into something less familiar with frightening speed. ■



自由交流

冲击疗法

新冠肺炎疫情给政策制定者带来了一种新型经济威胁

我们唯一要害怕的是害怕本身，富兰克林·罗斯福那句话大概是这么说的。在许多次经济衰退中，情况确实是如此——人们因焦虑而不愿消费，成为威胁经济繁荣的主要因素。眼下，世界对新冠肺炎疫情（已导致超过2000人死亡）的应对也不例外。亚洲各国央行都在放松货币政策，各国政府也在拟订开支计划以求限制经济损害。

但是，新冠肺炎并不是那种常规的经济威胁。为遏制病毒传播，政府限制了经济活动：工厂被关闭，供应链中断。相比企业和投资者因为忧虑而紧缩开支，这种中断对供应的冲击更难应付。当人们停止消费，增长会放慢，通胀会下降。但当供应受限，即便是在经济摇摇欲坠之时价格也可能加速上涨。上世纪70年代，经济学家首次开始对抗“供给冲击”问题，当时粮食和石油供应减少，终结了持续30年的空前增长，开启了“滞涨”时代。“供给冲击”分裂了经济学家的圈子。可以想见的是，他们为政府应该先解决高失业率还是高通胀争执不下。主张先抗击通胀的鹰派最终胜出，奠定了之后几十年里央行决策的基调。

和70年代石油与食品短缺一样，新冠疫情给全球生产的一大支柱带来了意想不到的威胁。只要中国工人的出行受限，这个全球最大出口国的商店、办公室和工厂就会闲置。这继而导致依赖中国供应的企业库存减少，经营活动受抑制。2月17日，苹果公司向投资者发出警告，称供应链问题令iPhone生产受限，可能导致营收减少。因为零部件短缺，汽车制造商现代已经减少了韩国工厂的产量。18日，英国汽车制造商捷豹路虎表示可能会在两周内耗尽零部件库存，公司已经让人把零件装在行李箱里从中国空运过来应急。

但是，尚不清楚在70年代形成的对供给冲击的看法是否仍适用于当下。事实上，对需求的冲击和对供给的冲击之间的界限很模糊。普林斯顿大学的

艾伦·布林德（Alan Blinder）和美联储的杰里米·路德（Jeremy Rudd）在2013年发表的论文重新审视了滞涨时代，认为70年代失业率飙升不能单从供给面来解释。他们表示，价格上涨的需求效应其实影响更甚。它增加了不确定性，减少了家庭可支配收入，令存款贬值。

后来发生的事支持了这种对供给冲击的影响更加细致的看法。2007年，油价飞涨重挫美国家庭消费，助推了经济衰退。2011年的地震、海啸以及由此导致的核事故沉重打击了日本产业。和中国一样，日本也在全球供应链上占据着非常重要的位置。这场灾难导致产量和出口急剧下降，经济活动长久地从受影响最严重的地区转移出去。但尽管遭受这样的破坏，日本仍处于通缩状态。理论上，关税上调会中断供应，推高价格。但迄今为止，中美贸易战的主要经济影响是信心削弱、商业投资告吹、利率下滑。受新冠疫情冲击，中国对大宗商品的需求下降，中国游客的旅行计划取消。这两方面的影响如同以往一样拖累全球需求，2003年SARS疫情爆发之后就是这样。

眼下的情形也与70年代大不相同。关键在于全球通胀仍离奇地处于低位。这意味着政策制定者可以推出刺激措施而不致加剧已有的通胀。在中国，销售损失可能导致裁员、进一步削减支出以及经济严重滑坡，政府似乎有正当理由推出支持措施。与中国关联紧密的经济体也在采取行动刺激支出，这是对的。日本去年决定上调消费税，导致2019年第四季度GDP年化下降了6.3%，现在回头看，这项措施太不合时宜。

如果新冠疫情蔓延到全球，那么整个全球经济无疑将需要一剂强心针，就像现在的中国一样。届时主要的并发症将是央行缺乏弹药，毕竟利率已经很低。但是，即使病毒被控制住，在那些受影响较小的国家里，政府也可能要忙得焦头烂额。面对供应暂时中断的冲击，政策制定者必须向公众保证增长和通胀最终将恢复常态，就像现代央行如今在油价飙升时尽力去做的那样。但如果中断长期持续，那就需要做出调整。必须找到新供应商，签下新合同，寻找新客户。受挫的企业可能会决定这次终得要甩掉中国供应商了。这类变化的影响难以预测。

| 深感不适

假如中国经济因此而进一步下滑，它可能会把西方经济体往通缩的方向拽。但假如几十年来的经济一体化进程（许多经济学家认为这是过去20年全球通胀受抑制的原因）逆转，那么蛰伏的价格压力可能会被唤醒。宏观经济政策制定者可能会再次面临痛苦的抉择，即在经济衰退时是否出手抑制通胀加剧。

对于深受未知数困扰的政策制定者而言，反应过度和反应不足都会带来严峻的风险。可惜的是，增加生产链和金融系统的韧性的时机已经错失。也许全世界在这场疫情爆发之前就应该领会上世纪70年代最重要的教训：冲击总会发生，而且会以骇人的速度把人们已经烂熟于心的经济地形变陌生。■



Free exchange

Rummaging in the toolbox

Economists hope yield-curve control can fight the next recession, but it may not be enough

MANY HAZARDS complicate the job of Jerome Powell, the chairman of the Federal Reserve, from meddling presidents to pandemics. At the press conference following the Fed's monetary-policy meeting on January 29th, he was grilled on its likely response to all of these. But Mr Powell's biggest problem is a more enduring and global one: interest rates are stubbornly low. In recent months, members of the Fed's Board of Governors have spoken about the need to prepare for future downturns. The Fed's main policy rate will almost certainly be cut to zero, forcing it to rely once more on its "unconventional" tools. Mr Powell has said he is open to considering yield-curve control, a new approach borrowed from Japan. It is a promising innovation, but also a timid one, given the challenges the next recession will probably bring.

During the global financial crisis the hope was that when recovery arrived overnight interest rates—central banks' preferred policy lever—would rise, restoring business as usual. In fact, despite a resilient global expansion, few rich-world countries have left zero behind. America, the most obvious exception, discovered last year that it could not sustain an overnight rate above 2%, even with low unemployment and a government-budget deficit approaching 5% of GDP. Some economists reckon low rates are only a minor inconvenience. In a recent lecture Ben Bernanke, a former Fed chairman, argued that the unconventional tools used during and after the crisis worked reliably and effectively, and could do so again. Others would prefer to have more powerful, and comprehensible, monetary policy ready for the next downturn.

The natural extension of interest-rate policy would be to cut overnight rates into negative territory, as central banks in Europe and Japan have already done. But the room for manoeuvre is limited. Economists worry that even modestly negative rates risk destabilising the financial system, as banks become reluctant to pass on interest-rate cuts for fear that depositors will yank their savings out. Fewer worries attach to quantitative easing (QE), the Fed's unconventional tool of first resort, though it too has its downsides.

Before the crisis, the Fed traded bonds to keep overnight interest rates within a desired range. With QE, by contrast, bond purchases are an end in themselves. Rather than announce changes to rates, central bankers inform markets of the quantity of bonds they will buy (hence "quantitative") with newly created money. When investors sell long-term government bonds to the central bank, the thinking goes, they use the cash they receive to buy other assets, such as corporate bonds or equities. Higher stock and bond prices in turn encourage firms to invest, boosting the economy.

Some evidence suggests that QE is subject to diminishing returns, however, and works best when credit markets are in crisis, which is not the case in most recessions. Asset-purchase programmes can also be difficult for investors to interpret. In 2013, for example, when the Fed signalled that it might curtail purchases, markets spasmed. In November Lael Brainard, a Federal Reserve Board governor, noted that the Fed's announcements regarding QE often wrong-footed markets. This confusion may have put the Fed off using QE as aggressively as the economy required.

Yield-curve control would allow a central bank that has cut its overnight rate to zero to set rates for bonds of longer maturities. Keeping rates down at any horizon should stimulate investment and consumption, helping the economy. The Bank of Japan began its programme by targeting a yield of 0% for ten-year Japanese government bonds; an American version might begin by capping the rate for one-year bonds, then adding in longer durations as

needed. No announcements regarding the buying or selling of bonds would be necessary; the Fed would simply transact in the bond market to keep yields on target, as it does for overnight rates. And this would be easier for markets to parse than tweaks to QE.

A commitment to defend interest-rate pegs unnerves some economists. Mr Bernanke warns that America's government-bond market is so large and liquid that the Fed might have to purchase huge quantities of Treasuries to hit its target. But if markets found the yield-curve policy credible, the Fed might not need to buy many bonds at all; its commitment to intervene would deter investors from selling bonds at yields outside its target. And it might reinforce the central bank's promises about the future path of short-term interest rates. The Bank of Japan, which conducted QE before switching to its yield-curve control policy, has kept yields at its desired level while buying fewer bonds than before.

Still, even successful yield-curve control could underwhelm. Long-term rates are already low, limiting the stimulus to be had from reductions. In Japan a pancake-flat yield curve has not pushed inflation up to the central bank's 2% target, and low government-bond yields seem to be encouraging insurers and pension funds to load up on dangerously risky assets. Bolder change, like a shift to a higher inflation target, might offer a sustainable route away from low interest rates. But getting there might require more firepower than a central bank alone can muster.

| *Bonds away*

Government spending packs a powerful punch, and sustained low rates of interest are sapping political opposition to large budget deficits. Even so, American-style deficits worry economists, who fear that markets will eventually lose their appetite for bonds. Under yield-curve control, however, the central bank would in effect guarantee the government's low borrowing costs.

America has controlled its yield curve before—in the 1940s, when the Fed held down the government's borrowing costs during the second world war. Few economists would endorse such a strategy outside wartime. But yield-curve control cannot fight the next recession alone. Without bigger changes to monetary policy, it will need to be paired with fiscal stimulus. Blurring the line between monetary and fiscal policy may once again become imperative. ■



自由交流

翻箱倒柜

经济学家希望能靠收益率曲线控制抵御下一次衰退，但这可能还不够

从爱指手画脚的总统到流行病的爆发，多种危险让美联储主席杰罗姆·鲍威尔的工作愈加复杂。在1月29日美联储货币政策会议后的新闻发布会上，他被追问美联储对所有这些问题可能的应对措施。但鲍威尔面临的最大问题是一个更持久、更全球性的问题：利率持续低位。近几个月来，美联储的理事们已经谈到了需要为未来的经济衰退做准备。几乎可以肯定，美联储的主要政策利率将被降至零，迫使它再次依赖其“非常规工具”。鲍威尔曾表示愿意考虑收益率曲线控制，这是借鉴自日本的一种新方法。鉴于下一次经济衰退可能带来的挑战，这是一项有前途的创新，却也是一项胆怯的创新。

全球金融危机期间，人们曾希望等到经济复苏时，作为各国央行首选政策杠杆的隔夜利率将会上升，助力经济恢复正常。实际上，尽管全球恢复经济增长，但几乎没有几个发达国家的利率摆脱了零。最明显的例外是美国。不过，即使去年美国失业率较低，政府预算赤字接近GDP的5%，其隔夜利率也无法维持在2%以上。一些经济学家认为低利率只是一个小麻烦。在最近一次演讲中，前美联储主席本·伯南克认为，危机期间和之后使用的非常规工具很可靠也很有效，而且还可能再次发挥作用。另一些人则希望有更强大、更容易理解的货币政策来应对下一次衰退。

利率政策的自然延伸是将隔夜利率降至负值，就像欧洲和日本的央行已经做的那样。但回旋的空间有限。经济学家担心，即使是小幅的负利率也有可能破坏金融体系的稳定，因为银行担心储户会把存款取出，所以不愿把降息传递下去。量化宽松是美联储首选的非常规工具，尽管它也有不利之处，但人们对它的担忧较少。

危机前，美联储通过债券交易将隔夜利率维持在一个理想区间内。相比之下，使用量化宽松时，购买债券本身就是目的。央行官员不会宣布调整利

率，而是通知市场他们将用新发行的货币购买的债券数量（因此叫做“量化”）。这种方式预计投资者在向央行出售长期政府债券后，会用收到的现金购买其他资产，如公司债券或股票。更高的股票和债券价格反过来再鼓励公司投资，促进经济增长。

然而，一些证据表明量化宽松遵从收益递减的规律，而且在信贷市场陷入危机时效果最好，但大多数经济衰退期的情况并非如此。资产购买计划也可能很难让投资者理解。例如，2013年当美联储暗示可能缩减购债时，市场出现了痉挛。去年11月，美联储理事莱尔·布雷纳德（Lael Brainard）指出，美联储有关量化宽松的声明常常让市场措手不及。这种混乱可能导致美联储在使用量化宽松时未能达到经济所需的大胆程度。

收益率曲线控制让已经将隔夜利率降至零的央行能够设定较长期债券的利率。在任何期限上保持低利率应该都能刺激投资和消费，从而助力经济。日本央行这个项目的开端是为10年期日本政府债券收益率设定0%的目标。美国的方案可能会从限制一年期债券的最高利率开始，然后根据需要增加更长的期限。债券的买卖无需公告，美联储只需要通过在债券市场交易来将收益率维持在目标水平，就像对隔夜利率一样。而对市场来说，这比调整量化宽松更容易理解。

保卫利率固定的承诺让一些经济学家感到不安。伯南克警告说，美国政府债券市场规模庞大，流动性强，美联储可能得购买大量国债才能达到目标。但如果市场认为收益率曲线政策可信，那美联储可能根本不需要购买大量债券，它对干预的承诺就会阻止投资者以高于目标收益率的价格出售债券。而这可能会强化美联储对短期利率未来走势的承诺。日本央行在实施了量化宽松后转向收益率曲线控制政策，它已经将收益率保持在了预期水平，而购买的债券数量减少了。

不过，即便是成功的收益率曲线控制也可能令人失望。长期利率已经很低，这限制了降低利率的刺激效果。在日本，平坦的收益率曲线并没有将通胀推高至央行2%的目标，而较低政府债券收益率似乎在鼓励保险公司和养老基金增持危险的风险资产。而更大胆的改变，比如转向更高的通

胀目标，可能会提供一条摆脱低利率的可持续道路。但要实现这一目标，可能需要比央行单独行动更强大的火力。

| 放弃债券

政府支出是一剂强心针，而持续的低利率削弱了巨额预算赤字面对的政治阻力。即便如此，美国式的赤字水平还是让经济学家们忧心忡忡，他们担心市场最终会对债券失去兴趣。然而，在收益率曲线控制下，央行实际上会保证政府的低借贷成本。

美国曾经控制过自己的收益率曲线：上世纪40年代美联储压低了政府在二战期间的借贷成本。很少有经济学家会在非战争时期支持这样的策略。但是，单靠收益率曲线控制不足以应对下一次衰退。如果不对货币政策做出更大的改变，就需要同时实施财政刺激。模糊货币和财政政策之间的界限可能再次成为当务之急。 ■



Management in the 2020s

Meet the new boss

The rules of management are being ripped up. CEOs need to adapt

ON PAPER THIS is a golden age for bosses. Chief executives have vast power. The 500 people who run America's largest listed firms hold sway over 26m staff. Profits are high and the economy is purring. The pay is fantastic: the median of those CEOs pockets \$13m a year. Sundar Pichai at Alphabet has just got a deal worth up to \$246m by 2023. The risks are tolerable: your chances of being fired or retiring in any year are about 10%. CEOs often get away with a dreadful performance. In April Ginni Rometty will stand down from IBM after eight years in which Big Blue's shares have trailed the stockmarket by 202%. Adam Neumann got high in private jets and lost \$4bn before being ousted from WeWork last year. The only big drawback is all those meetings, which eat up two-thirds of the typical boss's working hours.

Yet CEOs say the job has got harder. Most point the finger at "disruption", the idea that competition is more intense. But they have been saying that for years. In fact the evidence suggests that, as America's economy has become more sclerotic, big firms have been able to count on cranking out high profits for longer. Nonetheless, bosses are right that something has changed. The nature of the job is being disrupted. In particular, CEOs' mechanism for exercising control over their vast enterprises is failing, and where and why firms operate is in flux. That has big implications for business, and for anyone climbing the corporate ladder.

Few subjects attract more voodoo analysis than management. Even so, studies suggest that the quality of an American firm's leadership explains about 15% of the variance in profitability. But boards and headhunters struggle to identify who will do a good job. Perhaps as a result, they tend to

make conservative choices. About 80% of CEOs come from within the company and over half are engineers or have MBAs. Most are white and male, although that is changing slowly.

This tiny elite faces big changes, starting with how they control their firms. Ever since Alfred Sloan shook up General Motors in the 1920s, the main tool that CEOs have wielded is the control of physical investment, a process known as capital allocation. The firm and the CEO have had clear jurisdiction over a defined set of assets, staff, products and proprietary information. Think of “Neutron” Jack Welch, who ran General Electric between 1981 and 2001, opening and shutting plants, buying and selling divisions, and ruthlessly controlling the flow of capital.

Today, however, 32% of firms in the S&P 500 of big American firms invest more in intangible assets than physical ones, and 61% of the market value of the S&P 500 sits in intangibles such as research and development (R&D), customers linked by network effects, brands and data. The link between the CEO authorising investment and getting results is unpredictable and opaque.

Meanwhile the boundaries of the firm, and the CEO’s authority, are blurring. Uber’s 4m drivers are not employees and neither are the millions of workers in Apple’s supply chain, but they are mission-critical. Big firms spent \$32bn last year on cloud services from a few powerful vendors. Factories and offices have billions of sensors pumping sensitive information to suppliers and customers. Middle-managers talk business on social media.

Even as CEOs’ authority is being redefined, a shift is under way in where firms operate. Generations of bosses have obeyed the call to “go global”. But in the past decade the profitability of multinational investment abroad has soured, so that returns on capital are a puny 7%. Trade tensions mean that

CEOs face the prospect of repatriating activity or redesigning supply chains. Most have only just begun to grapple with this.

The last change is over the purpose of the firm. The orthodoxy has been that they operate in the interests of their owners. But pressure is coming from above, as politicians such as Bernie Sanders and Elizabeth Warren call on CEOs to favour staff, suppliers and clients more; and from below, as both customers and young workers demand that firms take a stand on social issues. Alphabet has faced rolling staff protests.

CEOs are experimenting, with underwhelming results. Reed Hastings at Netflix preaches radical autonomy. Staff decide their expenses and do without formal performance reviews, an idea that at most firms would cause chaos. Others assert authority by reviving the 1980s cult of celebrity. Sometimes it works: Satya Nadella has rebuilt Microsoft using “empathetic leadership”. Often it does not. Mr Neumann’s stint as WeWork’s party-animal-in-chief ended in fiasco. Jeff Immelt, the ex-boss of General Electric, has been accused of “success theatre” by making himself a jet-setting star as its cashflow fell by 36%.

Keen to show they are engaged, bosses are publicly weighing in on issues like abortion and gun control. The danger is hypocrisy. Goldman Sachs’s boss wants to “accelerate economic progress for all”, but it faces a huge fine for its role in the 1MDB corruption scandal in Malaysia. In August 181 American CEOs pledged to serve staff, suppliers, communities and customers as well as shareholders. This is a promise, made during a long economic expansion, that they will not be able to keep. In a dynamic economy some firms have to shrink and shed workers. It is silly to pretend there are no trade-offs. Higher wages and more cash for suppliers mean lower profits or higher prices for consumers.

| *The very model of a modern CEO*

What, then, does it take to be a corporate leader in the 2020s? Every firm is different, but those hiring a CEO, or aspiring to be one, should prize a few qualities. Mastering the tricky, creative and more collaborative game of allocating intangible capital is essential. A CEO must be able to marshal the data flowing between companies and their counterparties, redistributing who earns profits and bears risk. Some firms are ahead—Amazon monitors 500 measurable goals—but most CEOs are still stuck clearing their email inboxes at midnight. Last, bosses need to be clear that a firm should be run in the long-term interest of its owners. That does not mean being crusty or myopic. Any sensible business should face up to the risks from climate change, for example. It does mean avoiding mission creep. CEOs in the 2020s will have their hands full with their own company, so forget trying to run the world too. And if, in between meetings, you find time to smoke weed at 40,000 feet, don't get caught. ■



【首文】2020年代的管理经

会会新老板

管理的法则正在被颠覆。CEO们需要调整

表面上看，如今是企业老板的黄金时代。CEO们手握大权。掌管美国最大的上市公司的500名CEO手下员工超过2600万人。企业盈利高涨，经济运行平稳。这些CEO的薪酬优渥，年薪中位数达1300万美元。Alphabet的桑达尔·皮查伊（Sundar Pichai）刚得到一份合同，到2023年他将进账高达2.46亿美元。风险也可接受：在任意一年被解雇或退休的几率约为10%。CEO离任时常常留下一个烂摊子，却不用担责。IBM的罗睿兰（Ginni Rometty）将在4月离任，她在任的八年里蓝色巨人的股价表现落后大市202%。亚当·诺伊曼（Adam Neumann）在私人飞机上吸大麻，在WeWork亏损40亿美元后，去年被罢免。当老板唯一的重大缺点是会议太多，一般要占用三分之二的工作时间。

但CEO们说这份工作越来越难做了。他们大多都将矛头指向了“颠覆”——意指竞争愈发激烈了。但他们已经这么说了很多年。实际上，有证据表明，随着美国经济越来越僵化，大企业能在更长时间里赚取高额利润。不过老板们也没说错，有些东西确实发生了变化。工作的性质正在被颠覆，特别是CEO借以掌控其庞大企业的机制正在失效，企业开展经营活动的地点和目的也不断变化。这对业务以及努力在企业里向上爬的人都影响重大。

没有哪门学科比管理学引发了更多玄乎的分析。话虽如此，研究表明，美国企业之间盈利能力的差异约有15%是由领导层的水平造成的。但是，董事会和猎头公司很难鉴别谁能干得好。或许是出于这个原因，它们倾向于做出保守的选择。大约80%的CEO是从公司内部晋升，一半以上是工程师或拥有MBA学位。多数是白人男性，虽然这一点正在慢慢改变。

这一小群精英面临着巨大的变化，首先是他们掌控公司的方式。自阿尔弗雷德·史隆（Alfred Sloan）在上世纪20年代彻底重组通用汽车以来，CEO

使用的主要工具是控制实物投资，这一过程被称作资本配置。公司和CEO对已划定的资产、员工、产品和专有信息拥有明确的管理权。有“中子”之称的杰克·韦尔奇（Jack Welch）就是一个典型的例子，他在1981年至2001年执掌通用电气，期间开设新厂，关闭旧厂，收购了一些业务部门再出售一些部门，严格控制着资本流动。

但如今，标普500涵盖的美国大公司中有32%对无形资产的投资高于实物资产，而且标普500公司市值的61%来自无形资产，包括研发、网络效应带来的客户、品牌和数据等。CEO批准投资与取得成果之间的关联不可预测且模糊不清。

同时，公司的边界和CEO的权限正在变得模糊。优步的400万名司机不算员工，苹果供应链中的数百万工人也不是，但他们对达成企业的目标都至关重要。去年，大公司在云服务上花费了320亿美元，这些服务主要由几家大供应商提供。工厂和写字楼里安装了数十亿个传感器，将敏感信息传送给供应商和客户。中层管理人员用社交媒体谈业务。

在CEO的权力被重新定义之时，企业的经营地点也在发生变化。几代老板响应了“走向全球”的号召。但在过去的十年中，海外跨国投资的盈利能力下降，资本回报率仅为7%。贸易关系紧张意味着未来CEO们要么将经营转回国内，要么重新设计供应链。大多数人刚刚开始着手处理这一问题。

最后一个变化关乎公司的目的。一直以来的正统观念是公司为其所有者亦即股东的利益行事。但公司正从上下两头受压：伯尼·桑德斯（Bernie Sanders）和伊丽莎白·沃伦（Elizabeth Warren）等政客呼吁CEO为员工、供应商和客户谋求更多的利益；客户和年轻员工要求企业就社会问题表明立场。Alphabet已经面对员工一浪接一浪的抗议。

CEO们正在做各种尝试，效果平平。奈飞（Netflix）的里德·海斯廷斯（Reed Hastings）倡导激进的自治。员工自行决定支出，也没有正式的绩效评估，这种做法在大多数企业里都会造成混乱。其他CEO则重启上世纪80年代的名人崇拜，以此维护权威。这种做法有时确能奏效，萨蒂亚·纳

德拉（Satya Nadella）就是通过“同理心领导”重建了微软。但大多数情况下还是行不通。诺伊曼在WeWork的“首席派对狂人”任期以惨败收场。通用电气的前任老板杰夫·伊梅尔特（Jeff Immelt）被指靠着乘坐商务机满天飞来上演“成功大戏”，而他的任期内公司现金流缩水了36%。

老板们急于表明他们关注社会，纷纷就堕胎和枪支管制等问题公开发表看法。不过这有被指虚伪的风险。高盛的老板说要“加速经济发展，惠及所有人”，但高盛却因卷入马来西亚一马发展有限公司（1MDB）的腐败丑闻而面临巨额罚款。去年8月，181位美国CEO承诺除服务股东外，还要服务员工、供应商、社区和客户。但他们无法兑现这个在经济长期扩张时做出的承诺。在不断变化的经济中，有些企业不得不缩减规模，裁减人员。假装无需做出权衡是愚蠢的。要提高工资和增加供应商的收入就要压缩利润或让消费者承担更高的价格。

| 现代CEO模型

那么，2020年代的企业领导者需要具备什么素质呢？每个企业的情况不尽相同，但打算聘请新CEO的公司或有志成为CEO的人应该注重几个特质。掌握分配无形资本这项复杂、需要创造力和更多协作的工作至关重要。CEO必须能够有效调度企业与其交易对手之间的数据往来，重新分配所获的利润和承担的风险。有些公司走在了前面，比如亚马逊监测着500个可衡量目标，而大多数CEO还在为回覆邮件忙活到半夜。最后，CEO需要明白，企业应该为其所有者的长期利益服务。这并不意味着冷漠或偏狭。例如，任何明智的业务都应正视气候变化的威胁。但这确实表示要避免偏离使命。20年代的CEO自己公司的事已经够忙活的了，就不要想着去管理世界了。还有，如果在赶场开会中间还有时间在四万英尺的高空抽大麻，别被抓个现行。■



The Economist Film

The Disrupters: Tracking the traffickers

Today's biggest criminals could be trafficking humans, drugs or weapons. The authorities charged with stopping them have found some unlikely partners: banks.



经济学人视频

颠覆者系列：追踪非法贩卖者

当今数量最庞大的犯罪集团可能是人口、毒品与武器贩卖团伙，试图阻止这些罪行的执法机构找到了一些看似不相干的合作伙伴：银行。



Trade secrets

As you sow

How seed-rustling in Iowa fed American fears of China

IN THE AUTUMN of 2011 two ethnic Chinese men were seen digging up seeds in a cornfield in Iowa. When approached, they sped away in a hired car. A routine report of trespassing quickly spiralled into a long FBI investigation that uncovered a plot by DBN, a Chinese agricultural company, to reverse-engineer seed lines belonging to two American firms, Monsanto and DuPont Pioneer. When the probe became public, America's media had a field day. "Hey China!" screamed *Bloomberg Businessweek*. "Stop Stealing Our Stuff."

Mara Hvistendahl's compelling account of the drama reads in parts like a spy thriller, replete with car chases, phone-tapping and aerial surveillance as agents track the shovel-carrying suspects across America. The anti-hero is Robert Mo, an American-based Chinese research scientist who took a job with DBN to help pay his mortgage. Pressed into seed-rustling, he darts from field to field, yanking genetically modified strains from the ground, while posing as a grower to buy others from wholesalers for thousands of dollars in cash.

He ends up with almost comically large quantities—wrapped in napkins swiped from Subway or stashed in microwave-popcorn boxes. Some of the seeds are taken to be grown and monitored on a plot in Illinois, conveniently close to Chicago's international airport. Later arrested and accused of conspiring to steal trade secrets, Mr Mo would plead guilty and serve a three-year sentence. None of his suspected co-conspirators was prosecuted.

As Ms Hvistendahl explains, industrial espionage goes back centuries. Early

examples often involved the West stealing from the East, such as undercover efforts to learn about Chinese tea and porcelain production. For much of the 20th century America and Europe worried most about each other's spies. The idea of China as thief-in-chief is new. So is America's tough legislation against stealing trade secrets, which was not a federal crime until 1996. Before then it was regulated by state laws and civil suits brought by aggrieved companies.

Fears over Chinese pilfering of intellectual property (IP) and technology have soared under President Donald Trump, fuelling trade tensions and a tech stand-off. In 2018 there was talk in the White House of banning all students from China out of concerns over spying. The recent charging of a Harvard academic for failing to disclose Chinese state funding highlights anxieties about Beijing-backed "talent programmes" at American universities.

But the picture is not as clear as Mr Trump paints it. Both China and America are locked in internal struggles as well as with each other, says Ms Hvistendahl—in China's case between "the duelling forces of copying and innovation" (it has oodles of its own patents) and in America's between openness and security. Nor are motives simple to unpick. The seed plot was driven in part by Chinese ambition (to be a world leader in GM crops) but also by fear. Shortfalls of grain to feed their people, as well as poor yields, are a huge food-security headache for Communist Party leaders.

Nor, indeed, is the source and size of the threat always clear. DBN is a private outfit, albeit one with the mission of "rewarding the state with agricultural development". Some firms have their own incentives to steal; others may be responding to what they see as official incitement, as when President Xi Jinping urged Chinese businesses to master "core technologies". Not all of these are acquired through subterfuge. In 2016 ChemChina, a state-owned group, paid \$43bn for Syngenta, a Swiss seeds-

to-pesticides company. Estimates of the scale of Chinese IP theft, which value it as high as \$600bn a year, are based on wild extrapolations, Ms Hvistendahl shows.

She also questions whether safeguarding IP is an unalloyed good. Sometimes tight protection may benefit the powerful but hamper innovation. One reason cited for Silicon Valley's success is its ban on non-compete agreements, which makes it easier for whizzes to start their own firms.

What is clear from this book is that America's response to China has often been misguided. The FBI and CIA, looking for new threats after the cold war, piled resources into combating economic espionage, often hamfistedly. Ms Hvistendahl describes overzealous investigations that skimmed on science and relied on racial profiling. The agencies have yet to eschew the idea that China relies mostly on its vast population, an army of amateur snoops, rather than technology or covert operations. This, she says, is "as if China were to develop a theory of how the CIA functioned based on American individualism". ■



商业秘密

种豆得豆

爱荷华州种子偷盗事件如何刺激了美国对中国的忧惧【《科学家与间谍》书评】

二〇一一年秋天，有人看到两名华裔男子在爱荷华州的一片玉米地里挖种子。当有人走近时，他们跳上一辆租来的车飞驰而去。一份关于非法侵入的例行报告迅速演变成了美国联邦调查局一项漫长的调查。调查揭露了一起阴谋：中国农业公司大北农集团试图对孟山都和杜邦先锋这两家美国公司的若干种子系列展开逆向工程。调查被公之于众，美国媒体登时群起鼓噪。“嘿，中国！”《彭博商业周刊》喊道，“别再偷我们的东西了。”

玛拉·赫维斯滕达尔（Mara Hvistendahl）扣人心弦地讲述了这起戏剧性事件，读来就像一部谍战惊险小说。探员们在美国各地追踪拿着铲子的嫌疑犯，时不时就要上演飞车追逐、电话窃听和空中监视。反派人物是一名在美国工作的中国研究员莫海龙，他在大北农谋了份职位来还按揭贷款。他被逼去偷种子，于是便从一块地蹿到另一块地，刨走地里的转基因品种。他还假扮成种植户，支付数千美元的现金从批发商那里购买其他品种。

他得手的种子数量之大简直叫人哭笑不得。有些用从赛百味顺来的餐巾纸包着，有些藏在微波炉爆米花的包装盒里。一部分种子被送到伊利诺伊州的一个地块上种植并监控，那里离芝加哥国际机场很近，地理位置便捷。莫海龙后来被捕，被指控阴谋窃取商业秘密，他认罪并服刑三年。他的同谋嫌疑人无一被起诉。

正如赫维斯滕达尔解释的那样，商业间谍活动可以追溯到几个世纪前。早期的例子通常是西方向东方偷师，比如暗中学习中国的茶叶和瓷器生产工艺。上世纪大部分时间里，美国和欧洲最担心的是彼此的间谍。认为中国是小偷头子的想法是后来才出现的。美国针对窃取商业秘密的严格立法也是近期的事——一直到1996年才被定为联邦罪行。在那之前，这种行为是由州法律和受害公司提起民事诉讼来监管的。

在特朗普治下，美国对中国窃取知识产权和技术的忧惧大增，加剧了贸易紧张和技术对峙。2018年，白宫出于对间谍活动的担忧，曾讨论禁止所有中国学生入境。近期一名哈佛教授因未披露受中国政府资助而受到指控，突显出美国对中国政府支持的“人才计划”渗透进美国高校的忧虑。

但事情并不像特朗普描绘的那样分明。赫维斯滕达尔说，除了彼此交战，中美各自都深陷内部斗争——在中国是“照抄和创新这两股力量的决斗”（中国自己也有很多专利），在美国是开放与安全之间的拉锯。动机也不容易厘清。偷种子的阴谋一定程度上是由中国的雄心（成为转基因作物的世界领导者）推动，但同时也是出于忧虑。粮食供给不足以及产量低是共产党领导人极为头疼的粮食安全问题。

事实上，威胁的来源和严重程度也并不总是很明确。大北农是一家私营企业，尽管它以“报国兴农”为使命。一些公司自有偷窃的动机，另一些可能觉得官方在鼓动自己（比如习近平敦促中国企业掌握“核心技术”）而对此做出响应。并不是所有的核心技术都是通过见不得光的手段获得的。2016年，国有集团中国化工斥资430亿美元收购了生产种子和杀虫剂等产品的瑞士公司先正达。赫维斯滕达尔论述称，“中国每年窃取高达6000亿美元的知识产权”的估算是胡乱推断出来的。

她还质疑捍卫知识产权是否是一件纯粹的好事。有时候，严密的保护可能对强者有利，但会阻碍创新。硅谷成功的原因之一就是禁止签订“非竞争协议”，方便能人创办自己的公司。

从这本书可以清楚地看出，美国对中国的回击常常误入歧途。冷战结束后，美国联邦调查局和中情局为找出新的威胁，投入了大量资源打击经济间谍活动，但手法通常都简单粗暴。赫维斯滕达尔在书中描述了那些用力过猛的调查——缺乏科学性而依赖种族定性。这两个机构仍未抛开这样一种观点：中国主要还是依赖其庞大的人口和一支业余探子大军，而不是技术或隐秘行动。那么，她说，“中国是不是也要发展出一套理论，说中情局是如何依赖美国个人主义运转的”。■



Elliott v SoftBank

Singer-Son time

An American activist investor wants SoftBank to reform. Good luck

MOST BOSSES dread Elliott Management, an American activist hedge fund whose tactics the traumatised chairman of a German company once described as “psycho-terror”. After news leaked on February 6th that Elliott had taken a 3% stake, worth over \$2.5bn, in SoftBank Group, a Japanese telecoms-and-tech conglomerate, its flamboyant founder, Son Masayoshi, seemed less perturbed. As he presented SoftBank’s results on February 12th, Mr Son professed to be “thankful that such a distinguished investor has joined us as a friend”. He has reason to sound welcoming. SoftBank’s languishing share price leapt by 7% on the news of Elliott’s stake.

Elliott’s main focus at SoftBank is the Vision Fund, Mr Son’s \$99bn tech-investment arm. Although SoftBank’s stake in the fund amounts to only 13% or so of the group’s total gross assets, the vehicle is causing a crisis of confidence. Last year its handling of WeWork led to the scuttling of the loss-making property firm’s listing, followed by a costly bail-out. That is when Elliott began to build its stake in earnest.

SoftBank’s earnings also disappointed. Overall the group eked out only \$24m of operating profit. The Vision Fund lost \$2bn in the last quarter, better than the \$8.9bn loss in the previous three months but far worse than the market was expecting. This month, one Vision Fund investment, an e-commerce startup from San Francisco called Brandless that received around \$100m from Mr Son two years ago, became the first in the portfolio to fold. A rare bit of good news came on February 11th when an American judge approved the \$26bn takeover of Sprint, a mobile operator majority-owned by SoftBank, by T-Mobile, a competitor. The merger would allow SoftBank to shed about \$40bn of Sprint debt. SoftBank’s shares gained 12%

the next day, though reports later surfaced that T-mobile might want to renegotiate the deal.

Even that leaves the firm's market value, at ¥11trn (\$104bn), well below what its assets would imply. It owns \$270bn-worth of stakes in big listed companies (Alibaba, Sprint and its Japanese telecoms firm) and unlisted firms like Arm, a British chip-design firm. SoftBank is trading at a discount to fair value of around 60% after accounting for debt. To close the gap Elliott's boss, Paul Singer, is urging the firm to buy back as much as \$20bn of its shares—and to improve its corporate governance.

A buy-back is likely after the Sprint deal is complete, says Chris Lane of Bernstein, a broker. SoftBank will probably add independent directors at its shareholder meeting in June; it currently has two. Mr Son may refrain from deploying a second, \$108bn Vision Fund, after it became clear that the original's troubles put off big institutional investors. SoftBank could instead use a small bridge fund to carry on investing, Mr Son said on February 12th.

Elliott wants SoftBank to create a new board committee to guide Vision Fund investments, which Mr Son has sometimes directed with little regard to opposition from colleagues. Mr Singer could agitate for the fund to be reduced in size over time.

If SoftBank's shares keep gaining in value, Elliott might simply cash in and exit. That would be easier than forcing the strong-willed Mr Son, who owns roughly a quarter of SoftBank, to reform. But Mr Singer is unlikely to depart without trying some of his signature psychological warfare. ■



埃利奥特对碰软银

辛格与孙正义PK

美国一家维权投资机构想要促成软银改革。祝好运

美国维权对冲基金埃利奥特管理公司（Elliott Management）令大多数公司老板闻风丧胆。某个深受创伤的德国公司董事长曾形容埃利奥特的策略是“心理恐怖行动”。2月6日传出消息称，埃利奥特已购入日本电信科技集团软银3%的股份，价值超过25亿美元。作风高调的软银创始人孙正义看起来并不怎么担心。12日他在公布软银业绩时表示，“感谢如此杰出的投资者加入我们，成为朋友”。他这般热情迎客也不无理由。在埃利奥特入股消息的刺激下，软银疲软的股价急升了7%。

埃利奥特的主要目标是软银的愿景基金（Vision Fund），孙正义的这个科技投资部门规模达990亿美元。尽管软银在愿景基金持有的股份仅占集团总资产的13%左右，但该基金正引发一场信任危机。去年，愿景基金对WeWork的处理方式导致这家亏损的房地产公司上市计划流产，之后又大手笔为其纾困。正是此时，埃利奥特开始积极建仓软银股份。

软银的收益也令人失望。集团的总营业利润仅为2400万美元。愿景基金上季度亏损20亿美元，好于之前三个月89亿美元的亏损额，但远逊于市场预期。愿景基金的一项投资是旧金山电商创业公司Brandless，两年前这家公司获孙正义投资约一亿美元，但本月它成了愿景基金投资组合中首个倒闭的公司。11日传出了罕有的好消息：美国一位法官批准软银的竞争对手T-Mobile以260亿美元收购软银控股的移动运营商Sprint。这起并购将使软银摆脱Sprint约400亿美元的债务。第二天，软银股价上涨12%，但之后有报道称T-mobile可能想重新谈判这笔交易。

即便这样，软银的市值也只有11万亿日元（1040亿美元），远低于其资产蕴含的价值。该集团拥有阿里巴巴、Sprint及其日本电信公司等大型上市公司和英国芯片设计公司安谋（Arm）等非上市公司共计价值2700亿美元的股份。在计入债务后，软银的股价较其公允价值有60%的折让。为缩窄

差距，埃利奥特的老板保罗·辛格（Paul Singer）正敦促软银回购多达200亿美元的股票，并改善公司治理。

经纪公司盛博的克里斯·莱恩（Chris Lane）表示，软银很可能在完成出售Sprint的交易后回购股票。集团可能会在6月的股东大会上增补独立董事——目前有两位。孙正义可能不再会部署规模达1080亿美元的2号愿景基金，显然第1号愿景基金的烂摊子已令大型机构投资者望而却步。孙正义在12日表示，软银可能会改用一只小型过渡基金开展投资。

埃利奥特希望软银董事会成立一个新的委员会来指导愿景基金的投资。孙正义先前在一些投资决策中不理睬同事的反对意见。辛格可能会鼓动逐渐缩减该基金的规模。

如果软银的股价继续上扬，埃利奥特也许会直接套现退出。这比迫使持有约四分之一的软银股份、固执己见的孙正义实施改革要容易。但不来点招牌式的心理战就抽身吗？对辛格来说，这不太可能。■



Schumpeter

The Qualcommunist manifesto

American state capitalism will not beat the Chinese at 5G

IF IMITATION IS the best form of flattery, one can only imagine the mandarins in Beijing blushing bashfully on February 6th as they eavesdropped on William Barr, America's attorney-general, firing the latest shots in the tech cold war. One of America's main concerns, he told a think-tank in Washington, DC, was Chinese dominance of fifth-generation (5G) wireless technology by Huawei. It had achieved this with totalitarian central planning. "As a dictatorship", he said, "China can marshal an all-nation approach—the government, its companies, its academia, acting together as one."

Mr Barr's response to this threat? Central planning, also involving the state, business and academia, but in support of American goals, not Chinese ones. He said America and its allies should decide which "horse we're going to ride in this race". That might mean, he went on, that America's government or its companies should buy controlling stakes in Huawei's European rivals, Finland's Nokia, Sweden's Ericsson, or both—despite there being no precedent for such a move (at least one that does not involve covert operations). It also meant public and private sectors standing shoulder to shoulder against China's technological blitzkrieg.

Call it state capitalism, American-style. In full 5G panic, President Donald Trump's administration wants to co-opt not just other countries' national champions, but domestic ones, too. One focus of attention is Qualcomm. The company, which is based in San Diego and worth \$103bn, is among the world's biggest 5G chipmakers. In 2018 it received unusual government support, when Mr Trump blocked its takeover by Broadcom, then a Singapore-based rival, on national-security grounds. A second round of

state-backed reinforcement came on February 13th, this time in a San Francisco courtroom where it was appealing against a landmark antitrust verdict. Its backer was Mr Barr's Department of Justice (DoJ).

Qualcomm's relations with the government reveal a lot about the way America is fighting the battle for global supremacy in technology. The Trump administration has two main national-security concerns about 5G. The first revolves around the public telecoms networks. It worries that kit installed by Huawei, which boasts a 30% market share in 5G and is in most places bar America, could be used for surveillance. Huawei insists it will never be. But news reports last week said American officials believe it can access mobile networks via "back doors" meant solely for law enforcement. Nokia and Ericsson are among the next-biggest makers of 5G kit but they lack Huawei's financial firepower. A deep-pocketed American rival like Qualcomm or Cisco could in principle bolster their balance-sheets. But they show no appetite for building fiddly, low-margin 5G networks.

The government's second worry is about micro-industrial networks, which is where Qualcomm could play a role. The administration argues that within five years 5G could become the backbone of a vast economic system in which everything from cars to factories to fridges seamlessly streams limitless information. It fears that a dominant China could jam them, monopolise them or suck up all the data they produce for its own artificial intelligence. Qualcomm hopes its modems used in 5G devices, and the licences on its patents, will enable customers around the world to build a web of private 5G networks in this "industrial internet". But it will have to remain competitive against Huawei, which also makes modems and licenses technology.

So far Qualcomm's bets on 5G have been ahead of the competition. But its ambitions have been undermined by repeated allegations that it is a monopolist. It was in court last week appealing against an antitrust verdict

in a case brought by the Federal Trade Commission (FTC) under Barack Obama. The FTC took aim at a lucrative licensing model that 5G could further strengthen. It is a sign of the Trump administration's alarm about Qualcomm's future that the DOJ, supported by the Pentagon and the Department of Energy, is throwing its weight behind the firm's appeal—on national-security grounds. Hence the strange spectacle of two trustbusting agencies battling each other in court.

The DOJ's backing may bolster Qualcomm's case. Much of the national-security argument, though, is rather nebulous. The DOJ argues that a verdict against Qualcomm forcing it to renegotiate its licence fees with customers could hit profits and hamper its ability to innovate, which would put America itself at risk. Yet the lack of competition could be a bigger threat to innovation.

The case highlights a deeper question about America's approach to 5G. How urgent is it to reduce China's technological lead? Some advise patience, and think much of the hysteria is a veiled justification for protectionism. At present, 5G capabilities are little different from superfast 4G, and as yet the applications do not exist to make the most of the industrial internet. There is still time for experiment and innovation. Alternatives to Huawei's hardware-heavy, vertically integrated networks are emerging. Companies in America, Europe and elsewhere are using their strengths in software to build virtual networks that are more open and decentralised. Qualcomm is eyeing such opportunities hungrily, and plans to sell chips for virtualised 5G networks as well as devices.

| *Chip on the shoulder*

Mr Barr, who has mixed a career in government with one in telecoms, argues that all this would take too long to counter the clear and present threat from China. The message is unambiguous. If only America could play by China's rules, subsidising domestic champions and hobbling

foreign rivals, it could win in 5G. That is a counsel of despair. Qualcomm and other firms may happily lap up government support. They would benefit, too, from an overdue infrastructure upgrade. But ultimately America's greatest industrial strength is its freewheeling spirit. Rewriting the rules of American capitalism with Chinese characters would not help that at all. ■



熊彼特

高通共产主义宣言

靠仿效国家资本主义，美国将无法在5G上击败中国

如果说模仿是最好的奉承，那么可以想象北京的官员在2月6日偷听美国司法部长威廉·巴尔（William Barr）发言时会不好意思地脸上一红。巴尔发出了科技冷战中的新一轮炮轰。他对华盛顿一家智库说，美国最关切的问题之一是中国通过华为在第五代（5G）无线通讯技术上占据主导。中国通过极权式的中央计划实现了这一点。他说：“作为一个独裁政权，中国可以运用举国体制，让政府、企业、学术界统一行动。”

面对这种威胁，巴尔有何对策？办法同样是中央计划，同样要调动政府、企业和学术界，只不过支持的是美国而非中国的目标。他说美国及其盟友应该决定“骑哪匹马参加这场比赛”。他接着说，这或许意味着美国政府或美国公司应该买下华为的欧洲竞争对手的控股权——芬兰的诺基亚、瑞典的爱立信，或者两家都要——尽管此举没有先例（至少没有公开采取过这样的行动）。这还意味着公共部门和私营部门将并肩作战，共同抵御中国的科技突袭。

这可以称之为美国式国家资本主义。特朗普政府完全陷入了5G恐慌，不仅想拉拢其他国家的领军企业，还要团结本国的。高通就成为了关注的焦点之一。该家总部位于圣迭戈的公司市值1030亿美元，是世界最大的5G芯片制造商之一。2018年，高通获得了不同寻常的政府支持：特朗普以国家安全为由，阻止了当时总部尚在新加坡的竞争对手博通对高通的收购。2月13日高通又获得了第二轮国家增援，这次是在旧金山的一个法庭对一起具里程碑意义的反垄断裁决提起上诉。其后援正是巴尔的司法部。

高通与政府的关系透露出许多有关美国如何打这场全球科技霸权之战的信息。特朗普政府对于5G主要有两个国家安全方面的担忧。首先是公共通讯网络。鉴于华为占据了30%的5G市场份额，并进入了除美国以外的大部分地区，美国担心华为安装的设备可能被用于监控。华为坚称这绝不会发

生。但上周有报道称，美国官员认为华为可以通过仅限执法用途的“后门”进入移动网络。诺基亚和爱立信都是市场份额仅次于华为的5G设备制造商，但缺乏华为那样深厚的财力。高通或思科这种财大气粗的美国竞争对手理论上有能力增强它们的资产负债表。但这几家公司对打造精细复杂却利润低下的5G网络毫无兴趣。

政府的第二个担忧在微型工业网络，而高通可以在这个领域发挥作用。特朗普政府指出，五年之内5G可能成为一个庞大经济体系的基础，从汽车、工厂到冰箱的万物都将在这个系统中无缝传输无限的信息。美国政府担心占据主导地位的中国会干扰、垄断这些信息，或者收集所有这些信息用于发展自己的人工智能。高通希望，自己为5G设备生产的调制解调器以及专利技术许可将能让世界各地的客户在这个“工业互联网”中建立起众多私有5G网络。但华为也生产调制解调器并提供技术许可，高通必须首先保持对华为的竞争力。

目前为止，高通在5G上的投入一直领先于对手。但它的雄心壮志却因一再被指控垄断而受挫。上周它在法庭上对一项反垄断裁决提出上诉。该反垄断诉讼在奥巴马时代由美国联邦贸易委员会（以下简称FTC）提起，当时FTC盯上了高通某个利润丰厚的许可模式，5G可能进一步巩固这种模式。在五角大楼和能源部的支持下，美国司法部以国家安全为由，全力支持高通上诉，这显现出特朗普政府担忧高通的未来。于是便出现了两个反垄断政府机构在法庭上角力的奇景。

司法部的支持可能有利于高通的抗辩。但是，有关国家安全的论据大多相当模糊。司法部指出，裁定高通必须与客户重新谈判许可费可能会损害其利润和创新能力，而这将给美国自身造成风险。然而，缺乏竞争也许更不利于创新。

此案突显出美国5G战略一个更深层次的问题。缩小中国的技术领先优势有多紧迫？一些人建议要有耐心，认为目前这种谈虎色变主要是为保护主义提供借口。目前5G的效能与超高速4G几乎没有差别，而且也尚未出现能够充分利用工业互联网的应用。仍有时间开展更多的试验和创新。与华为

这种硬件密集、垂直整合的网络不同的替代方案正在浮现。美国、欧洲和其他地区的公司正在发挥它们的软件实力，打造更加开放和去中心化的虚拟网络。高通也紧盯这类机会，打算销售针对5G设备和虚拟5G网络的芯片。

| “芯”怀不忿

除了政府供职，巴尔也曾在电信公司工作。他认为所有这些做法都耗时太久，无法对抗清晰而现实的中国威胁。他的观点很明确。美国若能模仿中国的规则行事，补贴国内龙头、阻击外国对手，就可能在5G一役中获胜。这无异于承认自己已经穷途末路。高通和其他公司可能会欣然接受政府的支持，它们也会从姗姗来迟的基础设施升级中获益。但归根结底，美国最大的产业优势是它那无拘无束的自由精神，用汉字改写美国资本主义的规则对此毫无裨益。 ■



Bartleby

The number of the best

Finding the optimal size of teams and organisations

HOW BIG should a business team be? It is an enormously important issue for companies. Teams that are too small may lack the skills required to get the job done; teams that are too big may be impossible to co-ordinate.

Similar trade-offs may apply when it comes to firms as a whole. Startups are often short of staff. The founders must play a host of different roles, from obtaining finance to product development and marketing, for which they may not be equally suited. But the upside is that they can have highly collaborative working environments.

People who have worked for startups say the culture changes when the company reaches a certain size. Patty McCord, formerly of Netflix, referred to the “stand-on-a-chair number”—the biggest group that can easily hear the boss address them.

Robin Dunbar, an anthropologist at Oxford University, has done a lot of work on primate groups. His argument is that the size of the group is linked to the size of the brain. With their large brains, humans can cope with larger bands. A larger social group has many advantages, allowing for greater protection and specialisation.

Whereas 150 is sometimes referred to as the “Dunbar number”, the academic himself in fact refers to a range of figures. He observes that humans tend to have five intimate friends, 15 or so good friends, around 50 social friends and 150-odd acquaintances.

Running a larger network can be difficult. So much time is needed to

maintain relationships that their quality inevitably suffers. The armed forces have spent millennia experimenting with unit size. A Roman centurion oversaw 100. The modern American army company has 180 members. Britain's equivalent numbers 120.

These are rough estimates, rather than rigid figures. But it is striking that many group activities seem to be close to a Dunbar number. The Special Air Service, Britain's elite fighting unit, has four-man patrols; when your life depends on it, you need to have absolute trust in your colleagues. As a result, such groups are limited in size.

Sports-team sizes relate to the playing area. There are five players in a basketball side and six in ice hockey; outdoors there are 11 players in football and cricket teams, and 7-15 in the various forms of rugby. Perhaps this is the optimal size for coaching purposes, or perhaps crowds would struggle to distinguish individual players if teams were larger.

Small work teams may also tend towards these two size ranges. "If you want a committee to decide something, limit it to four to five people," says Mr Dunbar. "But to brainstorm in a meeting, you need 12-15." Many companies use "agile" teams which draw employees from across the company; they tend to have between five and nine members.

Most businesses are small. A survey of British firms in 2015 found that only 0.6% employed more than 150 people. Nor are small companies necessarily ephemeral. One study concluded that 89% of organisations that last more than 100 years employ fewer than 300 people.

Another group of long-lasting organisations is religious congregations. The Hutterites, a Protestant group with German origins, limited their communities to 150. They believed that it was possible to maintain solidarity in a group of fewer than 150 people with peer pressure; once you

exceeded that number, you needed the equivalent of a police force.

For much of economic history, work was conducted in small units by peasants, tenant farmers and artisans (for example blacksmiths). The advent of powered machinery enabled production at a much larger scale, with workers crowded into factories. These days the rise of the service economy means that workers are no longer concentrated in such large groups.

This may not be a bad thing. It was easy for employees in large factories to regard remote company owners as “them” rather than “us”, and indeed it was easy for business owners to perceive workers as an undifferentiated mass of people and treat them accordingly. Strikes were common.

The modern company may settle on a model with a small group of “core” workers and a larger group of contract workers. The result may be more cohesion within the core staff but the non-core staff may be less well treated. The small core teams may work effectively. The big question will be the effect on morale of those outside those teams. ■



巴托比

最佳数字

探索团队和组织的最佳规模

业务团队的规模应该多大？对企业来说这是一个极其重要的问题。团队太小可能会缺乏完成工作所需的技能，太大则可能无法协调。

类似的权衡可能也适用于整个企业的规模。创业公司通常人手不足。从融资到产品开发和营销，创始人必须扮演多种不同的角色，可能不是每个角色都胜任。但好处是他们可以拥有高度协同的工作环境。

在创业公司工作过的人说，公司达到一定规模后，文化就会发生变化。曾供职于奈飞（Netflix）的帕蒂·麦考德（Patty McCord）提到了一个“站在椅子上讲话能听到的人数”，意思是说在老板讲话时所有员工都能清楚听到的人数规模。

牛津大学的人类学家罗宾·邓巴（Robin Dunbar）对灵长类动物群体做了大量研究。他认为群体规模的大小与脑容量大小有关。人类的脑容量大，可以应付更大的群体。较大的社会群体具有许多优势，可以提供更多的保护及实现专业化。

尽管有时150被称为“邓巴数字”，但邓巴本人其实说的是一组数字。根据他的观察，人类一般有五个密友，15个左右的好朋友，大约50个普通朋友和150来个相识的人。

交际网络过大可能很难维系。维持关系所需耗费的时间太多，其质量不可避免地会受损。军队用了几千年时间试验部队编制的大小。一名罗马百夫长手下管着100人。现代美军一个连有180名士兵，英国军队里的同级单位有120人。

这些都是粗略数字，不是严格的限制。但令人惊讶的是，许多组织的大小看起来都与邓巴的数字接近。英国的精锐作战部队特种空勤队（Special

Air Service) 每四人为一个小组。性命攸关之时，需要对战友绝对信任，因此这类队伍的成员人数有限。

运动队的大小与比赛场地有关。篮球比赛中每方上场球员为五名，冰球是六名；户外运动里，足球和板球队都是11名球员上场，橄榄球队根据不同的类型有7至15名球员。也许是因为这样的规模最利于教练指导，也可能是因为如果球员再多些，观众就很难认清谁是谁。

小型工作团队可能也常采用这两种规模。“如果希望委员会做出某项决定，就要把委员人数限制在四到五人，”邓巴说，“但若要在会议上集思广益，就需要12到15人。”许多公司都会采用“敏捷”团队的形式，从公司各个部门抽调人员，通常共有五到九人。

大多数企业都是小规模。2015年对英国企业的一项调查发现，只有0.6%的企业雇员超过150人。小企业也不一定寿命短。一项研究得出结论，成立一百年以上的企业里，有89%雇员人数在300人以下。

另一种长期存在的组织是宗教团体。哈特教派（Hutterites）是一个起源于德国的新教团体，其每个社群人数限制在150人。他们认为，在少于150人的队伍里，靠同侪压力就可以令成员保持团结。一旦超过这个人数，就需要有一个相当于警察的机构了。

在经济史的大部分时间中，农民、佃农和工匠（例如铁匠）都是小团体劳作。动力机械的出现大大扩展了生产规模，让工人成批涌入工厂。如今由于服务经济的兴起，工人已不再集聚在这样的大规模团队中。

这可能不是件坏事。过去，大工厂的员工很容易把高高在上的企业老板视作“他们”而不是“我们”，而企业主也确实很容易把工人视为面目模糊、无差异的一群人，漫不经心地对待他们。罢工曾经很普遍。

现代企业也许可以采用一小群“核心”员工和一大群合同工相结合的模式。其结果可能是增强了核心员工的凝聚力，但非核心员工的待遇可能就没那么好。小型核心团队可能会高效工作。但一大问题是这种组织模式对核心

团队以外的员工士气的影响。 ■



Covid-19 and trade

A deadly disease disrupts

The new coronavirus could have a lasting impact on global supply chains

TO GLIMPSE THE impact of the new coronavirus on global businesses, consider Apple. Such is the American tech titan's reliance on the Chinese mainland for parts and assembly that United Airlines typically shuttles some 50 of its executives between California and China each day. But not at the moment. United and other carriers have suspended flights to and from China. A lack of workers meant that after the end of the lunar new-year holiday Foxconn, which makes most of Apple's iPhones in China, could not get its assembly plants back to full capacity last week. Analysts reckon that the virus could lead to Apple shipping 5-10% fewer iPhones this quarter and could scupper its plans to ramp up production of its popular AirPods.

As covid-19 spreads, its effect on business is amplified. Tourism into and out of the mainland has plunged. Some 400,000 Chinese tourists are forecast to cancel trips to Japan by the end of March. One large cruise ship in Asia was turned away by five countries and regions because scores on board are infected (Cambodia at last allowed it to dock). The Singapore Air Show earned the city-state some \$250m in 2018, but far less last week owing to cancellations by 70 companies including Lockheed Martin, an American defence giant. The Mobile World Congress, a giant telecoms conference due to take place in Barcelona this month, has been cancelled after companies from Vodafone and BT to Facebook and Amazon pulled out. It is increasingly clear that the virus could damage global supply chains, costing the world's economy dearly.

Most multinational firms have been caught by surprise. This is not the first time they have suffered shocks to their Asian supply chains. The tsunami that hit Japan in 2011 and devastating floods in Thailand the same year

disrupted production for many big firms. More recently, Donald Trump's trade war with China has exposed the risks of supply chains that rely too heavily on the mainland. But the bosses of such businesses have done little to prepare for shocks such as that inflicted by the outbreak of the new coronavirus.

Investors are punishing companies for this failure. The shares of American firms with strong exposure to China have underperformed the S&P500 index by 5% since early January, when news of the outbreak first broke (see chart).

There are three reasons to think the coming months could prove even more unpleasant for many firms. First, big multinationals have left themselves dangerously exposed to supply-chain risk owing to strategies designed to bring down their costs. For example, many keep only enough stock on hand to last a few weeks, confident that they can always replenish their inventories "just in time". That confidence is misplaced, argues Bindiya Vakil of Resilinc, a consultancy.

The second vulnerability arises from the fact that giant firms are much more reliant on Chinese factories today than they were at the time of the SARS outbreak in 2003. China now accounts for 16% of global GDP, up from 4% back then. Its share of all exports in textiles and apparel is now 40% of the global total. It generates 26% of the world's furniture exports. It is also a voracious consumer of things such as metals, needed in manufacturing. In 2003 China sucked in 7% of global mining imports. Today it claims closer to a fifth.

Koray Köse of Gartner, a research firm, points out that it is not only the increase in size of China's manufacturing base that matters. Since 2003 factories have spread from the coast to poorer interior regions like Wuhan, where the epidemic broke out. Workers from such places now toil at

factories all over China—and travel home for the holidays. That interconnectedness increases supply-chain risks, argues Mr Köse. So does the rising interdependence of many firms. Mainland suppliers no longer simply assemble products; they make many of the parts that go into them as well.

The third reason to think that big companies may experience a supply-chain shock is that the regions worst affected by covid-19 and the subsequent government lockdowns are particularly important to several global industries. The electronics industry is most at risk, according to Llamasoft, a supply-chain analytics firm, because of its relatively thin inventories and its lack of alternative sources for parts.

Hubei province, where Wuhan is located, is the heart of China's "optics valley", home to many firms making components essential for telecoms networks. Perhaps a quarter of the world's optical-fibre cables and devices are made there. One of China's most advanced chip-fabrication plants, which makes the flash memory used in smartphones, is found there, too. Analysts worry that the epidemic in Hubei could reduce global shipments of smartphones by as much as 10% this year.

The car industry has also been hit. The lack of parts from mainland-based suppliers forced Hyundai to shut all its car plants in South Korea (it is now partially reopening them). Nissan has temporarily closed one in Japan, and Fiat-Chrysler has warned that it could soon halt production at one of its European factories.

Fears of the virus are now affecting the global oil price. Chinese refiners are slashing output in anticipation of shrinking demand at home. Slowing Chinese demand is further darkening what was already a dismal outlook for natural gas. Chinese copper buyers have asked Chilean and Nigerian mining firms to delay or cancel shipments. Mongolia has suspended

deliveries of coal to China.

Some Chinese firms are panicking. Dozens have received official “*force majeure* certificates”, which they hope will allow them to slip out of contracts without incurring penalties. They may not. Faced with faltering demand as well as closed ports and roads, CNOOC, a Chinese energy giant, recently used such tactics to avoid accepting LNG shipments. Total and Royal Dutch Shell, European oil majors, are rejecting the move.

What happens next? Big firms want to ramp up production quickly. But it is unclear how soon workers will be allowed to return to factories. However, factory dormitories are crowded. Foxconn’s workers are packed eight to a room at its Shenzhen plant. If that leads to renewed infections plants may be forced to shut down again. Senior bosses will return soon, but some worry that mid-level expatriate managers with young children will not.

Even when plants are up and running, moving goods around and out of China will remain difficult. Alan Cheung of Kerry Logistics, a big provider in Asia, reports that his drivers are getting stopped across the mainland because the Chinese government is still trying to prevent lorries moving around unless they are delivering food or other necessities. The longer shipping volumes are depressed, the bigger the backlog when China Inc returns to work. That will probably lead to bottlenecks and a surge in freight rates.

In the longer term the epidemic could dampen the love affair between multinationals and China. Big companies had long assumed that their mainland supply chains were reliable and easy to manage. Surveys have found that only a minority of firms across all industries regularly assess their supply-chain risks carefully. For years bosses have devolved responsibility for sourcing to mid-level managers, typically instructed to extract an extra percent or two from costs each year. The covid-19 outbreak

has exposed the risks of doing so, especially since America's trade war with China is not exactly resolved. Tsunamis and floods came and went and firms simply thought they could manage, says Jochen Siebert of JSC Automotive, a consultancy. He predicts that the epidemic will put the question of supply-chain management squarely on the desks of their CEOs.





新冠病毒与贸易

恶疾之扰

新型冠状病毒可能会对全球供应链产生持久的冲击【新冠报道】

要一窥新型冠状病毒对全球企业的影响，看看苹果。这家美国科技巨头高度依赖中国大陆为其制造零部件和组装产品，每天通常都有约50名苹果高管乘坐美联航的航班往返加州和中国。但眼下不一样了。美联航等航空公司已经暂停了往返中国的航班。由于工人短缺，春节假期结束后，富士康（在中国制造了全球大部分iPhone）无法让组装厂自上周起恢复满负荷生产。分析人士估计，新冠病毒可能会导致本季度iPhone出货量减少5%至10%，并可能令畅销产品AirPods的扩产计划泡汤。

随着新冠病毒的扩散，疫情对商业的影响也在扩大。进出中国大陆的游客量骤跌。到3月底，预计约40万中国游客将取消前往日本的行程。亚洲一艘大型邮轮因有数十名乘客感染病毒而被五个国家和地区拒绝靠港（柬埔寨最终准其靠岸）。新加坡航空展在2018年为这个城市国家赚进约2.5亿美元，但今年包括美国军火巨头洛克希德·马丁公司（Lockheed Martin）在内的70家公司取消参展，上周举行的航展收入大减。通信行业盛会世界移动通信大会（Mobile World Congress）原定本月在巴塞罗那举行，但在沃达丰（Vodafone）、英国电信（BT）、Facebook及亚马逊等公司相继退出后，会议取消。新冠病毒可能破坏全球供应链，令世界经济蒙受巨大损失，这一点正日益清晰地显现出来。

大多数跨国公司都被杀了个措手不及。它们的亚洲供应链并非第一次遭受冲击。2011年的日本海啸和同年的泰国洪灾也导致许多大公司的生产中断。较近的则有特朗普发起的对华贸易战，暴露出供应链过分依赖中国大陆的风险。但这类企业的老板们并没有采取什么措施来应对此类冲击，比如此次新冠疫情爆发。

这样的失策正令企业受到投资者的惩罚。自1月初疫情爆发的消息首次传出后，对中国依赖程度较高的美国公司的股票表现已较标普500指数落后

5%（见图表）。

对于许多公司来说，未来几个月的日子可能会更难过，理由有三。首先，大型跨国公司旨在降低成本的战略令它们极易受到供应链风险的影响。例如，许多公司仅留有几周的库存，自信随时都能“及时”补货。这份自信看来是盲目了，咨询公司Resilinc的宾迪亚·瓦基尔（Bindiya Vakil）说。

第二个软肋是如今巨头企业对中国工厂的依赖程度比2003年SARS爆发时高得多。中国如今占全球GDP的比重达16%，2003年为4%。现在，中国的纺织品和服装出口占全球的40%，家具出口占全球的26%。中国也是金属等制造业原材料的消耗大户。2003年，中国吸收了全球矿业进口的7%，如今已接近五分之一。

研究公司高德纳（Gartner）的科瑞·科瑟（Koray Köse）指出，重要的不仅仅是中国制造业基地规模的扩大。自2003年以来，工厂已从沿海地区扩展至内陆较贫穷的地区，例如这次爆发疫情的武汉。如今，来自落后地区的工人在全国各地的工厂上班，在节假日返乡。科瑟认为，这种交织关联加大了供应链的风险。许多公司之间相互依赖程度日增也令风险上升。大陆供应商不再单纯组装产品，还生产其中的许多零部件。

推测大公司可能遭受供应链冲击的第三个原因是，那些受病毒传播和随后的政府封锁令影响最深的地区对某些全球性行业尤为重要。供应链分析公司Llamasoft指出，电子行业面临的风险最大，因为其库存相对较少，而且零部件供应的替代选择不多。

武汉所在的湖北省是中国“光谷”的心脏地带，有许多制造电信网络必备元件的企业。全世界可能有多达四分之一的光缆和光纤设备在这里生产。中国最先进的芯片制造工厂之一（生产智能手机的闪存芯片）也在这里创建。分析人士担心，湖北省的疫情可能导致今年全球智能手机出货量减少达10%。

汽车行业也遭到了打击。由于中国大陆制造的零部件供应中断，现代被迫暂时关闭在韩国的所有汽车生产线（目前正部分重启）。日产已在日本暂

时关闭旗下一家汽车制造厂。菲亚特克莱斯勒也发出警示，称其欧洲的一座工厂可能很快会停产。

对病毒的恐慌正在影响全球石油价格。因预期国内需求缩减，中国的炼油厂正在减产。中国需求放缓令原本就已不乐观的天然气前景变得愈加灰暗。中国的铜买家已要求智利和尼日利亚的矿业公司推迟或取消发货。蒙古已暂停向中国付运煤炭。

一些中国企业惊慌失措。几十家公司已收到官方出具的“不可抗力证明”，它们希望可以凭此让自己在回避履约时免责。事实上未必有用。由于需求下降，加上港口和道路封闭，中国能源巨头中海油最近使用这种方法停收交付的液化天然气，被欧洲石油巨头道达尔和荷兰皇家壳牌拒绝。

接下来还会发生什么？大公司希望快速提升产量。但工人何时能获准返厂还是未知数。而工厂宿舍环境拥挤。富士康在深圳的工厂一间宿舍住八个人。假如这导致新一轮感染，工厂可能被迫再次关闭。高管很快会返岗，但有人担心家有小孩的外籍中层管理人员不会。

即使工厂复工，国内物流和进出口货运仍会困难重重。亚洲大型物流服务供应商嘉里大通（Kerry Logistics）的张亚伦（音译）表示，由于中国政府仍在限制运送除食品或其他必需品以外商品的货车跨地运输，他的物流货车仍搁浅在各地。货运被限制的时间越长，等到整个“中国工厂”恢复运作时积压的货运订单就越庞大，这很可能导致运输瓶颈和运费激增。

更长远来看，这次疫情也许会给跨国公司对中国的迷恋大泼冷水。大公司一直以为自己在中国大陆的供应链可靠且易于管理。调查发现，各行各业中只有少数公司会定期仔细评估其供应链的风险水平。多年来，企业高管都将采购工作下放给中层主管，通常要求他们设法每年缩减一到两个百分点的成本。新冠病毒疫情暴露了这种做法的风险，尤其是在中美贸易战尚未完全终结的背景下。捷实汽车咨询公司（JSC Automotive）的约亨·希伯特（Jochen Siebert）说，海啸洪灾来了又去，企业以为自己总能对付得了。他估计这次疫情将把供应链管理问题清楚地摆在CEO们的桌面上。■



Technology C-suites

Time for an update

Talk of succession atop Big Tech grows louder

MOST BOSSES, even of multibillion-dollar businesses, are anonymous to anyone who is not their employee or an equity analyst. Except, that is, technology bosses—and not just founders like Amazon’s Jeff Bezos or Mark Zuckerberg of Facebook. Many bystanders are familiar with the bespectacled visages of Satya Nadella, who runs Microsoft, or Tim Cook, from Apple. Over the next year or so people may need to learn some new faces.

The first notable tech succession of the decade was announced on January 30th, when IBM said that Arvind Krishna will take over from Ginni Rometty, a rare female Big Tech boss, in April. Two days later Sandeep Mathrani was named as the chief executive of WeWork, a troubled pseudo-tech firm which rents office space. In December Google’s founders, Larry Page and Sergei Brin, handed control of Alphabet, the search firm’s parent company, to Sundar Pichai, who ran its core business.

More turnover is afoot. Marc Benioff, founder and co-CEO of Salesforce, which sells cloud-based business services, is expected to step down this year. Some Uber investors and executives wonder if Dara Khosrowshahi is the right person to bring the ride-hailing giant to profitability. Questions are even being raised about superstars like Mr Cook, who turns 60 in November and will then have run Apple for nearly a decade, and Mr Nadella, a 52-year-old who has been in the top job for six years. Who takes their place will say a lot about America Inc’s sexiest sector.

The names bandied about share a lot in common. For one thing, they are all male. Mr Cook’s heir-apparent is Jeff Williams, currently in charge of the

iPhone-maker's operations. Mr Nadella's likeliest replacement is Kevin Scott, Microsoft's chief technology officer, whose upcoming tome, "Reprogramming the American Dream", looks like a book-length job application. Mr Benioff is expected to hand over his co-CEO role to Bret Taylor, Salesforce's president and chief operations officer.

Ms Rometty's departure leaves only two prominent female leaders in tech: Lisa Su at AMD, a chip-design firm (who was reportedly considered for the IBM job) and Safra Catz at Oracle (though Larry Ellison remains the power behind the throne at the business-software giant he founded). Microsoft has nurtured a generation of impressive female talent, including Lila Tretikov, a vice-president of its artificial-intelligence (AI) business. But none of these executives appears likely to succeed Mr Nadella unless he sticks around for a few years more.

Besides more men, Big Tech corner offices can expect more geeks. Whereas Ms Rometty and Mr Benioff came from sales, Mr Krishna (who oversees IBM's cloud and AI business) and Mr Taylor (who worked as Facebook's technology chief before he joined Salesforce) are engineers by trade. Mr Williams, too, has an engineering degree. Mr Scott is a computer scientist. All are also seasoned managers by now.

Each new CEO will face distinct challenges. Mr Krishna has to complete IBM's pivot from conventional computing, such as mainframes and information-technology services, to AI and the cloud. Mr Taylor would have to integrate Salesforce's recent acquisitions. Mr Williams's main task would be to grow Apple's services business as it sells fewer iPhones. Whoever takes over at Microsoft must ensure that Mr Nadella's remarkable reinvention of the software-maker as a big-data and cloud-computing behemoth stays on course.

If Mr Benioff goes, only three of America's ten biggest tech firms will be run

by their creators: Amazon, Dell and Facebook. Mr Bezos and Michael Dell are in their 50s. Mr Zuckerberg is a stripling 35. Neither is going anywhere; Mr Dell tried retirement once before and it did not agree with him. They could nevertheless take some pointers from tech's new chiefs, who tend to be less abrasive and more politic than flamboyant founders. Those are useful traits at a time of techlash from politicians and calls for cuddlier behaviour from woke consumers and employees. ■



科技公司高管 该更新啦

关于科技巨头接班人的讨论日渐喧嚣

大多数企业老板都无甚名气，除了他们的员工和股票分析师之外没什么人听过他们的名字，即便有些人掌管着千百亿美元的生意。但科技公司的老板例外，而且不止是亚马逊的杰夫·贝佐斯或Facebook的马克·扎克伯格这样的创始人——许多圈外人也都熟悉微软总裁萨蒂亚·纳德拉或苹果的库克戴眼镜的形象。在未来一年左右的时间里，人们可能还要认识一些新面孔。

IBM在1月30日宣布，阿尔文德·克里希纳（Arvind Krishna）将于4月接替科技巨头中罕见的女老板罗睿兰（Ginni Rometty），这是进入20年代后第一起引人注目的科技公司换帅。两天后，桑迪普·马斯拉尼（Sandeep Mathrani）被任命为WeWork的CEO，这家出租办公空间的伪科技公司已陷入困境。去年12月，谷歌的创始人拉里·佩奇和谢尔盖·布林将母公司Alphabet的控制权交给了负责公司核心业务的桑达尔·皮查伊（Sundar Pichai）。

更多的人员变更正在准备中。Salesforce销售基于云计算的商业服务，其创始人兼联合CEO马克·贝尼奥夫（Marc Benioff）预计将在今年卸任。网约车巨头优步的一些投资者和高管猜想达拉·科斯罗萨西（Dara Khosrowshahi）会不会是让公司实现盈利的合适人选。甚至像库克和纳德拉这样的超级明星也引来同样的猜测。库克今年11月将年满60岁，届时他将执掌苹果近10年，52岁的纳德拉也已执掌微软6年。谁将接替他们将会揭示很多关于这个美国最光鲜亮眼的行业的状况。

那些传来传去的名字有许多共同点。首先，他们都是男性。库克的首选接班人是杰夫·威廉姆斯（Jeff Williams），目前负责苹果公司的运营。纳德拉最有可能的接替者是微软首席技术官凯文·斯科特（Kevin Scott），他即将出版的巨著《重编美国梦》（Reprogramming the American

Dream) 看起来就像一份冗长的求职信。贝尼奥夫预计会把联席CEO一职交给Salesforce的总裁兼首席运营官布莱特·泰勒 (Bret Taylor)。

罗睿兰离任后，科技业只剩下两位杰出的女性领导者：芯片设计公司AMD的苏丽萨 (Lisa Su，据称她曾是IBM考虑过的人选) 和甲骨文的萨弗拉·卡兹 (Safra Catz，不过公司创始人拉里·埃里森仍是这个商业软件巨头的幕后操盘手)。微软培养了一代令人印象深刻的女性人才，包括人工智能 (AI) 业务副总裁莱拉·特雷蒂科夫 (Lila Tretikov)。但这些高管目前似乎都不太可能接替纳德拉，除非他再留任几年。

除了男性增多，大型科技公司的高管办公室还会迎来更多技术派。罗睿兰和贝尼奥夫是销售出身，而克里希纳 (负责IBM的云计算和人工智能业务) 和泰勒 (在加入Salesforce之前曾担任Facebook的技术主管) 都是工程师出身。威廉姆斯也拥有工程学位。斯科特是一位计算机科学家。现在他们都是经验丰富的管理者。

每位新任CEO都将面临特有的挑战。克里希纳必须完成IBM从传统计算 (如大型机和信息技术服务) 向人工智能和云计算的转型。泰勒将不得不整合Salesforce近年来的几笔收购。威廉姆斯的主要任务是发展苹果的服务业务，因为iPhone销量减少了。无论谁接手微软，都必须确保纳德拉将这家软件公司重塑为一个大数据和云计算巨头的非凡努力能继续推进。

如果贝尼奥夫离任，美国十大科技公司中将只有三家仍由其创始人掌管：亚马逊、戴尔和Facebook。贝佐斯和迈克尔·戴尔 (Michael Dell) 都是五十来岁，扎克伯格是个35岁的年轻人，他们三人目前都不会离开。戴尔曾经试过退休，但发现退休生活不适合自己的。尽管如此，他们还是可以从科技行业的新掌门人那里学到一些东西，这些人往往不像高调招摇的创始人那么粗鲁，行事更得当、讲求策略。在如今政客们掀起科技抵制潮、觉醒的消费者和雇员呼唤更讨喜的行为之时，这些都是有用的特质。■



The future of work

If you can get it

Robots may well take your job—eventually

INNOVATORS ARE not always welcome. In 1589 William Lee made his way to the English court, hoping to be granted a patent for his invention, a knitting machine. Queen Elizabeth I turned him down: “Consider thou what the invention could do to my poor subjects,” she enjoined. “It would assuredly bring to them ruin by depriving them of employment.”

The fears of Good Queen Bess have echoed down the centuries—from the Luddites, who smashed textile machinery in the early 19th century, to John F. Kennedy, who warned of the dangers of automation during his presidential campaign of 1960. In the 21st century the concerns have switched to robots and artificial intelligence (AI); 30% of American workers believe their jobs are likely to be replaced by robots and computers in their lifetime.

Daniel Susskind has written about this issue before in “The Future of the Professions”, co-authored with his father, Richard. That book focused on the threat posed by machine-learning to doctors, lawyers and the like. His new tome is a much broader look at the economic and social consequences of automation.

In the past the relationship between machine and human labour has been driven by two factors: the substituting effect, which caused people to lose jobs, and the complementing effect, which allowed employees to do their work more productively. The author worries that, in the future, the substituting effect will dominate. Advances in AI have been so rapid that machines will eventually be better than people at most activities, he says, and so will be the “default choice” for performing them. A few highly paid

humans will still be employed, but the rest will either struggle to find work or fall into the “precariat”, stuck in jobs that are not just poorly paid but unstable and stressful.

Mr Susskind thinks that this scenario will require a change in political thinking. Part of his answer would be a “conditional basic income”, paid by the government and financed by taxes on the better-off. Rather than being universal, this would come with provisos: recipients would have to make some contribution to society, such as providing social care or teaching children. Given all the superabundant free time, societies will also need a more coherent leisure policy, coaxing people away from their smartphones and televisions.

This gloomy view of the impact of technology is plausible. But so is a more optimistic outlook, as the economist Roger Bootle showed in “The AI Economy: Work, Wealth and Welfare in the Robot Age”, published last year. Mr Bootle argued that AI and robotics would improve productivity and economic growth, and release people from performing the most humdrum tasks. As for employment, there will always be demand for services with the human touch, just as there is an appetite for “artisanal” loaves as well as sliced white bread.

Which of these visions is right? Recent history has not vindicated either the optimists or the pessimists. Employment has surged in both America and Britain, suggesting that technology has not led to widespread labour replacement. On the other hand, growth in productivity has consistently been extremely disappointing, indicating that technology is not yielding the hoped-for increases in prosperity. This record is a shaky basis on which to make forecasts. Mr Susskind wisely hedges his bets, declaring that “in all likelihood, there will be enough work for humans to do for a while yet.” The problem, he says, lies in the long run.

Perhaps. The truth is that, seductive as prognostications like Mr Susskind's may be, it is impossible to be sure whether the latest advances will in the end have mainly benign or malign economic effects. Books like his are a useful summary of the current debate on an important subject. But they are not crystal balls. ■



工作的未来

还抢得到吗？

最终，机器人很可能会夺走你的工作【《没有工作的世界》书评】

创新者并不总是受欢迎。1589年，威廉·李（William Lee）来到英国法院，希望自己发明的针织机能获得专利。女王伊丽莎白一世拒绝了他。“你想想看，这项发明对我可怜的臣民会有什么影响，”她告诫道，“这将剥夺他们的工作机会，定然会给他们带来灭顶之灾。”

从19世纪早期砸毁织布机的卢德派分子，到1960年在竞选总统期间警告自动化的威胁的约翰·肯尼迪，几个世纪以来，“贤明女王”的忧惧一直在回响。21世纪，人们的关切点已经转向了机器人和人工智能（AI）；30%的美国工人认为自己有生之年很可能被机器人和计算机取代。

丹尼尔·萨斯坎德（Daniel Susskind）曾在与父亲理查德（Richard）合著的《专业人士的未来》（The Future of the Professions）中谈到这个问题。这本书着重讨论机器学习对医生和律师等职业的威胁。他的新书视角广泛得多，探讨了自动化对经济和社会整体的影响。

过去，机器和人类劳动力之间的关系由两个因素驱动：一是导致人们失业的替代效应，一是让员工提高效率的互补效应。作者担心，在未来，替代效应将占主导。他认为，人工智能的进步如此之快，以至于机器最终将在大多数活动上都优于人类，因此应用人工智能将是“默认选择”。少数高收入人群仍然会有工作，但其余的人要么很难找到工作，要么沦为“朝不保夕族”，困在薪水低、不稳定、压力大的岗位上。

萨斯坎德认为，这种情况需要政治思维的转变。他的解决方案包括“有条件的基本收入”，由政府支付并由富人的纳税来资助。它不是普遍的，而是包含附加条件：受助者必须对社会做出一些贡献，例如提供社会照护或教育儿童。鉴于有如此多的闲暇时间，社会也需要一个更清晰连贯的休闲政策，诱导人们远离智能手机和电视机。

这种对技术影响的悲观论调似乎言之有理。但是，正如经济学家罗杰·布特尔（Roger Bootle）在去年出版的《人工智能经济：机器人时代的工作、财富和福利》（The AI Economy: Work, Wealth and Welfare in the Robot Age）中所展示的那样，更为乐观的观点同样显得合情合理。布特尔认为，人工智能和机器人技术将提高生产率和刺激经济增长，并把人们从最单调的工作中解放出来。至于就业问题，人们对人性化服务的需求总是存在的，就像除了吃切片方包，他们也要吃“手工”面包。

那么，种种预测中哪个是正确的呢？近期的历史并没有证明乐观主义者和悲观主义者孰是孰非。美国和英国的就业都在激增，这表明技术还没有导致广泛的劳动力替代。另一方面，生产率的增长一直都极其令人失望，表明技术并没有带来人们所希望的繁荣发展。这段历史并没有给预测提供足够可靠的基础。萨斯坎德明智地两边下注，宣称“在一段时间内，人类十之八九仍然有足够的工作可做”，问题在于长期，他说。

也许吧。事实是，虽然像萨斯坎德这样的预言可能很诱人，但我们无法确定，这些最新的进展最终带来的经济影响大体上是良性还是恶性的。与他的著作类似的书籍是对围绕当前这个重要议题的争论的有益总结，但它们不是水晶球。■



Medical diagnosis

iScanning

A system based on AI will search the retina for early signs of disease

THE DIFFERENT parts of a health-care system have different focuses. A hospital's dementia unit keeps records of patients' mental abilities. The stroke unit monitors blood flow in the brain. The cardiac unit is interested in that same flow, but through and from the heart. Each agglomeration of equipment and data is effective in its own domain, but for the most part has little relevance to other bits of the body and the conditions that plague them. Thus, like the proverbial blind men feeling an elephant, modern health care offers many fragmented pictures of a patient, but rarely a useful cohesive one.

On top of all this, the instruments that doctors use to monitor health are often expensive, as is the training required to wield them. That combined cost is too high for the medical system to scan regularly, for early signs of illness, all patients at risk of dementia, heart disease or a stroke. Rather, doctors work to manage symptoms after a disease has obviously taken hold.

An unusual research project called AlzEye, run from Moorfields Eye Hospital in London, in collaboration with University College, London (UCL), may change this. It is attempting to use the eye as a window through which to detect signals about the health of other organs. The doctors in charge of it, Siegfried Wagner and Pearse Keane, are linking Moorfields' database of eye scans, which offer a detailed picture of the health of the retina, with information about other aspects of its patients' health garnered from other hospitals around England. This will allow them to look for telltales of disease in the eye scans.

The data set includes, whether they know it or not, every one of the 300,000 patients who visited Moorfields between 2008 and 2018 and was over the age of 40—though names and other easily identifiable information are not preserved. The idea is to examine changes to people’s eyes within that ten-year period, and correlate these with, say, the emergence of Alzheimer’s disease in the same patient. Building such a data set while respecting privacy and confidentiality has been a challenge. It took the doctors two and a half years to go through a series of ethics-committee approvals at Moorfields, UCL and NHS Digital, the body which handles agglomerated data from English hospitals. In order to create the database without the consent of the patients involved they invoked a special legal provision known as Section 251 assent, which comes with its own review process and, in essence, empowers senior government health officials to give consent on behalf of patients from whom it would be impractical or impossible to acquire such individually. The data sets were linked together on November 1st, and the process of correlation is now under way.

The Moorfields data set has a lot of linked cases to work with—far more than any similar project. For instance, the UK Biobank, one of the world’s leading collections of medical data about individual people, contains 631 cases of a “major cardiac adverse event”. The Moorfields data contain about 12,000 such. The Biobank has data on about 1,500 stroke patients. Moorfields has 11,900. For the disease on which the Moorfields project will focus to start with, dementia, the data set holds 15,100 cases. The only comparable study had 86.

Drs Wagner and Keane are searching for patterns in the eye that betray the emergence of disease elsewhere in the body, and are focusing first, as the name AlzEye suggests, on Alzheimer’s disease. They will seek such patterns with the help of machine-learning algorithms that can crunch through imagery far faster than any human being, and which can spot far tinier variations. (The team has collaborated with DeepMind, a British artificial-

intelligence firm co-founded by Mustafa Suleyman, who sits on *The Economist's* board.) They may, it should be remembered, never find such patterns. Although there is circumstantial evidence that the back of the eye does change as its owner develops Alzheimer's, it may be that the changes are too subtle to be detected reliably enough for diagnosis. If such patterns could be recognised reliably, though, the potential impact would be huge. Even in rich countries, between 50% and 80% of Alzheimer's cases go undiagnosed. Moreover, even if the technique does not work for Alzheimer's, it might work for something else. Dr Wagner and Dr Keane therefore plan further searches for patterns related to strokes and heart disease. Even one relevant pattern would constitute a remarkable diagnostic leap forward.

| *Seeing is believing*

If it does work, the technique the two researchers are proposing will be cheap to implement. An indication of how cheap is the project's total budget of just £15,000 (about \$19,000). Equipment to perform an eye scan is becoming ubiquitous. Specsavers, which runs a chain of high-street opticians, now routinely offers the same sort of scans as Moorfields' in half of its 800 branches. Costco, a bulk retailer, offers scans in Britain for £24.99 a pop. An Israeli company called Notal Vision is building an eye-scanning device that is small enough to operate at home. The equipment and algorithms required to run machine learning on an eye scan are available to anyone, through cloud-computing services like Google and Amazon. Dr Keane once joked that he would like to see eye-scanning widgets become so cheap that they could be bundled in boxes of cereal.

This project will also act as a model for linking disparate health data together in a useful way while respecting patients' rights. Other such endeavours involving information-technology firms handling health data, such as Google's work with Ascension hospitals in America, or other parts

of its subsidiary DeepMind's work with England's health service, have generated controversy because they offered no notice of their plans to patients. As well as jumping deftly through all the required legal and ethical hoops, Drs Wagner and Keane also posted notices around the hospital and on Moorfields' website, informing patients of the impending linkage. Besides explaining what was happening, these also noted the research's potential benefits. Not one person complained. ■



医疗诊断

iScanning

一个基于人工智能的系统将在视网膜上搜索疾病的早期迹象

医疗卫生系统的不同部门关注的重点不同。一家医院的痴呆症部门记录病人的心智能力。卒中科监测大脑中的血液流动。心脏科也对血液流动感兴趣，只不过是流经和流出心脏的。每一个系列的设备和数据在其所在的领域内都是有效的，但大多数情况下与身体的其他部位和折磨它们的病痛无甚干系。因此，就像谚语中的盲人摸象一样，现代医疗就某个病人的情况提供了许多支离破碎的画面，却很少有全面的有用信息。

最重要的问题是，医生用来监测健康状况的仪器通常都很昂贵，为操作这些仪器而做的培训也代价不菲。对于医疗系统来说，这样的综合成本太高了，因此无法对所有存在痴呆、心脏病或卒中风险的病人定期筛查，以发现疾病的早期迹象。相反，医生多是在明显发病后尽力控制症状。

伦敦莫菲尔茨眼科医院（Moorfields Eye Hospital）与伦敦大学学院（UCL）合作开展了一项特殊的研究项目，也许能改变这一现状。该项目名为阿尔茨眼（AlzEye），试图以眼睛作为窗口来探测其他器官健康状况的信号。负责这项研究的医生西格弗里德·瓦格纳（Siegfried Wagner）和皮尔斯·基恩（Pearse Keane）正在将莫菲尔茨医院的眼部扫描数据库（提供了有关视网膜健康状况的详细信息）与从英格兰各地的其他医院收集到的该院病人其他方面的健康信息联系起来。这让他们能够在眼部扫描中找寻疾病的蛛丝马迹。

所用数据集包括2008年到2018年间到莫菲尔茨医院就诊的30万名40岁以上患者，无论他们本人是否知晓这项研究。不过该院并未保存他们的姓名和其他可轻易识别身份的信息。项目的想法是观测患者的眼睛在十年内的变化，并将这些变化与同一病患出现的阿尔茨海默病等病症联系起来。在尊重隐私和保密的同时构建这样的数据集一直都是个挑战。医生们花了两年半的时间才获得了莫菲尔茨医院、UCL和英国国家医疗服务体系数字部

（NHS Digital，负责处理来自英格兰医院的汇总数据）的一系列伦理委员会的批准。为了无需当事患者同意就能创建数据库，他们援引了一项名为“Section 251同意”（Section 251 assent）的特殊法律条款。该规定包括了一个独立的审查过程，实际上就是授权政府高级卫生官员在逐一获取病人同意不切实可行或不可能的情况下代表病人表示同意。这些数据集在去年11月1日被连接在一起，目前正在进行相互关联。

莫菲尔茨医院的数据集有大量相互关联的病例供研究，数量远超任何类似的项目。例如，全球领先的个人医疗数据收集机构之一英国生物银行（UK Biobank）收集了631例“严重不良心血管事件”，而莫菲尔茨医院的数据大约有12,000例。生物银行有大约1500名卒中患者的数据，莫菲尔茨医院有11,900例。莫菲尔茨医院的项目将首先关注痴呆症，其数据集包含15,100个此类病例，而唯一与之类似的研究仅有86例。

瓦格纳和基恩正在从眼睛中搜寻显露身体其他部位疾病迹象的模式。如项目名称“阿尔茨眼”所示，他们首先关注的是阿尔茨海默病。他们将在机器学习算法的帮助下寻找这样的模式，机器学习算法处理图像的速度远超人类，所发现的变化也细微得多。（该团队与英国人工智能公司DeepMind合作，本刊董事会成员穆斯塔法·苏莱曼[Mustafa Suleyman]是DeepMind的联合创始人。）有一点要记住，他们可能永远也找不到这样的模式。虽然有间接证据表明，随着病人患上阿尔茨海默病，他们眼睛的后部确实会发生变化，但这些变化可能太过细微，难以被可靠地检测到而做出诊断。但是，如果这种模式能够被可靠地识别出来，就会产生巨大的影响。即便在富裕国家，也有50%到80%患阿尔茨海默病的病人被漏诊。此外，即使这项技术对阿尔茨海默病无效，也可能对其他疾病有效。因此，瓦格纳和基恩计划进一步探寻与卒中和心脏病相关的模式。就算只找到一个可用的模式，也是诊断上的一次大飞跃。

| 眼见为实

如果这种方法真的有效，两位研究人员提出的技术实施起来会很便宜——从该项目的预算总共只有1.5万英镑（1.9万美元）中就可以看出来。眼部扫描设备随处可见。商业街眼镜连锁店Specsavers现在有800家分店，其

中一半提供与莫菲尔茨医院相同的眼部扫描服务。量贩零售商开市客（Costco）在英国以24.99英镑的价格提供眼部扫描服务。以色列公司Notal Vision正在研制一种便于在家中使用的小型眼部扫描设备。通过谷歌和亚马逊等云计算服务，任何人都可以获得在眼部扫描上运行机器学习所需的设备和算法。基恩曾经开玩笑说，他希望眼睛扫描设备会变得很便宜，甚至可以和麦片捆绑销售。

该项目还将示范如何在以有益的方式将分散的健康数据连接在一起时兼顾对患者权利的尊重。其他由信息技术公司参与处理健康数据的尝试都引发了争议，比如谷歌与美国Ascension医院的合作，或其子公司DeepMind的其他部门与英国健康服务部的合作，因为它们没有把自己的计划告知病人。除了机敏地跳过所有法律和伦理的要求外，瓦格纳和基恩还在医院各处和医院的网站上张贴了告示，告知病人即将进行的数据关联。除了解释正在发生的事，他们还指出了研究的潜在好处。至今还没人投诉过。■



Free exchange

Tearing up the rule book

The costs of America's lurch towards managed trade

STANDING BEFORE the global glitterati at the World Economic Forum in the Swiss mountain resort of Davos, President Donald Trump bragged of a “transformative change” to America’s trade policy. The newly inked “phase one” deal with China, he said on January 21st, would lower trade barriers and protect intellectual property. He crowed about China’s promise to buy an extra \$200bn of American services, energy, agricultural produce and manufactured goods over the next two years. He was not exaggerating. The agreement on a level of purchases, rather than on the rules of trade, does indeed mark a fundamental shift in American policy. But not one for the better.

America has embraced outcome-based rules in its trade relations before. Mercantilists like Mr Trump manage trade in two ways: either by restraining foreigners’ sales to America, or by encouraging them to buy more American goods. In the 1980s American negotiators spent most of their efforts on the first, as they faced political pressure to contain a burgeoning trade deficit and became convinced that Japan’s trade practices were unfair. At their peak, these “voluntary” restraints affected around 12% of all exports to America, including cars, steel, machine tools, textile products and semiconductors.

Voluntary import expansions, where a trading partner agrees to import more, as China has, were less common. Most famously, Ronald Reagan’s administration negotiated a commitment from the Japanese government that 20% of its semiconductor market would be imported. The aim was not so much to target the trade deficit directly, but to prise open what America thought was an unfairly closed market. The hope was that the intervention

would jolt suppliers into investing in new economic relationships and lead to a sustained shift in trade patterns.

A generous interpretation of Mr Trump's deal with China is that he is simply trying to do the same. He is not alone in feeling that China's market shuts out outsiders, or that its policymakers do not always play fair. Veteran trade negotiators tell of haggling away one Chinese trade barrier, only for another to pop up elsewhere. (Economists recognise this problem as the difficulty of writing down a "complete contract" that covers every contingency.) An outcome-based trade deal, tied to easily verifiable trade flows, should help to overcome distrust, and could force China to provide real market access. If it led to more investment in supply-chain infrastructure, then it could have lasting effects.

It could even be argued that managing trade with China would be easier than it was with Japan. Later attempts to repeat Reagan's semiconductor tactic failed, as Japan's government had grown tired of cajoling its private sector into changing its sourcing decisions. It had no direct control over who bought the managed products, and had to resort to pleading letters to firms, as well as surveys asking about who they were buying from. By contrast, China's government has the purchasing power of its state-owned enterprises at its disposal, and sway over the private sector too.

Dig into the details of Mr Trump's new deal, though, and the risks of waste and distortion become clear. The agreed increase in sales to China is large and rapid. According to an analysis by Chad Bown of the Peterson Institute for International Economics (with whom your columnist hosts a podcast), China has, in effect, pledged to increase its purchases of certain American agricultural products by 60%, and manufactured products by 65%, by the end of this year compared with levels in 2017 (see chart). This must happen regardless of economic conditions in China. Whereas Japan agreed to increase the share of imported goods in domestic demand, China has

signed up to buy fixed dollar amounts.

The risk is that China has promised to buy products that it either will not need or would rather get from elsewhere. State-owned enterprises could suck up American commodities and leave them to rot. American exporters, lured by higher prices to Chinese buyers, could switch from more sustainable relationships to ones that fizzle once their artificial advantage ends. Or China could resort to logistical gymnastics to make it appear that it is buying American, such as by transporting goods from third countries through America. It could also have more American goods shipped directly to China, rather than through Hong Kong, so that they appear in the mainland's trade figures.

Another danger is that China simply diverts trade from its other trading partners, prompting complaints that the biggest actors are carving up markets between themselves—and carving others out. Admittedly, members of the World Trade Organisation (WTO) are already allowed to agree on broad tariff cuts among themselves, which could lead to similar diversionary effects. But trade deals are permitted, whereas discriminatory managed-trade arrangements are not. And if, as Mr Bown warns, Brazilian and Argentine sellers of soyabeans or Russian and Canadian lobster-traders find themselves pushed out of China's market, they are unlikely to react well.

| *Managed decline*

If the deal sticks, it will threaten the world's trading system. That system, ironically, is the result of America's turning away from managing trade in the 1990s. Realising that it could not preach the virtues of free markets while itself practising something so different, America sought the creation of the WTO, as a shift towards a system based on rules rather than power. Mr Trump's presidency has consistently undermined those rules, and the deal with China again reinforces the idea that they do not matter. Now that

he has won his share of the Chinese market, other countries may demand the same.

But the deal could also very easily fall apart, ushering in another round of hostilities. America is tightening its export controls, which could limit the goods available for China to buy. So, whatever the deal's fate, disruption looks inevitable. Whether Mr Trump will still be in office when that becomes clear remains to be seen. Official figures on whether China's purchases have met this year's target will not become available until early 2021, after the presidential election. ■



自由交流

撕毁规则

美国突然转向管理贸易政策的代价

在瑞士山区度假胜地达沃斯举办的世界经济论坛上，美国总统特朗普站在全球名流政要面前吹嘘美国贸易政策的“变革”。他在1月21日表示，刚刚与中国签署的“第一阶段”协议将降低贸易壁垒、保护知识产权。他炫耀地宣称中国已承诺在未来两年内额外向美国采购2000亿美元的服务、能源、农产品和工业品。他并没有夸大其词。从采购层面而非贸易规则的角度看，这份协议确实标志着美国政策的一种根本性转变。但不是朝着好的方向。

以往美国在贸易关系中也曾采用成果导向的规则。像特朗普这样的重商主义者用两种方式管理贸易：要么抑制外国对美国的销售，要么推动外国多买美国货。上世纪80年代，美国谈判代表背负着遏制迅速扩大的贸易逆差的政治压力，并越发确信日本采取了不公平的贸易做法，因而将大部分精力放在了前一种策略上。在高峰时期，这些“自愿”抑制措施影响了对美出口总量的12%左右，涉及行业包括汽车、钢铁、机床、纺织品和半导体。

贸易伙伴自愿扩大进口，也就是像中国那样同意增加进口的情况相对而言并不多见。最著名的例子是里根政府通过谈判使日本政府承诺其半导体市场的20%留给进口。贸易赤字倒不是首当其冲的目标，主要还是为了撬开美国认为的不公平的封闭市场。美国希望这种干预能够刺激供应商投资于新的经济关系，并引导贸易模式持续转变。

对特朗普新协议的一种宽容的诠释是他不过想故技重施。有不少人跟他一样，感到中国市场排斥外来者，或者认为中国的政策制定者并不总是公平行事。经验丰富的贸易谈判专家常说，通过谈判消除中国的贸易壁垒往往都是按下葫芦浮起瓢。（经济学家承认这个问题在于难以订立一份包含各种可能情况的“全面契约”。）一份成果导向的贸易协议与易于核查的贸易流动挂钩，应该有助于克服对中国的不信任，并有可能迫使中国提供真正

的市场准入。如果它能带来更多对供应链基础设施的投资，就可能产生持久的效果。

人们甚至还可以辩称，管理对华贸易会比管理对日贸易更容易。美国后来也试图重复里根的半导体策略，但未能成功，因为日本政府已经厌倦了劝说私营部门改变采购决策。日本政府并不能直接控制那些采购被管理产品的企业，只能向它们发出恳求信函，同时展开调查，询问它们的采购来源。相比之下，中国政府可以随意支配国有企业的采购，对私营部门也有影响力。

不过，深入分析特朗普新协议的细节之后，可以清晰地看出其中有浪费和扭曲的风险。双方同意扩大对华销售的数额庞大且增速迅猛。据彼得森国际经济研究所（Peterson Institute for International Economics）的查德·鲍恩（Chad Bown，他与本专栏记者共同主持一个播客）分析，中国实际上承诺到今年年底之前，将某些美国农产品和工业品的采购量较2017年水平分别增加60%和65%（见图表）。无论中国经济状况如何，这都必须完成。当年日本同意增加进口商品占国内需求的份额，而中国则是同意购买固定金额的商品。

其中的风险在于，中国承诺购买自己可能并不需要、或者原本宁愿从别处采购的商品。国有企业可能会大举吸纳美国商品，然后任其腐坏。受更高价格的诱惑，美国出口商可能会放弃更可持续的客户关系而转向中国买家，但他们享受的人为优势一旦结束，这种关系也会烟消云散。或者，中国也可能借助物流操作，例如将第三国商品经由美国转口运输，造成自己购买美国货的假象。中国还可能让更多美国商品不经香港而直接运往内地，使其纳入中国大陆的贸易数据。

另一种危险是中国直接把其他贸易伙伴的份额转移给美国，从而引发抱怨，指责两个大国瓜分市场，将其他国家排除在外。不可否认，世贸组织成员之间已被允许达成广泛的关税削减协议，可能也会造成类似的转移效应。但是，虽然允许达成贸易协定，却并不允许采取歧视性的管理贸易安排。而且，正如鲍恩警告的那样，如果巴西和阿根廷的大豆卖家或者俄罗

斯和加拿大的龙虾贸易商发现自己被挤出了中国市场，他们可不会心平气和。

| 人为的衰落

这份协议如果得以维持，将会威胁世界贸易体系。讽刺的是，该体系正是美国在上世纪90年代摒弃管理贸易的结果。当年美国意识到在宣扬自由市场的优点时不能说一套做一套，于是寻求建立世贸组织，从基于权力的体系转向基于规则的体系。特朗普担任总统以来一直在削弱这些规则，与中国达成的协议再次强化了这些规则无用的想法。既然他赢得了中国市场的份额，其他国家也可能提出同样的要求。

但这份协议也很容易破裂，引发新一轮摩擦。美国正在收紧出口管制，可能会限制中国购买商品的选择范围。那么，无论这份协议未来的命运如何，扰乱似乎都不可避免。当协议的后果明朗之时，特朗普是否仍在任还不得而知。要待到2021年初官方数据公布之后，才能知道中国是否达到今年的采购目标，而那已是在美国大选之后的事了。■



Schumpeter

An existential questioner

Clayton Christensen's insight on disruptive innovation will outlive him

“WHEN I DIE and they’re going to interview me outside of heaven to decide whether...to let me in,” Clayton Christensen once told an *Economist* conference, “I’m going to start by saying ‘I’ve got some questions for you first.’” Mr Christensen, who died of leukaemia on January 23rd, aged 67, was endlessly seeking answers. The most important, to the question “why do great firms fail?”, inspired “The Innovator’s Dilemma”. The book, published in 1997, popularised the idea of disruptive innovation. It made the Harvard Business School professor the most influential management thinker of his time.

He disliked the term “guru”. It sat awkwardly with him, as he sat awkwardly on stage: a lanky two-metre-tall Mormon who laced conversations with exclamations like “Holy Cow!” and knotted his fingers together as if trying to stop his enthusiasm from bounding out. He was the antithesis of Silicon Valley’s self-promoters who, often in his name, turned innovation and disruption into the most overhyped words in business. Still, unlike most management theories, which live and die like fruit flies, his will outlast him.

Its compelling simplicity caught the zeitgeist just as the disruptive power of the internet was taking hold. It was not wholly new. As management thought goes, disruptive innovation is no double-entry book-keeping, or even Joseph Schumpeter’s “creative destruction” (on which it was partly built). But it has stood the test of time so far. In a pleasing symmetry, a business insight that grew from research on, among other things, the impact of mini-mills on the steel industry would apply generations later to the impact Harry’s razors are having on an incumbent brand like Gillette.

In a nutshell, Mr Christensen's insight was that it is not stupidity that prevents great firms from foreseeing disruption but rather their supreme rationality. They do "the right thing", focusing on better products for their best and most profitable clients, often to the point of over-engineering (how many Mach and Fusion blades does a chin need?). But that is "the wrong thing" if it blinds them to the threat from poorly capitalised upstarts offering cheaper stuff in markets too obscure to worry about. Such threats can swiftly turn existential if the rivals move upmarket and go for the jugular.

At the time the insight was radical. To business schools it had seemed obvious that big firms had the resources, the labs and the boffins to out-innovate anyone. "The Innovator's Dilemma" challenged that complacency. It was also inspirational. It gave startups the confidence to believe that even the best-run incumbents could be overthrown. That may be why Apple's Steve Jobs and Amazon's Jeff Bezos were fans—and, once they disrupted their markets, why they stayed eternally vigilant, even paranoid.

Mr Christensen had his critics. One historian at Harvard University, Jill Lepore, wrote a *New Yorker* article in 2014 lamenting the Christensen-inspired "blow things up" style of disruption spreading through corporations, schools, universities, hospitals and newspapers. She also said some evidence from the industries he had studied did not support his claims.

"Mr Disrupter", as his colleagues called him, did himself no favours by sometimes acting as if he had a monopoly on disruptive wisdom. Even devotees such as Ben Thompson of Stratechery, a tech newsletter, point out that for years Mr Christensen shrugged off Apple's iPhone as just a fancy mobile phone, because it did not neatly fit his notion of disruption as a frugal, bottom-up process (he later conceded it perhaps disrupted the laptop). He felt the same way about Tesla, which he once brushed off as a

luxurious irrelevance, and Uber, which started off neither more bare-bones nor cheaper than taxis. Both may end up rocking the car industry. The internet has made it easier to provide both the high end and low end of the market with superior services at the same cost.

Look around, though, and signs of disruptive innovation are widespread. In India Mukesh Ambani's Jio, a mobile network offering cheap, high-speed data, has upended the telecoms market—albeit with oodles of cash from Reliance Industries, India's most valuable company. In America, e-commerce-enabled, direct-to-consumer brands, from razors (Harry's) to eyewear (Warby Parker) to mattresses (too many to name), are giving traditional retailers sleepless nights.

The difference is how incumbents are responding, guided by Mr Christensen's counsel. Richard Lyons of the University of California, Berkeley, calls it “the disruption risk-management system”. Some big firms buy up the competition before it hurts them, as Google did with YouTube, Facebook did with Instagram and WhatsApp, ExxonMobil did with XTO, a fracking firm, and Danone did with non-dairy brands such as Alpro. Some take stakes in potential disrupters to keep an eye on them: GM invested in Lyft, now a listed ride-sharing company, and two other carmakers, Daimler and Geely, have taken stakes in flying-taxi firms. Others, such as Apple, have managed to disrupt themselves from within.

| *A towering figure*

Some of the defining business trends of the past decade are, in other words, infused with Christensenian thinking, which has itself gone from disruptive to ubiquitous. In other ways, however, Mr Christensen remained an iconoclast. He was scathing about data's ballyhooed ability to predict the future. When he arrived at heaven's gate, he said, one of his first questions to St Peter would be: “Why did you only make data available about the past?” He was wary of accepted measures of success, such as fame. Life, he

insisted, should be judged by the impact it has on individuals; at its best management could be “the most noble of professions”, but only if it assisted others in learning and growing. And he preferred not to give answers, but to help people work things out for themselves. The concept of disruptive innovation was just such a pedagogic aid—and an elegant one. Mr Lyons speaks for many when he says “We will always remember the beauty.” ■



熊彼特

生死之问

克莱顿·克里斯坦森那颠覆性创新的洞见将长存于世

“等我死了，他们会在天堂门口和我谈话，决定是否……让我进去，”克莱顿·克里斯坦森（Clayton Christensen）曾在本刊举办的一次会议上这样说道，“而我会说，‘我有些问题要先问一下你们’。”克里斯坦森于1月23日因白血病去世，享年67岁。他一生孜孜不倦地寻求答案，其中最重要的是为了解答“为什么伟大的公司会失败”，这启发他写下了《创新者的窘境》（The Innovator's Dilemma）。这本书于1997年出版，广泛普及了颠覆性创新的理念，也让这位哈佛商学院的教授成为了他那个时代最具影响力的管理学思想家。

他不喜欢“大师”这个词。当他别扭地坐在台上时，这个称号确实与他不太相称：一个身高两米、身形瘦长的摩门教徒，言谈间不时发出“我的天啊！”之类的惊叹，双手手指也交叉着，似乎是想克制自己的激情迸发。他是硅谷那些自我推销者的对立面，而这些人却往往以他的名义，将创新和颠覆变成商业世界里最被过度吹捧的词语。尽管如此，与大多数生命短暂如同果蝇的管理学理论不同，他的理论将在他的身后长存于世。

互联网的颠覆性力量生根之时，他的理论以一种强有力的简洁抓住了时代精神。他的理念并不是全新的创造。就管理学思想而言，颠覆性创新比不上复式记账法，甚至也不如约瑟夫·熊彼特的“创造性破坏”（克里斯坦森的理论部分源自于此）。但是迄今为止，它经受住了时间的考验。他从小型钢铁厂对钢铁行业的冲击等各种例子中总结出商业洞见。几十年后，在Harry's剃须刀对传统品牌吉列的冲击中，这种洞见再次得到验证——这种恒定性令人愉悦。

简而言之，克里斯坦森认为，大公司之所以无法预见自己被颠覆的命运并非因为愚蠢，而是由于它们的极度理性。它们去做“正确的事”，专注于为最优质和最能贡献利润的客户提供更好的产品，往往到了过度设计的地步

（一个下巴能用得着多少片锋速和锋隐刀片呢？）。但是如果这令它们忽视了那些资金不足的后起之秀的威胁，认为这些小公司推出的较廉价产品针对的市场不起眼而不足为患，那么它们其实就是做了“错误的事”。这些竞争对手一旦转入高端市场，直击要害，其威胁可能很快变得攸关生死。

在当时，这种洞见是相当激进的。在商学院看来，大公司拥有大量的资源、实验室和研究人才，显然比谁都更具创新力。《创新者的窘境》挑战了这种自满心态。它同时也鼓舞人心。它让创业公司深信，即使最优秀的传统企业也可能被推翻。或许正因如此，苹果的乔布斯和亚马逊的贝佐斯都是该理论的拥护者——而且也能解释为何他们在颠覆了市场之后仍然永远保持警惕，甚至有些偏执多疑。

克里斯坦森也不乏批评者。哈佛大学的历史学家吉尔·莱波雷（Jill Lepore）2014年在《纽约客》撰文，哀叹克里斯坦森启发下的“破坏一切”式的颠覆风潮席卷了企业、院校、医院和报纸。她还说，克里斯坦森研究过的行业当中有一些证据并不能支撑他的主张。

而“颠覆者先生”（他的同事对他的称呼）有时的言行仿佛垄断了对颠覆思想的认知，也于他自己不利。就连他的忠实信徒、科技博客Stratechery的博主本·汤普森（Ben Thompson）也指出，克里斯坦森多年来对苹果的iPhone不屑一顾，认为它只是一款花哨的手机，因为他认为颠覆应该是一种节俭朴素、自下而上的过程，而iPhone不太合乎这种理念（他后来承认也许它颠覆了笔记本电脑）。他对特斯拉的看法也差不多，一度视之为无关紧要的奢侈品。他对优步的态度也是如此，因为它起步的时候既不比出租车服务更精简，也没有更便宜。但这两者最终都有可能撼动整个汽车行业。有了互联网，无论在高端还是低端市场都可以更容易地提供优越的服务，同时保持成本不变。

不过，环顾四周，颠覆性创新的迹象随处可见。在印度，穆克什·安巴尼（Mukesh Ambani）的Jio移动网络提供廉价的高速数据服务，已经颠覆了电信市场——尽管印度市值最高的信实集团（Reliance Industries）在背后提供了大笔现金。在美国，借助电商渠道的直销消费品牌也让传统零售商

夜不能寐，从剃须刀（Harry's）到眼镜（Warby Parker）再到床垫（品牌太多，不胜枚举）。

差别在于，在克里斯坦森思想的指导下，传统企业如何应战。加州大学伯克利分校的理查德·莱昂（Richard Lyons）称之为“颠覆风险管理系统”。一些大公司在竞争对手有能力造成伤害之前就将其收归麾下，正如谷歌收购了YouTube，Facebook收购了Instagram和WhatsApp，埃克森美孚收购了水力压裂公司XTO，达能收购了Alpro等非乳业品牌。也有公司通过持股潜在的颠覆性公司来监视其动向：通用汽车投资了Lyft（现已上市的网约车公司），另外两家汽车制造商戴姆勒和吉利入股了一批“飞的”公司。苹果等其他公司则设法从内部自我颠覆。

| 形象伟岸

可以说，过去十年里一些具有决定性意义的商业趋势都灌注了克里斯坦森的思想，其思想本身也从具有颠覆意义变成了无所不在。然而在其他方面，克里斯坦森仍然是一个打破常规的人物。他严厉抨击对数据预测未来的能力的大肆吹捧。他说，当他到达天堂的大门，首先向圣彼得提出的问题就包括：“为什么你只提供有关过去的数据？”他对公认的成功标准保持警觉，例如名声。他坚持认为，人生的评判标准应该取决于对其他个体产生的影响；在最好的情况下，管理可以是“最高尚的职业”，但前提是它必须帮助别人学习和成长。他倾向于不给出答案，而是帮助人们自己解决问题。颠覆性创新的理念就是这样一种教学辅助手段——而且相当优雅。“我们将永远记住这份美感”，莱昂的话说出了许多人的心声。■



Coronavirus

Run, don't walk

Scientists are racing to produce a vaccine for the latest coronavirus. Even if they are too late for this outbreak, their work will not be wasted

IN RECENT WEEKS searches on Google for “contagion movie” have soared. In the film, a thriller from 2011, a virus spreads rapidly around the world, killing 26m people. The plot follows the frantic efforts of scientists to produce a vaccine. Some 133 days after the first infection, they succeed.

In the real world most recent vaccines have taken years to develop. Some have taken more than a decade. Others, such as a vaccine to stop HIV, the virus that causes AIDS, still elude scientists. But technological innovations and a more streamlined development process could dramatically shrink the time it takes to produce a vaccine against a new pathogen that has the potential to cause an epidemic.

The new coronavirus that emerged in the Chinese city of Wuhan in December presents vaccine-makers with an urgent test. It has so far killed more than 900 people and infected more than 40,000. Scientists in China published the Wuhan virus’s genetic sequence on January 12th, less than a week after they isolated the bug from a patient suffering from a mysterious respiratory infection. By late January, several groups around the world had started work on a vaccine using these genetic data. The first clinical tests on humans, for safety, could begin as early as April. With luck, a vaccine could be ready within a year. This week the World Health Organisation (WHO) will convene a global meeting to set a research agenda. It will agree on rules, or protocols, for trials and work out which medical advances should be priorities.

People have rushed to make new vaccines before. The west African Ebola

outbreak of 2013-16 tested the world in many ways, but particularly in the need to speed up the delivery of new treatments. Organisations and institutions that normally work slowly, and at arm's length, came together to get the job done faster. Drug regulators from America and Europe, pharmaceutical firms, charities, experts and the WHO all worked closely to advance the trials and technologies needed. They succeeded. An outbreak of Ebola in 2018 in the Democratic Republic of Congo, which now appears to be on the wane, has been contained largely as a result of the wide availability of a vaccine. This process of scientific acceleration is under way again, this time “on steroids”, says Seth Berkley, the boss of GAVI, a vaccine-finance agency.

Even if a vaccine were ready within a year, it would be too late to stem the current epidemic in China. But it could help other countries. Fears are growing that the Wuhan virus will spread more widely and become an established seasonal disease around the world, like the common flu. China's extraordinary efforts to contain the virus, including quarantining over 50m people, may stave off epidemics in other countries until next winter. It is too soon to tell how deadly the Wuhan virus is. But if it is at least as bad as seasonal flu, a vaccine for those most at risk will be vital. In 2017-18 more than 800,000 people were hospitalised and about 60,000 died in America alone as a result of influenza.

The rush to develop a vaccine against the Wuhan virus has been led by the Coalition for Epidemic Preparedness Innovation (CEPI), a group set up in 2017 in the wake of the west African Ebola outbreak. CEPI's purpose is to forearm the world against future outbreaks of disease, without knowing what those diseases will be. Its aim is to have a vaccine against a previously unknown pathogen ready to test in humans within 16 weeks of its identification. To that end, some of the university research centres and biotechnology firms that it has funded have been working on “plug-and-play” vaccine design and manufacturing technologies that can be used for a

number of pathogens. This allows the genetic sequence of a particular pathogen to be slotted into an existing molecular platform that forms the basis of the vaccine.

In the past, laboratory work on a vaccine required stocks of the actual virus. It would be treated to make it harmless but still able to tickle the immune system into producing antibodies—proteins that fight off the wild virus if it attacks. Working with a deadly virus is tricky, naturally. It requires special containment facilities and exhaustive procedures to prevent it from escaping or infecting scientists.

Gene sequencing has made this process quicker, safer and easier. Researchers can build synthetic versions of parts of viruses to work on vaccines without needing complete samples of the pathogens.

Scientists have produced vaccines against other viruses, including Zika, Ebola and two other coronaviruses—SARS (Severe Acute Respiratory Syndrome) and MERS (Middle East Respiratory Syndrome)—using such technology. The vaccine research on these two cousins of the Wuhan virus has come in handy in recent weeks.

| *Going viral*

Once a vaccine has been developed in a laboratory, it is sent to a factory where it is turned into a sterile vaccine mix. This is then put into vials and tested to ensure it is not contaminated before clinical trials in humans can be carried out. Many of these tests are done in petri-dishes; the process takes several months. Genetic sequencing can do the job much faster. By sequencing the DNA of everything in a vial of vaccine and examining the result, scientists can spot traces of viruses that should not be present. Vaccine research groups in Britain are in talks with the country's medicines regulator about an approval process for such alternative testing methods.

The development of a vaccine can be speeded up if bottlenecks in the process are eliminated, says Sarah Gilbert. She leads a group at Oxford University which is working on a vaccine against the Wuhan virus. Her group has developed a template for vaccines that can be adapted quickly for new pathogens. The researchers can make the first small quantities of a new vaccine in just six to eight weeks. In the past the process would have taken up to a year. The other groups trying to come up with a vaccine for the Wuhan virus are using similar methods involving templates that have already been proven to work.

Faster regulatory approval can also speed vaccines through clinical trials. Even as it started making the vaccine, Dr Gilbert's group began putting together an application for clinical trials for it. The group plans to apply for an expedited ethical and regulatory review, which can be granted within days as it was for clinical trials of the Ebola vaccine conducted in Britain in 2014. Normally, the process takes about three months, says Dr Gilbert.

Even if a vaccine is developed and approved, the rapid rise in cases of the Wuhan virus in China and its spread to other countries has created a new urgency: planning ahead for ways to make massive quantities of a vaccine quickly. There are not many factories that can mass-produce vaccines, so new vaccines often wait in a long queue. Aware of this problem, the American government has built dedicated manufacturing facilities that can produce vaccines rapidly for emergencies. Britain is doing something similar.

When CEPI was planning its work, those involved were thinking about epidemics (outbreaks limited to one country), not pandemics (global epidemics), explains Richard Hatchett, the head of the group. Early this month CEPI put out a call for vaccine candidates for the Wuhan virus that can be manufactured on a large scale with existing capacity. On February 3rd it brought on board as a partner GSK, a big drug firm, which has agreed

to lend its highly effective adjuvant to a new vaccine. An adjuvant is a special ingredient that makes vaccines more efficient by boosting the immune response—which means that fewer doses of the vaccine or a lower concentration of its core ingredient is needed for vaccination.

Even if a vaccine can be produced in sufficient quantities, getting it to the people who need it, regardless of where they live, can still be a problem. In theory, a vaccine for the Wuhan virus would go to those most at risk, such as health workers, the elderly and those with conditions that appear to make the virus more lethal, such as patients with immune deficiencies. The problem is that politics often intervenes during a pandemic, and governments that are the home to vaccine-making facilities can requisition some of it for their own use, citing national defence or security.

This is a problem Mr Hatchett knows all too well; he worked at the White House on medical preparedness during a flu pandemic in 2009. The outbreak had a very low mortality rate, but exporting any vaccine before it was available to American citizens quickly became a vexed issue. Mr Hatchett is working with the WHO to try to ensure that the Wuhan virus vaccine is made at a number of different sites around the world including ones in small countries which would quickly be able to meet the needs of their entire populations.

| *A jab in the dark*

The issues surrounding any potential vaccine make questions about medicines to treat those who have become gravely ill particularly acute. Licensed medicines to treat coronaviruses do not currently exist, but experimental drugs are in development, with some early data on their use. One that has been highlighted as promising is called remdesivir, which is made by Gilead, a drug firm. Two randomised controlled trials started enrolling patients last week. Remdesivir was developed to treat Ebola but in laboratory tests has been shown to be effective against a range of viruses. A

combination of two drugs usually used in HIV treatment also looks promising and is already being tried on patients, says Vasee Moorthy who helps set research and development priorities at the WHO during epidemics.

Randomised controlled trials—in which some people are given the drug being tested and some are given a placebo—are the gold standard of scientific evidence. These will probably go ahead in the coming weeks when it is clear which drugs seem most promising. Trials with hospitalised patients will probably involve a placebo arm. Everyone in the trial would receive intensive care but some would also be given the drug being tested. This is because no one yet knows whether the new drugs, which may have side effects, do more harm than good. The most gravely ill patients may also be allowed to try untested drugs.

Only so much preparation is ever possible in advance of a new disease. A drug or vaccine's efficacy can only be tested during an outbreak. The urgency behind the search for treatments for the Wuhan virus is understandable. Such efforts were effective in the case of Ebola. People are willing to rush vaccines and drugs into use for a disease with a fatality rate around 70%, as Ebola's was. The calculus is different for one that kills 2% (or less) of those infected. Should hasty decisions lead to products that are not completely safe, people's faith in vaccines could be damaged. If so, the harm done to the world's health could rival the worst feared of the Wuhan virus. ■



冠状病毒

走不行，得跑了

科学家正紧急研发疫苗对抗新型冠状病毒，即便赶不上眼前的疫情，他们的努力也不会白费【新冠报道】

最近几周，谷歌上搜索“传染病 电影”的次数激增。在这部2011年的惊悚片《传染病》（Contagion）中，一种病毒迅速席卷全球，导致2600万人死亡。电影讲述了科学家们疯狂研制疫苗的故事。在发现首个感染病例的大约133天后，他们成功了。

在现实中，近年来新疫苗研发都耗时数年，有些超过十年。而有一些病毒，例如引发艾滋病的人类免疫缺陷病毒（以下简称HIV），科学家至今未能研制出攻克它的疫苗。但随着技术的创新和研发流程的简化，研发疫苗以对抗有可能引发流行病的新病原体的进程可能大幅缩短。

去年12月在武汉出现的新型冠状病毒对疫苗研制者提出了紧迫的考验。至今该病毒已致900多人死亡，感染人数超过4万。中国科学家于1月12日公布了新冠病毒的基因序列，距他们从一名患有不明原因呼吸道感染的患者身上分离出病毒毒株不到一周。到1月下旬，全球各地已有多个研究小组开始利用这些基因数据研发疫苗。为安全起见，新疫苗的人体临床试验最快可在4月启动。一切顺利的话，疫苗能在一年内研制出来。本周世卫组织将召开全球会议，制订针对新冠病毒的研究议程。会议将商定临床试验的规则或方案，确立应优先开展的医疗研究项目。

此前人们也曾紧急研制新疫苗。2013年至2016年西非爆发埃博拉疫情，对全球构成多方面的考验，其中加快推出新疗法的挑战尤为严峻。原本工作节奏缓慢且彼此独立的组织和机构携手，加速完成了这项工作。欧美的药品监管机构、制药公司、慈善机构、专家和世卫组织紧密合作，推进所需的试验和技术。他们取得了成功。2018年在刚果民主共和国爆发的埃博拉疫情得到遏制（现在似乎已逐渐消退）主要就是得益于疫苗的广泛使用。如今这种“科研加速”再度上演，这次更是“打了兴奋剂”，疫苗资助机构全

球疫苗免疫联盟（GAVI）的负责人塞思·伯克利（Seth Berkley）说。

即使能在一年内推出疫苗，对于遏制中国当前的疫情也为时已晚。但疫苗可以帮助其他国家。人们越来越担心新冠病毒会更广泛地传播，并像普通流感一样在全球成为一种季节性疾病。中国为遏制病毒传播做出了非同寻常的努力（包括隔离超过5000万人），这也许能阻延疫情在其他国家爆发直至下个冬季。现在还难以确定新冠病毒有多致命。但是假如其致命性至少与季节性流感相当，那么为高危人群提供疫苗就将变得至关重要。在2017年至2018年，单单美国就有超过80万人因流感住院，约六万人死亡。

在紧急研发新冠病毒疫苗的行动中，领头的是流行病防范创新联盟（CEPI）。该机构成立于2017年西非刚经历过埃博拉疫情之后，宗旨是“武装”世界，为在未来抗击可能爆发的各种未知疾病做好准备。其目标是在对新发病原体做出判定后的16周内研制出可用于人体临床试验的疫苗。为此，CEPI资助的一些大学研究中心和生物技术公司已在研究“即插即用的”疫苗设计和制造技术，可用于多种病原体。这样就能把特定病原体的基因序列插入构成疫苗基础的已有分子平台中。

过去，疫苗研发的实验工作需要真正的病毒。病毒会经过处理，变得对人体无害但仍能激发免疫系统产生抗体——也就是可抵御原本的野生型病毒攻击的蛋白质。当然，与致命病毒打交道不容有闪失，需要特殊的防护设施和详尽无遗的程序来防止病毒外泄或感染科学家。

基因测序令这一过程变得更快捷、安全、简单。研究人员可人工合成病毒的某些部分用于研制疫苗，并不需要完整的病原体样本。

科学家已运用这类技术研制出了针对其他病毒的疫苗，包括寨卡病毒、埃博拉病毒，以及另外两种冠状病毒——SARS（严重急性呼吸综合征）和MERS（中东呼吸综合征）。对新冠病毒这两位“表亲”的疫苗研究几周正好派上了用场。

| 病毒式传播

疫苗在实验室里成功研制出来后，会被送到工厂制成无菌疫苗混合剂，之

后注入小瓶并进行测试以确保它在开展人体临床试验前未被污染。这些测试很多是在培养皿上做的，整个过程耗时几个月。基因测序可以大大加快这项工作。通过对小瓶疫苗所含物质进行DNA测序并检查结果，科学家可以发现疫苗被病毒污染的痕迹。英国的疫苗研究团体正与该国的药品监管机构商议制订此类替代测试方法的审批程序。

如果研发流程中的瓶颈能解决，疫苗研发便可加速，牛津大学的科学家萨拉·吉尔伯特（Sarah Gilbert）表示。她正率领团队研发新冠病毒疫苗。该团队已开发出一个疫苗模板，可就新发病原体迅速调整。研究人员仅需六至八周便可制成首批少量新疫苗。而以往这一过程耗时长达一年。其他力图研发出新冠病毒疫苗的团队也在运用类似的方法，使用过往行之有效的模板。

加速监管审批也将加快疫苗的临床试验。吉尔伯特的团队刚着手研制疫苗时就已经开始准备临床试验的申请文件。该团队计划申请加急伦理及法规审查，可在几天之内完成，就像2014年在英国进行的埃博拉疫苗临床试验那样。而一般情况下这个过程约需要三个月，吉尔伯特说。

即便疫苗研制成功并获批使用，中国的新冠病毒病例急速增加并已传播到其他国家，又造成了新的紧急任务：须提前规划快速生产大量疫苗的方法。可以大批量生产疫苗的工厂并不多，所以新疫苗往往要排长队等候。美国意识到了这个问题，建设了专门的生产设施，能为紧急状况快速生产疫苗。英国也在打造类似的生产线。

CEPI之前的工作规划考虑的是地区流行病（单个国家爆发疫情）而非大流行病（全球流行病），该组织的负责人理查德·哈切特（Richard Hatchett）解释道。本月初，CEPI发出公告，征集可以现有能力大规模生产的对新冠病毒有效的成熟疫苗技术提案。2月3日，大型制药公司葛兰素史克加入成为合作伙伴，同意为新疫苗提供高效佐剂。佐剂是通过增强免疫反应使疫苗更有效的特殊成分，这意味着疫苗接种所需剂量可减少或核心成分浓度可降低。

即使能生产出足够多的疫苗，把它送达全球各地需要接种的人手中仍然存在。理论上，新冠病毒疫苗会被用到高危人群身上，例如医护人员、老年人，以及患有其他疾病而可能使病毒更为致命的人群——如免疫缺陷患者。问题是，大流行病爆发期间往往有政治因素的干预，疫苗生产设施所在地的政府可以国防或安全为由，征用部分疫苗自用。

对此，哈切特深有体会。2009年流感大流行期间他在白宫任职，负责医疗防控工作。那次流感的死亡率非常低，但在满足美国公民的需求之前就出口疫苗很快成了棘手问题。哈切特正在与世卫组织协力确保新冠病毒疫苗能在全球多地生产，包括一些能迅速满足其所有国民接种需求的小国。

| 用药风险

围绕潜在疫苗的这些问题让治疗重症患者的药物成了特别紧要的事情。目前没有针对新型冠状病毒的获批药物，但试验性药物正在研发中，已累积了一些前期试验数据。其中被看好的是由制药公司吉利德（Gilead）生产的瑞德西韦（remdesivir）。两个随机对照试验已于上周开始招募受试患者。瑞德西韦当初是研发用于治疗埃博拉病毒的，不过实验室测试显示它对多种病毒都有疗效。协助世卫组织在流行病期间确立研发重点的科学顾问瓦希·穆尔蒂（Vasee Moorthy）说，通常用于治疗HIV的两种药物的复方制剂似乎也可行，已开始试用于患者。

随机对照试验（一组参与者接受测试药物治疗，另一组接受安慰剂治疗）是最有说服力的科学证据。等到未来几周明确了哪些药物最有希望后，随机对照试验大概就会陆续展开。对住院患者进行的试验很可能会包含安慰剂对照组。受试者都将得到特别监护，但其中部分患者还将服用测试中的药物。这是因为药物可能产生副作用，大家还不知道新药是否弊大于利。病情最严重的那些患者可能还会被允许尝试未经测试的药物。

在一种新的疾病爆发前，能准备的也就只有这些。药物或疫苗的功效只能在爆发期间才能测试。寻找新冠病毒治疗方法的紧迫性是可以理解的。当年埃博拉疫情期间，这类努力带来了成效。面对埃博拉这类致死率约70%的疾病，人们愿意紧急使用新研制的疫苗和药物。但对于致死率为2%或

更低的疾病，考虑就不一样了。如果仓促的决定导致并非完全安全的产品投用，人们对疫苗的信心可能会受损。如果这样，对世界医疗卫生的危害可能堪比这次新冠病毒疫情最坏的情形。 ■



American economic power

Spooked by sanctions

America has weaponised the dollar. In the rich and emerging world, the search is on for an alternative

ON JANUARY 15TH America and China signed the first phase of a trade deal that eases tensions, with China agreeing to buy an additional \$200bn of American products over two years. It may look as if peace is breaking out in global economic relations, but beneath the surface the tectonic plates of commerce are shifting. America's financial muscle-flexing—through the use of sanctions, tariffs and bans on blacklisted firms—has not escaped the attention of other countries, which have been intensifying efforts to avoid the global dollar-based financial plumbing. Though these could herald a more balanced international monetary system, they also carry risks for the world economy.

The Trump administration has turned its financial might on not only China but also Iran, Russia and a host of others—including even allies such as the European Union and Turkey. The latest Iranian sanctions, announced last month, will heap more pain on an economy already pummelled by economic missiles aimed at banks, oil production and shipping. So dollar-centric is global commerce that other countries have long found it difficult to trade, even among themselves, without recourse to America's currency, banks and payments infrastructure. At least half of all trade invoices are in dollars. A majority of cross-border transactions are ultimately cleared through New York.

America started using the dollar system as a geopolitical weapon in earnest after the attacks of September 11th 2001. President Donald Trump has taken this policy to a new level of intensity, using sanctions as his main foreign-policy tool and even targeting allies with “secondary” sanctions that punish

anyone who trades with states in America's bad books. America's power ultimately stems from its ability to prohibit firms from using its financial system, in turn leaving them isolated and unable to interact with most counterparties. Often the effect is fatal.

The moves to explore alternatives to dollar-dependence in the face of this bellicosity are varied. Russia has substantially de-dollarised its trade flows, foreign debt and bank assets. Its energy giants have started switching contracts to roubles. Russia, China, India and others are discussing—and signing—bilateral or wider deals to settle trade in national currencies. They are also exploring alternatives to SWIFT, the dominant payments-messaging network, over which America holds sway. Europe, meanwhile, has built Instex, a clearing-house, that could allow its firms to trade with Iran while bypassing America's financial cops.

The search for workarounds has been given further impetus by the technological revolution sweeping through finance. Central bankers from Europe to China are stepping up work on public digital currencies. These could help bring down the cost of electronic cross-border payments, which is still relatively high. Some foresee the creation of cryptobaskets of reserve currencies.

It would be overdoing it to say these initiatives pose an immediate threat to the dollar. Instex has yet to be used; the SWIFT alternatives have yet to gain traction. The dollar's share is holding up on most measures (though in forex reserves it has slipped from around 70% to 60% since 2000). It continues to enjoy strong network effects. The most complex bits of global finance, including a huge mesh of derivatives, are generally dollar-based.

Moreover, potential rivals have drawbacks. The euro is hobbled by structural and governance problems, not least the lack of a proper banking or markets union in the euro zone, and a dearth, relative to America, of

risk-free financial assets such as German bunds. Blockchains alone cannot overcome such flaws. The yuan, too, has had false dawns. The tightening of capital controls after a financial crash in 2015 put paid to brash predictions that it would overtake the dollar by the early 2020s.

Nevertheless, an inflection point has been reached. Since Mr Trump began firing off financial ordnance, his targets have gone from merely musing about breaking free from the dollar to doing something about it, albeit tentatively for most. It is hard to see those efforts being wound down, even if America eases up.

A world in which the dollar is tested from several sides will be unpredictable. In the longer term, more balance among global reserve currencies may make the global monetary system less vulnerable to shock. And the dollar's current pre-eminence is not an unalloyed good for America: it distorts the currency's value (upwards) and market interest rates (downwards).

In the interim, however, the new era of monetary experimentation carries three big risks. First, a further escalation of sanctions could cause a financial shock, for instance if China's giant banks, which together have over \$1trn of dollar assets, were targeted. The second worry is that the more politicised America's financial hegemony becomes, the less reliable it will be in its long-standing role as a lender of last resort to offshore dollar-based financial markets and banks. The third is that transitions in the global monetary order are inherently unpredictable. Some economists believe the Depression was partly caused by the absence of a hegemon to steady the world economy. Mr Trump's upping of the financial pressure will have repercussions far beyond Tehran or Moscow. ■



美国的经济力量

受制裁惊吓

美国将美元用作武器。富裕国家和新兴国家正在另寻替代品

中美在1月15日签署了第一阶段经贸协议，缓和了紧张局势。中国同意在两年内增购价值2000亿美元的美国商品。全球经济关系似乎显露出和平之势。但在这种表象之下，商贸板块正在漂移。美国对自身金融实力的展示——利用制裁、关税和对黑名单上的公司实施禁令等措施——并没有逃过其他国家的注意。这些国家一直在努力避开以美元为基础的全球金融管道。尽管这些变化可能预示着一个更为平衡的国际货币体系，但也给世界经济带来了风险。

特朗普政府不仅利用金融力量向中国施压，也向伊朗、俄罗斯甚至包括欧盟和土耳其等盟友在内的许多其他国家施压。伊朗经济本就已经备受针对银行、石油生产和航运领域的经济“导弹”打击，上月刚宣布的对伊新制裁更是雪上加霜。美元在全球贸易的中心地位相当显著，其他国家早已发现，如果不依靠美国的货币、银行和支付基础设施，即使是它们之间的贸易也很难进行。所有贸易票据中至少有一半以美元计算。而大部分跨境交易最终也必须通过纽约清算。

自2001年911袭击事件之后，美国开始实实在在地将美元体系用作地缘政治武器。美国总统特朗普已将这一政策的运用提升到了一个新高度，把制裁用作了其外交政策工具，甚至还以“二级”制裁来打击盟友——任何与美国的敌人做贸易的国家都要受到惩罚。美国的实力归根到底源于它能禁止企业使用其金融系统，进而使其孤立，无法与大多数交易对手互动。这种影响通常是致命的。

面对美国的好斗，各国纷纷寻求各种方案来取代对美元的依赖。俄罗斯在其贸易流动、外债和银行资产中大幅度去美元化。俄罗斯能源巨头已经开始将合同结算转为卢布。俄罗斯、中国、印度和其他国家正在讨论并签署双边或更广泛的协议，用本国货币进行贸易结算。它们也在探索方案来替

代美国主导的主流支付信息网络SWIFT（环球同业银行金融电讯协会）。与此同时，欧洲已经建立了Instex(贸易互换支持工具) 结算机制，它可以使欧洲公司绕过美国的“金融警察”与伊朗贸易。

席卷金融领域的科技革命进一步推动了对变通方案的寻求。从欧洲到中国，各国央行官员都在加紧研究公共数字货币。这可能有助于降低仍相对较高的跨境电子支付成本。有些人则展望建立加密的储备货币篮子。

如果说这些举措对美元构成了即刻的威胁，那是言过其实了。Instex尚未开始使用，SWIFT的替代方案也还未得到广泛认同。美元所占份额在大多数指标上依然保持稳定（尽管自2000年以来美元在外汇储备中的比例已从约70%下滑至约60%）。美元仍继续享有强大的网络效应。全球金融体系中最复杂的部分，包括数量庞大而复杂的衍生品，大体以美元为基础。

另外，潜在的竞争对手也有弱点。欧元受结构性和治理问题的拖累，尤其是欧元区缺乏一个像样的银行或市场联盟，而且与美国相比也缺乏像德国国债这样的无风险金融资产。单靠区块链并不能克服这些缺陷。人民币也经历了虚幻的曙光。2015年金融危机后资本管制收紧，打破了人民币将在本世纪20年代初赶超美元的大胆预测。

尽管如此，拐点还是已经到来。自从特朗普开始动用金融武器以来，他的打击目标已经从想摆脱美元的想法变成了为此而采取的某些措施，虽然在大多数情况下这些措施都只是试探性的。即使美国放宽限制，这些措施也很难停止。

美元面临多方面考验，这样的世界将是不可预测的。从长远来看，如果国际储备货币之间达到更多的平衡，国际货币体系在面对冲击时可能就不会那么脆弱。而对美国来说，美元目前的主导地位也不完全是利好：它扭曲了美元的价值（推高）和市场利率（压低）。

然而，在这之前，货币试验的新时代也带来了三大风险。首先，进一步加大制裁力度可能会造成金融冲击，例如，如果制裁目标是总计拥有超过1万亿美元资产的中国大型银行。第二个担忧是，美国的金融霸权越政治

化，它长期以来扮演的境外美元金融市场和银行的最后贷款人的角色就越不可靠。第三，国际货币秩序的转变本质上是不可预测的。一些经济学家认为，上世纪30年代大萧条发生的部分原因就是没有一个霸权国家来稳定世界经济。特朗普加大金融压力所产生的影响将远远超出德黑兰或莫斯科。 ■



The Economist Film

Why do humans want to set foot on Mars?

There are similarities between Mars and the earth.



经济学人视频

人类为何想要踏足火星？

火星和地球有不少相似之处。



Democracy and its discontents

The ironies of revolution

The history of liberal democracy in eastern Europe casts light on both the region and the ideology

IN A VIRAL video for a song by Sergei Shnurov, a Russian rock star, a provincial young woman in a shabby Soviet-era apartment vies for the attention of a Westernised businessman she has befriended over Skype. He invites her to an art exhibition. She duly waxes and squeezes herself into tight jeans, emulating a model in a glossy magazine, and paints the soles of her shoes in red nail varnish to mimic the expensive Western originals. Alas, as she answers the door, the jeans treacherously split, the shoes stick to the floor—and the Russian Cinderella falls flat on her face.

A scathing take on Russia's abortive date with the West, the video's popularity was due in part to its liberating message. Don't bother aping others, it wittily enjoined; stick with what you've got. The pitfalls for ex-communist countries of copying the (once) liberal West are the subject of "The Light that Failed", a sharp, polemical and ideas-packed book by Ivan Krastev, a Bulgarian-born political scientist who has witnessed and participated in the remaking of central and eastern Europe, and Stephen Holmes, an expert on the history of liberalism at New York University.

Published for the 30th anniversary of the fall of the Berlin Wall, their book sets out to explain how the liberal transformation of eastern Europe turned into a defeat for the idea of liberalism itself; why, after making reforms that paved the way for Europe's emancipation, Russia became a bitter enemy of the West; and why "the end of history"—as Francis Fukuyama once put it—gave way to the apparent cancellation of the sunlit future. Membership of NATO made many ex-communist countries more secure than ever. Accession to the European Union helped make them unprecedentedly rich.

Yet disillusionment set in.

To understand why, Mr Krastev and Mr Holmes examine the psychology of imitation. Unlike the great revolutions of 1789, 1917 or even 1968, the upheaval of 1989 was not powered by newfangled ideas or utopian visions. That it was largely peaceful was in part because it eschewed radicalism and innovation. Rather, it was staged in the name of reverting to “normality”, and of fixing the derangements of a system which postulated that two plus two made five (at best) and subordinated human instincts to ideology. Russia and Poland, Hungary and Bulgaria, ex-communists and dissidents—everyone wanted to be “normal”. And being normal meant being like the West. Copying it became the imperative.

With hindsight, that urge was also a source of psychological strain and future resentments. The imitation of moral precepts—as opposed to Chinese-style imitation of technology—required a degree of self-abnegation. It undermined citizens’ faith in the special character of their nations and compromised their dignity. Some felt like poor relatives magnanimously invited to someone else’s feast, but seated at the end of the table, and judged. Others felt like the girl in “The Exhibit”, Mr Shnurov’s video. The bigger the country and grander the past, the greater the strain.

| *Ghosts at the feast*

This was not the only structural problem in the impersonation process. Another, say the authors, was embedded in the model being emulated. The version of the West admired and craved by eastern Europeans was the anti-communist West of traditional nation states, in which liberalism was grounded in patriotism and protected by strong borders. It was, above all, a West of cohesive societies with smallish contingents of foreigners. That West, however, was transformed by the success of liberalism itself, amid migration, multiculturalism, secularism and gay marriage. People who grew up under totalitarian regimes had a heightened sensitivity to finger-

wagging; to many, political correctness came across as repressive groupthink.

The financial crash of 2008 and the subsequent migrant crisis were seen—at least by populists such as Hungary’s Viktor Orbán and Jarosław Kaczyński of Poland—as proof positive of the liberal West’s failures. An irony drawn out by Mr Krastev and Mr Holmes is that those leaders owe their rise not so much to the inflow of migrants from Africa and the Middle East (which barely affected their countries) but to the outflow of native-born citizens. “The dream of collective return of formerly communist countries to Europe made the individual choice to abscond abroad both logical and legitimate”; but when the best and the brightest want to leave, those who remain are liable to feel like losers, and be more likely “to cheer anti-liberal demagogues who denounce copycat Westernisation as a betrayal of the nation”. Anti-migrant scaremongering in eastern Europe is a displaced fear of depopulation, the authors argue.

Yet this analysis does not explain why anti-Western and anti-liberal rhetoric is louder in more populous countries, such as Poland, than in smaller Baltic and Balkan places. One reason, perhaps, is that Poland (like Hungary) can invoke a glorious past. By contrast, it is hard to imagine a demagogue promising to make Estonia great again. This may help explain why resentment of the West as an exemplar is particularly strong in Russia.

Mr Krastev and Mr Holmes think the trauma of losing the cold war made Russia different, and that its attempts at building democracy were always a charade. Both assertions need qualifying. Mikhail Gorbachev, who ended the cold war, suffered no inferiority complex; at the time, few Russians regretted the withdrawal of Soviet troops from eastern and central Europe. Meanwhile, the freedoms of the 1990s were as real in Russia as its political competition, which was sharp enough to take the country to the verge of civil war. The feeling of humiliation took hold later, amid economic

recovery, as anti-American propaganda was whipped up by Vladimir Putin, a former KGB officer, not a bedazzled reformer. Under Mr Putin, imitation of America and the West morphed into parody and became a means of retaliation. In its war against Georgia in 2008, annexation of Crimea in 2014 and meddling in the American election of 2016, the Kremlin implicitly claimed to have mirrored America's actions and exposed its hypocrisy.

The resentment of the imitators towards their model might have been expected. What is more surprising is that the anti-liberal agitators found an ally in the leader of the supposed home of liberal democracy—Donald Trump, whose victory was celebrated in Moscow as the end of reviled Western liberalism. While Mr Putin has become the template for authoritarians, Mr Trump has abandoned the notion of America's exceptionalism in the name of a different kind of normality. In this mercantilist dispensation, to be normal is to be selfish, to treat copycats as a threat and to impersonate your adversaries. America has begun to imitate the imitators: not only has Cinderella turned into an embittered stepsister, but the prince has ditched the gallantry. Liberals must hope that this is not the final irony of the topsy-turvy history grippingly explored in this book.





民主及其不满 革命的讽刺

从自由主义民主在东欧的历史理解该地区以及这种意识形态【《黯淡了的光》书评】

俄罗斯摇滚明星谢尔盖·希纳罗维（Sergei Shnurov）有一首歌的MV在网上疯传。视频中，一个住在建于苏联时代的破旧公寓里的乡下年轻女子在Skype上结识了一个打扮和举止西化的商人，殷切地向他示好。商人邀请女子参加一个艺术展。她效仿时装杂志上的模特形象，仔细地脱毛，硬套上一条紧身牛仔裤，还在鞋底涂上红色指甲油来模仿昂贵的西方正品。唉！当她去给他开门时，牛仔裤居然崩开了，鞋子也粘在了地板上。这位俄罗斯灰姑娘摔了个狗啃泥。

这段视频尖锐地影射了俄罗斯与西方的一场失败的约会。它的疯传一定程度是因为它传递出的信息让人感到解脱和自由。它俏皮地告诫道，别去费心模仿别人，坚守你已拥有的。前共产主义国家为复制（曾经的）自由主义西方世界而跌入的陷阱正是《黯淡了的光》（The Light that Failed）一书的主题。这本书观点尖锐，充满争议，思想丰富。作者是保加利亚出生、曾目睹并参与中欧和东欧重建过程的政治学家伊万·克拉斯特夫（Ivan Krastev），和纽约大学研究自由主义历史的专家斯蒂芬·霍姆斯（Stephen Holmes）。

这本书是为了纪念柏林墙倒塌30周年而出版，它尝试解释东欧的自由主义转型如何却演变成了自由主义思想本身的一次失败；为什么俄罗斯经历了为欧洲解放铺平道路的改革之后，却成为了西方的死敌；为什么弗朗西斯·福山（Francis Fukuyama）一度高呼的“历史的终结”并没有发生，阳光灿烂的前景似乎已经落空。加入北约让许多前共产主义国家变得前所未有的安全，加入欧盟又使它们空前地富裕。然而，幻灭却开始了。

为了找到原因，克拉斯特夫和霍姆斯分析了模仿的心理学特征。与1789年、1917年甚至1968年的大革命不同，1989年的剧变并非受新思想或乌托邦式愿景的推动。这场剧变大体上是和平的，部分原因是它避开了激进主

义和革新思想。相反，它打出的旗号是回归“正常”和纠正一个体制的错乱，这种体制会公开宣称“二加二等于五”（这算好的），并以意识形态压制人的天性。俄罗斯和波兰、匈牙利和保加利亚，前共产主义者和异见分子——每个人都想变得“正常”。而正常就意味着像西方那样。模仿西方就成了当务之急。

现在回过头去看，这种想要回归正常的强烈欲望也是心理压力和日后怨恨的源头。对道德戒律的模仿不同于中国式的技术模仿，需要某种程度的自我克制。它削弱了公民对自己民族特有品格的信仰，也损害了他们的尊严。有些人感觉自己就像个穷亲戚，受到别人慷慨大度的邀请而赴宴，却只能坐在桌尾，还要被人评头论足。也有人觉得自己就像希纳罗维那首《展览品》MV中的女孩。国家越大、历史越辉煌，压力就沉重。

| 宴会上的鬼魂

这并非模仿过程中唯一的结构性问题。作者认为，另一个问题根植在被模仿的榜样之中。东欧人仰慕和渴求的西方模式实际上是传统民族国家的反共产主义西方阵营，其自由主义扎根于爱国主义并受到强固边界的保护。这些西方国家毕竟是具有凝聚力的社会，其中只有少量外国人。然而，在移民、多元文化主义、政教分离和同性婚姻的浪潮中，这些国家也由于自由主义本身的成功而发生了转变。在极权制度下长大的人对别人的指手画脚本来就特别敏感，许多人也将政治正确视为一种压制性的群体思维。

发生在2008年的金融危机以及随后的移民危机被视为自由主义西方失败的铁证，至少在匈牙利的维克多·欧尔班（Viktor Orbán）和波兰的雅罗斯瓦夫·卡钦斯基（Jarosław Kaczyński）等民粹主义者眼里是这样。克拉斯特夫和霍姆斯指出，讽刺的是，这些领导人的崛起更多是因为本土公民的外流，而不是非洲和中东移民的流入（这些移民对他们的国家几乎没有影响）。“前共产主义国家集体重返欧洲的梦想使得逃亡国外的个人选择看起来合理又合法”；但是当最优秀和最聪明的人想要离开，留下来的人就难免感到自己沦为了失败者，他们也更可能“拥护那些反对自由主义、将模仿西方的行为谴责为叛国的煽动者”。作者们认为，东欧散布反移民的恐慌情绪实则是对人口流失的恐惧的一种转移。

然而，这种分析并不能解释为何在人口较多的国家（如波兰），反西方和反自由主义的声音比在人口较少的波罗的海和巴尔干地区更加响亮。也许其中一个原因是波兰（与匈牙利一样）会回想起自己辉煌的历史。相比之下，很难想象会有一个煽动家承诺要让爱沙尼亚再次伟大。这或许有助于解释为何俄罗斯对西方榜样的怨恨尤其强烈。

克拉斯特夫和霍姆斯认为，冷战失败的创伤让俄罗斯与众不同，而其建设民主制度的努力一直都是一场闹剧。这两种论断都不够确切。终结冷战的戈尔巴乔夫并没有自卑情结；当时俄罗斯人也并没有后悔苏联从东欧和中欧撤军。同时，俄罗斯在20世纪90年代的自由也是货真价实的，就如同当时该国的政治竞争一般真实——这种竞争甚至激烈到让国家滑向内战的边缘。屈辱感的冲击是后来的事：在经济复苏期，普京挑起了反美宣传。这位前克格勃官员可不是什么困惑的改革者。在普京的领导下，对美国和西方的模仿演变成一种恶搞和报复手段。在2008年对格鲁吉亚的战争、2014年吞并克里米亚以及插手2016年美国选举中，克里姆林宫都隐晦地宣称自己只不过是在效仿美国的行为和揭露美国的虚伪。

模仿者对他们的榜样产生怨恨也许是预料之中的。更让人惊讶的是，反自由主义的鼓动者居然在号称自由民主发源地的领导人中找到了一位盟友——特朗普。莫斯科对他的胜利额手相庆，视之为他们所痛恨的西方自由主义的终结。普京成了独裁主义的典型，而特朗普却以另一种“正常化”的名义摒弃了美国例外论。在这个重商主义的时代，所谓的正常就是自私自利，将模仿者视为威胁，同时效仿自己的对手。美国已经开始模仿它的模仿者：不但灰姑娘变成了她怨毒的继姐，王子也丢掉了骑士风度。这本书扣人心弦地探讨了这段颠三倒四的历史，自由主义者一定希望这不是讽刺剧的终篇。■



The arrest of Charles Lieber

No small matter

A prominent American nanotechnologist has been arrested on suspicion of illegal dealings with China

IN 2013 CHARLES LIEBER, a pioneer of nanoscience who is now the chairman of Harvard University's chemistry department, visited the Wuhan University of Technology (WUT), in China, to celebrate the founding of a lab he was credited by that university with helping to establish and oversee: the WUT-Harvard Joint Nano Key Laboratory. It was a remarkable coup. WUT is an institution of little renown. Harvard is generally regarded as the top of the academic tree. And Dr Lieber, whose research has since become part of Elon Musk's ambitious scheme to supercharge the human brain with nanotechnology, has been seen as a potential Nobel laureate.

Harvard's officials had not, however, approved the laboratory and did not know about it until early 2015, according to the US Department of Justice. Nor did they know that while conducting his research with grants from the Department of Defence and the National Institutes of Health (NIH), Dr Lieber was, according to federal authorities, also being paid up to \$50,000 a month by WUT, plus at least \$150,000 in "living expenses", as a prized recruit in China's Thousand Talents programme to bring foreign scientists, and return Chinese expatriates, to that country's research laboratories.

On January 28th agents of the Federal Bureau of Investigation (FBI) arrested Dr Lieber on a charge of lying to federal authorities after his having denied his alleged participation in the Thousand Talents programme. He was jailed pending a court hearing on January 30th. Harvard placed him on administrative leave and said it was co-operating with the authorities while conducting its own review. (Dr Lieber's lawyer did not respond to a request for comment.) The Justice Department also announced charges against two

Chinese nationals who had been in Boston ostensibly as researchers. One, a lieutenant in the People's Liberation Army (PLA) who is now in China, allegedly worked on behalf of PLA officials and has been charged with visa fraud, conspiracy and making false statements to federal investigators. The other, who is under arrest, allegedly tried in December to smuggle to China 21 vials of material stolen from a teaching hospital.

By putting one of Harvard's superstars in handcuffs, federal authorities seek to shock America's research institutions into greater vigilance about collaborations with Chinese counterparts. At the least the arrest is expected to have a chilling effect on research partnerships between America and China after a decade in which they have flourished. Certainly, the Trump administration would not view that as a bad thing. The Justice Department has said that more than 90% of prosecutions for economic espionage since 2011 have involved a link to China. Christopher Wray, the FBI's director, has lamented to Congress the "naïveté" of American academia, and has cited China's "so-called talent plans" as a vehicle for the theft of research.

One concern of federal authorities, including investigators at the NIH, has been the establishment of "shadow labs" in China run by Thousand Talents recruits in parallel with their American-funded research. Those authorities may consider the WUT-Harvard Joint Nano Key Laboratory to be such a shadow lab. In an affidavit supporting the criminal complaint against Dr Lieber, the FBI, quoting emails between him and a professor at WUT, says that in 2012 he entered into a Thousand Talents agreement that promised, in addition to his personal compensation, 11m yuan (\$1.74m) from WUT and the Chinese government for development of the joint laboratory, including the recruitment of talent.

The contract called for Dr Lieber to publish "high-level articles" in renowned journals and to host international conferences "in the name of Wuhan University of Technology", and to guide young scholars and

doctoral students, helping them publish in respected international journals. In January 2013, the affidavit says, he signed a five-year contract formalising Harvard's co-operation in the joint lab, and obliging Harvard to host researchers from WUT for two months a year.

According to the FBI, officials from Harvard said Dr Lieber did not have the authority to sign such a contract. Those officials also said they eventually became aware of the joint laboratory, and that Dr Lieber was its director, in about early 2015. When confronted, Dr Lieber told Harvard officials that WUT "was using Harvard's name and logo without his knowledge and consent", the affidavit says.

In 2018, the affidavit says, Dr Lieber told investigators from the defence department that he was never asked to participate in the Thousand Talents programme, but that he "wasn't sure" how China might describe him. The FBI also says he caused Harvard to report falsely to the NIH that he was not a participant in the recruitment programme (the NIH requires disclosure of such foreign payments to grant applicants). Meanwhile, the email traffic quoted in the FBI affidavit describes the payments to Dr Lieber going into a Chinese bank account set up on his behalf and, on occasions he visited Wuhan, given to him in cash.

In return for its association with Dr Lieber, Wuhan University of Technology may have burnished its reputation in nanoscience, and developed some young scholars in the field. The lab itself was meant to focus on "nanowire-based lithium ion batteries" for electric cars, per the contract Dr Lieber allegedly signed. In recent years Dr Lieber's research has focused on "neural lace" technology, the still-nascent field that Mr Musk is looking to develop. Mr Musk's own paper on the topic cites Dr Lieber as well as Chinese researchers who worked in his lab at Harvard.

It is not clear how much special insight Chinese researchers gained that

they would not otherwise have had. Leading scientists routinely note that in such high-level research international collaboration is increasingly common, and can happen organically. Most research is published openly for all to see. It is not certain that Chinese largesse was required to pry open the wonders of a top laboratory at the world's most prestigious university. But the Trump administration says that was precisely the goal of the Thousand Talents programme, and that university administrators and scientists have been asleep to the threat such recruitment programmes pose. If so, no longer. ■



查尔斯·李波被捕

纳米非小事

美国著名纳米科学家因涉嫌与中国非法交易被捕

二〇一三年，纳米科学领域的先驱、现任哈佛大学化学系主任的查尔斯·李波（Charles Lieber）到访武汉理工大学，庆祝武汉理工大学-哈佛大学纳米联合重点实验室成立。武汉理工大学感谢李波在创建和指导该实验室上所做的贡献。这次牵手实属难得。武汉理工大学名不见经传，而哈佛大学是公认的顶尖高校。自那以后，李波的研究还成为了伊隆·马斯克的宏伟计划——用纳米技术增强人脑能力——的一部分，他被认为可能获得诺贝尔奖。

然而，根据美国司法部的说法，该实验室并未得到哈佛官方的批准，而且直到2015年初哈佛才知晓此事。联邦当局表示，哈佛也不知道李波在使用美国国防部和国家卫生研究院（NIH）的资助开展研究的同时，还作为中国“千人计划”的宝贵人才，从武汉理工大学领取每月多达5万美元的薪资，外加至少15万美元的“生活费”。“千人计划”的目标是为中国的研究机构引进外国科学家以及侨居海外的华裔科学家。

李波于1月28日被FBI特工逮捕，罪名是向联邦当局撒谎——他早前否认自己加入了“千人计划”。他被监禁，等待1月30日的庭审。哈佛安排其休行政假，并表示学校正在配合当局调查，同时也在展开自行调查。（李波的律师没有回应置评请求。）司法部还宣布了针对两名中国公民的指控，此二人此前以研究人员的名义待在波士顿。其中一人是中国人民解放军的中尉，目前已回到中国，据说此前在波士顿实际是为解放军军方工作，被指控签证欺诈、共谋犯罪以及向联邦调查人员做虚假供述。另一人已被拘捕，被指控在去年12月试图向中国偷运从一家教学医院窃取的21瓶样本。

联邦当局给哈佛的超级明星戴上了手铐，想借此震慑美国的科研机构，让它们在与中国的科研机构合作时多加警觉。预计这次逮捕至少会给十年来蓬勃发展的中美科研合作带来寒蝉效应。当然，特朗普政府不会认为这是

件坏事。美国司法部表示，自2011年以来，超过90%的经济间谍活动的起诉都与中国有关。FBI局长克里斯托弗·雷（Christopher Wray）向国会抱怨美国学术界的“天真”，并指出“所谓的人才计划”是中国用来窃取科研成果的手段。

包括NIH调查人员在内的美国联邦当局担忧的事情之一是在中国建立的“影子实验室”。这些实验室由“千人计划”的成员负责，与他们受美国资助的研究项目同步运作。联邦当局可能认为武汉理工大学-哈佛大学纳米联合重点实验室就是这样的影子实验室。在一份支持对李波提起刑事起诉的书面陈述中，FBI援引李波与武汉理工大学一名教授之间的邮件并指出，2012年李波签订了“千人计划”协议。该协议承诺，除个人薪酬外，武汉理工大学和中国政府还将向李波拨款1100万元，用于包括人才招聘在内的联合实验室的发展。

该协议要求李波在知名期刊上发表“高水平文章”，“以武汉理工大学的名义”主办国际会议，指导年轻学者和博士生，帮助他们在有声望的国际期刊上发表文章。书面陈述称，2013年1月，李波签署了一份为期五年的合约，正式确定了哈佛就建设联合实验室参与合作，并要求哈佛每年接待武汉理工大学的研究人员进行两个月的研究。

FBI称，哈佛官方表示李波无权签署这样的合约。哈佛还表示，直到大约2015年初，他们才知道这个联合实验室的存在，以及李波是该实验室的主任。书面陈述称，李波在受到质询时告诉哈佛，武汉理工是在“他不知情且未经他同意的情况下使用了哈佛大学的名称和标志”。

书面陈述称，2018年，李波向国防部的调查人员表示他从未被邀请加入“千人计划”，但至于中国方面是怎么说的，他就“不确定了”。FBI还表示，李波导致哈佛向NIH做出了李波未参与“千人计划”的错误汇报（NIH在批准资金申请时要求披露此类来自境外的报酬）。与此同时，FBI的书面陈述中引用的往来电子邮件显示，支付给李波的报酬进入了以他的名义开设的中国某银行账户，有时也会在他到访武汉时以现金支付。

因为有了与李波的合作，武汉理工大学可能提升了自己在纳米科学领域的声望，并培养了一些该领域的年轻学者。据称，按照李波被指签署的合同，实验室原本致力于研发电动汽车使用的“基于纳米线的锂离子电池”。近年来，李波已经将研究重点放在马斯克正在考虑开发的“神经织网”技术上，这一领域目前仍处于萌芽状态。马斯克自己有关这一课题的论文引用了李波以及在他哈佛的实验室里工作的中国研究人员的文献。

尚不清楚中国的研究人员获取了多少他们原本不会拥有的独到见解。顶尖科学家们总是说，在这类高水平研究中，国际合作越来越普遍，而且也是自然而然的事情。大多数研究成果是公开发表的，人人可见。并不能确定，要撬开哈佛这所世界顶尖大学的顶级实验室这只宝葫芦，必须要有中国这般的出手大方。但特朗普政府表示，这正是“千人计划”的目的，而大学管理者和科学家们却不把此类招募计划带来的威胁当回事。如果真是这样，看起来这件事要到头了。■



Impaired vision

Hope for myopes

Over 70% of 12- to 14-year-olds in China are near-sighted. They must get out more

THE PHONE on Wang Xiaoying's desk rings incessantly on a weekday morning. An optometrist in Shanghai, Ms Wang doubles as a part-time operator for China's first publicly funded call centre providing information about myopia. It began operating on January 7th. Most callers are parents who worry about the deteriorating eyesight of their young offspring. "Make sure your child spends two hours outdoors each day!" Ms Wang often urges them. Another tip she offers is to avoid reading when supine. Trying to focus on an object held up by an unsteady arm is likely to strain the eyes, some experts believe.

The government reckons that more than 450m people in China, or at least one in three, are short-sighted (meaning that distant objects appear blurry). Globally just over one in five are. The prevalence of myopia among Chinese schoolchildren is even more alarming. In 2018 an official survey of 1m pupils found that among those aged between 12 and 14, 72% had myopia, up from 58% in 2010. Early onset of myopia is associated with a higher risk of eye diseases such as glaucoma, which can lead to blindness. In 2018 Xi Jinping, the president, declared the swelling ranks of young myopes a "big problem concerning the future of the country" which "must not carry on".

The affliction's spread in China is partly related to genes. Myopia is more common among East Asians than among white people. A study in 2016 found that just 19% of white 17-year-olds in Britain were short-sighted. But lifestyle plays a big role. A report by the World Health Organisation says the genetic contribution is "considered small". To the extent that genes are involved, they "may determine susceptibility to environmental factors". These are often a lack of outdoor activity and excessive "near work", ie, too

much time staring at close objects. The combination of an exam-crazed culture with the rapid spread of smartphones and computer-game technology explains much of China's problem.

A paper in 2008 by a group of Australian researchers supports this idea. The study tracked hundreds of ethnic Chinese children in Sydney and Singapore. Whereas only 3% of the children in Sydney had become myopic by the age of seven, 29% had in homework-obsessed Singapore.

Officials fret about rising myopia not only because they care about people's health. *Legal Daily*, a government-owned newspaper, recently suggested that China's security could be compromised by its shortage of military recruits with normal eyesight. Last year China's navy relaxed requirements for new pilots, no longer insisting on 20/20 vision.

The Communist Party is trying to reverse the trend. In 2018 it pledged to ensure that, by the end of this decade, less than 60% of 12- to 14-year-olds would be short-sighted. It also said the proportion of 15- to 17-year-olds with myopia should fall below 70% by then, down from 80% two years ago. Since 2018 periodic eye exams have been made compulsory at schools. Qiu Yu, a headmaster in Beijing, says his 1,800 pupils take eye tests twice a year. Headmasters whose pupils show a worsening trend in eyesight are summoned for "talks" by education officials, Mr Qiu explains—ie, a dressing down.

The party's remedies include evidence-based as well as unorthodox prescriptions. Schools must ensure that students have at least an hour a day of outdoor activity (many experts believe sunlight helps prevent myopia or slow down its progression). Pupils in the first two years of primary school—a time of life when eyes are highly sensitive to strain—must not be given written homework. Those in the final year of primary school should receive at most one hour of it daily. Video-game makers must release fewer

new products and devise ways of limiting the time children spend playing them. Schools and families must encourage children to avoid sweets and eat more fish. Experts agree that fish, which has high levels of omega-3 fatty acids, is good for eye health. Many doctors also recommend avoiding sugary foods, though why this helps is unclear.

More controversially, schools must ensure that pupils do “eye exercises” twice a day. These involve massaging the region around the eyes using the knuckles, with the thumbs placed on the temple (see picture). Mr Qiu, the headmaster, says that each set of exercises takes five minutes. The practice has its origins in traditional Chinese medicine. As with many remedies of such provenance, there is no sound evidence that it works.

The government could be doing more. Academics believe the proportion of pre-teens in China’s countryside who suffer from myopia may be five percentage points lower than in urban areas. That may be because they spend more time outdoors. But only one in seven rural schoolchildren who need glasses wear them, says a recent report by James Chen of Clearly, an international charity. A pair of cheap spectacles costs less than 50 yuan (\$7). Yet many rural Chinese think that wearing glasses aggravates myopia. In fact, squinting without glasses puts more strain on the eyes, and may cause sight to worsen. Officials should try harder to discredit mistaken beliefs.

Yang Lili, a mother of a bespectacled 12-year-old in Beijing, is grateful that officials are belatedly paying attention to “the poison” of myopia. But they are “only scratching the surface, not solving the real problem”, she says. Ms Yang blames the entire culture of education.

The fact remains that admission to the best universities involves intense cramming for a single exam. Schools may reduce homework. But parents “will continue to find private tutors and anything that gives their child an

edge". Another plan may be needed. ■



视力损伤

近视者的希望

中国12至14岁青少年近视率超过70%。他们需要更多的户外时间

在一个工作日的早晨，王小英（音译）桌上的电话响个不停。她是上海的一名验光师，在中国首个政府资助的近视防控热线服务做兼职接线员。这条热线于1月7日开通。来电咨询的多数是担心孩子视力下降的父母。“确保孩子每天有两小时户外活动！”王小英经常这样敦促他们。她给的另一个建议是不要仰卧看书。一些专家认为，当手举着东西不稳时，努力看清楚上面的内容很可能导致眼睛疲劳。

中国政府估计全国有超过4.5亿人即至少三分之一的人口近视（看不清远处的物体）。而全球的近视比例是五分之一略多。中国小学生的近视高发更加令人担忧。2018年，一项针对100万名学生的官方调查发现，在12岁至14岁的学生中，近视的比例从2010年的58%上升到了72%。近视早发的人更容易患眼部疾病，例如可能导致失明的青光眼。2018年，国家主席习近平指出，学生近视高发是“关系国家和民族未来的大问题”，“不能任其发展”。

近视在中国蔓延与基因有一定关系。相比白人，东亚人近视更普遍。2016年的一项研究发现，英国17岁白人中仅有19%近视。但生活方式有很大影响。世卫组织的一份报告称，遗传因素“被认为影响不大”。基因所能影响的只是它们“或许可以决定人对环境因素的敏感性”。这些因素通常是缺乏户外活动，以及过多的“近距离工作”，即长时间近距离视物。疯狂的考试文化，加上智能手机和电脑游戏技术的迅速普及，是中国近视高发的主要原因。

澳大利亚一组研究人员在2008年发表的一篇论文支持了这种观点。该研究跟踪了悉尼和新加坡的数百名华裔儿童。到这些孩子七岁时，在悉尼生活的仅有3%近视，而在作业量大的新加坡，近视率高达29%。

官员们担心近视率升高不仅是出于他们对人们健康的关心。官方报纸《法制日报》最近指出，视力达标的新兵人数不足可能会影响中国的国家安全。去年，中国海军放宽了招飞的视力要求，不再要求双眼1.0。

共产党正试图扭转这一趋势。2018年，它承诺确保到2030年，12至14岁青少年的近视率降至60%以下；它还表示届时15至17岁青少年的近视率应从两年前的80%降至70%以下。2018年以来，学校已强制定期检查视力。北京的一名校长邱瑜（音译）说，他的1800名学生每年接受两次视力检查。邱校长解释说，学生视力状况下降的学校校长会被教育局官员“约谈”，也就是挨训。

党的补救措施既有基于证据的，也有非正统的。学校必须确保学生每天至少一小时的户外活动（许多专家认为日光有助于预防或减缓近视）。在小学一二年级这个人生阶段，孩子的眼睛对疲劳高度敏感，学校不应布置书面作业。小学六年级学生每天的作业量不应超过一小时。电子游戏制造商必须减少新产品的发布，并设计出方法限制儿童玩游戏的时长。学校和家庭要鼓励儿童少吃甜食，多吃鱼。专家一致认为，鱼富含omega-3脂肪酸，对眼睛健康有益。许多医生也建议少吃含糖食品，尽管目前尚不确定糖分如何影响视力。

更有争议的一个要求是学校必须保证学生每天做两次“眼保健操”。其中一节是用拇指按住太阳穴，用指关节按摩眼眶（见图）。邱校长说，做一套眼保健操大概需要五分钟。这种方法源于中医。和源于中医的许多疗法一样，没有确凿的证据能证明眼保健操的作用。

政府还可以做更多的努力。学术界人士认为，中国农村13岁以下儿童的近视率可能比城市低五个百分点。这可能是因为他们的户外活动时间更多。但是，根据国际慈善机构Clearly的陈禹嘉最近的一份报告，需要戴眼镜的农村学童中只有七分之一在戴。一副便宜的眼镜不到50元，但许多中国农村人认为戴眼镜会加重近视。实际上，不戴眼镜眯着眼看东西会加剧眼部疲劳，可能导致视力进一步下降。政府官员应该加大力度破除错误观念。

北京的杨丽丽（音译）12岁的孩子也戴着眼镜。她对于官员们终于开始关注近视这颗“毒瘤”表示欣慰。但她说他们“只是在隔靴搔痒，没有解决实质问题”。杨丽丽认为问题出在整个教育文化。

现实情况仍然是孩子们若想要考入顶尖大学就要为高考进行高强度的填鸭式学习。学校可能会减少家庭作业，但父母“仍会继续安排课后补习，以及任何能给孩子带来升学优势的活动”。逆转近视问题可能需要重新全盘考虑。■



Buttonwood

The semaphore of semis

What Asia's chip industry tells us about the world economy

THE SETTING for Robert Harris's thriller, "Enigma", is wartime Britain, where everything is rationed except for the rain. It follows Tom Jericho, a young prodigy stationed at Bletchley Park, the real-life centre of code-breaking operations, who is part of a team of cryptologists trying to break the code used by Germany's armed forces. The work has frustration built in. Any progress can be undone if the enemy changes the code—which he will if he suspects that it has been cracked.

The novel comes to mind when considering the mysteries of shifts in the economic cycle and market reactions. The mood has clearly changed for the better since the middle of last year. Fears of recession have receded. Global equity prices have rallied. Bond yields have perked up. A truce in the trade war, however fragile, has helped. But the improvement in mood coincided with signs of life in Asia's manufacturing hubs.

The key to these coded messages is the semiconductor industry. Cars, smartphones, gadgets and cloud-computing servers rely on components, notably memory chips, that are disproportionately made in emerging Asia. The mood-sensitive parts of aggregate demand—capital spending by firms and non-essential purchases by consumers—have microchips in there somewhere. The chip industry itself has savage mini-cycles. When it turns down, it is a sign of trouble ahead in the world economy. When it perks up, as it has done recently, there is reason to be more optimistic.

The cost structure of the chip business is central to this enigma. A semiconductor fabrication plant, or fab, costs billions of dollars to build. A sudden jump in orders, such as occurred in 2017, is met with increased

capacity. But when demand falls, the fabs just keep producing. They are highly automated with few staff, so running costs are low. Continuous output makes sense but leads to occasional gluts and sagging prices, as happened through most of last year. Stocks become bloated. When demand picks up again, as it did late last year, stocks are drawn down and prices begin to stabilise.

Until quite recently the industry's rhythms, and the tautness or slackness of Asia's supply chains in general, were dictated by the two- or three-year life-cycle of smartphones. Export orders for Taiwanese electronics, for instance, tended to spike whenever a new Apple or Galaxy handset was launched. But the smartphone market is now saturated. Consumers find that an old model works almost as well as a newer one—and this might still be the case even when the new 5G generation of phones reaches the market. What drives growth in demand now is cloud computing, electrification of cars, wearable gadgetry and gaming, says Shawn Kim of Morgan Stanley. The cloud is a particular force. As firms ramp up capital spending of all kinds, that in turn spurs investment in cloud capacity, where business-related software lives.

What signals should market cryptologists be looking at? One measure is exports of semiconductors from South Korea, says Alicia Garcia-Herrero, chief economist for Asia at Natixis, an investment bank, who is based in Hong Kong. South Korea is pivotal to Asia's supply chain, she says, and its shipments of semiconductors help predict exports in the region more generally. After a brutal 2019 the trend has bottomed out and is turning (see chart). Another signal is the financial health of big Asian chip companies, such as Samsung and SK Hynix. Those averse to digging deep into financial statements could simply monitor industry share prices. Or they could look for inflection points in the price of DRAM, a type of memory chip used to store data on servers and computers.

Technology's share of global GDP will continue to grow. In principle, then, these signals will become even more closely watched. But other forces are at work. China has designs to be self-sufficient in electronic components, a goal made more urgent by the trade-tech wars. The short-term effect is to give a boost to Asia's tech industry. But in the longer term, firms might find themselves displaced by Chinese rivals, at least in China's own market.

To the extent that China succeeds, it will devalue the signals that arrive from the more open parts of emerging Asia. Market-watchers will come to feel the same frustration felt by Mr Harris's fictional codebreakers at Bletchley. The codes keep changing. For now, though, the message from Asia is that the sun is peeking through the clouds—or, at least, that it has stopped raining. ■



梧桐

半导体信号

从亚洲芯片业看世界经济

罗伯特·哈里斯（Robert Harris）的惊险小说《密码迷情》（Enigma）以战时英国为背景，当时一切物资都由政府限量配给，唯雨水供应不断。小说讲述年轻奇才汤姆·杰里科（Tom Jericho）在布莱切利园（Bletchley Park，二战期间英国政府的密码破译基地）担任密码专家小组成员，努力破解德国军队使用的密码。这项工作无可避免地充满了挫败感。只要敌方怀疑密码被破解，就会更改密码，这样之前在破译上取得的任何进展都会前功尽弃。

在思考经济周期与市场反应的谜之变化时，你会联想到这部小说。自去年年中以来，市场情绪已明显好转。对衰退的担忧消退。全球股票价格回升。债券收益率上升。中美贸易战的休战状态依然脆弱，但仍有帮助。但是，市场情绪的改善恰逢亚洲制造业中心恢复生机之时。

这些加密信息的关键就在半导体行业。汽车、智能手机、小型电子设备和云计算服务器所依赖的组件有很大一部分都集中在新兴亚洲地区制造，尤其是存储芯片。总需求中对市场情绪敏感的那部分（企业的资本支出和消费者的非必要购买）就包含了微芯片。芯片行业本身就存在凶猛的微周期。当它走低，预示着世界经济面临麻烦；如果像近期那样走高，则有理由对经济前景更乐观。

芯片业的成本结构是这个谜题的核心。半导体制造厂（以下简称fab）的造价一般达数十亿美元。假如订单突然增加（就像2017年那样），fab就会提升产能应对。但当需求下降时，fab还是会继续生产。这些工厂高度自动化，员工不多，因而运营成本不高。持续生产确有其道理，但也会导致偶发的产品过剩和跌价，去年大部分时间就是如此。这时库存就会积压膨胀。而当需求再次回升（像去年底），库存就会减少，价格又开始趋于稳定。

直到最近，芯片行业的节奏以及亚洲供应链总体上是吃紧还是萧条取决于智能手机两至三年的生命周期。例如，每当苹果或三星推出新手机，台湾电子业的出口订单往往就会激增。但现在智能手机市场已经饱和。消费者发现旧机型用起来几乎与新款一样顺畅，即使新一代5G手机上市，情况仍可能如此。摩根士丹利的肖恩·金（Shawn Kim）表示，当前推动需求增长的是云计算、汽车电气化、可穿戴设备和电子游戏。云计算是一股特别的力量。企业增加了各种资本支出，这进而刺激了对商业软件所依赖的云计算的投资。

要解密市场，应关注什么信号？投行法国外贸银行（Natixis）驻香港的亚洲首席经济学家艾丽西亚·加西亚-埃雷罗（Alicia Garcia-Herrero）表示，一个衡量指标是韩国的半导体出口量。她表示，韩国是亚洲供应链的关键，其半导体出货量有助于预测该地区更广泛的出口趋势。经过2019年的残酷洗礼，市场行情已触底，目前正在回升（见图表）。另一个信号是三星和SK海力士等亚洲大型芯片公司的财务状况。如果不愿意钻研财务报表，只追踪行业股价也行。或者也可以从DRAM（一种在服务器和计算机上存储数据的存储芯片）的价格中寻找拐点。

技术在全球GDP中的占比将继续增长，因此这些信号理论上将会更受关注。但还有其他因素在发挥作用。中国计划实现电子元件的自给自足，贸易加技术战让这个目标变得更为迫切。这在短期内将推动亚洲科技产业的发展。但从长远来看，企业可能会发现自己被中国的竞争对手取代，至少在中国本地市场上是这样。

如果中国达成目标，来自新兴亚洲中更开放地区的信号的价值将下降。市场观察者届时会像哈里斯小说中布莱切利园里的那些密码破解专家一样体验到挫败感。密码不断变化。不过就目前来说，从亚洲传来的信息是阳光正穿透阴云，或者说，起码雨停了。■



Coronavirus economics

Locked down

China's semi-quarantine will hurt growth at home and abroad

THE YU GARDEN, a 16th-century complex of pavilions and ponds in the heart of Shanghai, is all gussied up for the Chinese new-year holiday. Its walkways are bedecked with colourful lanterns, its stalls laden with dumplings, its entrances flanked by dozens of security guards to handle crowds. Just one thing is missing: people. Fearful of coronavirus, they are staying home. "I'll be doing well if I make a few sales today," says Li Xinming, manager of a silk-scarf shop. Last year Yu Garden attracted 700,000 visitors during the holiday week, peak season for it and its merchants. This year, Mr Li says his losses might wipe out his earnings for months to come.

The question for China, and for the many companies and countries around the world linked to its economy, is whether Mr Li's travails are indicative of a much broader problem. The obvious reference point is China's battle with SARS, another coronavirus, in 2003. Growth slowed sharply at the height of the epidemic but rebounded swiftly after it was contained. Other recent epidemics have reinforced the impression that economists should not be overly worried, so long as good doctors are on the job. Neither avian flu in 2006 nor swine flu in 2009 dimmed the global outlook.

Yet even flint-hearted investors are wondering whether the new epidemic might be worse. Stocks in Hong Kong have fallen by nearly 10% as reported infections have steadily increased. Tremors have also rippled through global markets.

The concern is less the severity of the virus, which seems less lethal than SARS, but rather the nature and potential duration of China's efforts to

bring the outbreak under control. And disruption in China, the world's second-biggest economy, has global consequences. "It's not the disease, it's the treatment," wrote analysts with Gavekal Dragonomics, a consultancy. The World Bank has estimated that as much as 90% of the economic damage from epidemics stems from people's fear of associating with others, which leads offices and stores to close. In China, this is being magnified by the government's policy of isolating affected areas and limiting interpersonal contact throughout the country. While public-health experts debate whether this is the right approach, economists will count the costs.

The most direct impact is being felt in Hubei province. First Wuhan, its capital, was placed under quarantine. Then the rest of the province, home to nearly 60m people, was locked down, too. Apart from food trucks and medical supplies, little can enter its cities and villages, and few are permitted to leave. Such a large-scale isolation is unprecedented as a public-health strategy. Economic activity of just about any kind, short of hospital care and movie streaming, has ground to a halt. Hubei generates 4.5% of China's GDP, so the closure will leave a hole.

Other cities in China may not be under quarantine but that is what life feels like for their residents. Instead of getting together with family and friends, attending temple fairs and going to restaurants—all, depending on where one lives, staples of the holiday—people have shut themselves in. The government has encouraged them to avoid crowds; many need little prodding.

That will be a drag on consumption. The extent of the damage will depend on how long it takes to stop the virus, but the timing is already rotten. Last year retail sales exceeded 1trn (\$144bn) yuan during the new-year week, a third more than an average week. This year, sales are sure to fall well short of that.

Some industries are being hit especially hard. The holiday accounted for 9% of China's box-office revenues last year. This year almost all of the country's 11,000 cinemas are closed. Spending on domestic tourism during the new-year week reached more than 500bn yuan last year, about 8% of the annual total. This year, fearful of the virus, people have cancelled trips.

There are also worries about how the virus will affect factories and offices. Several major economic centres, including Shanghai and Guangdong province, have extended the new-year holiday by a week, telling companies to wait until February 10th to restart. Chinese businesses are always slow to get back up to speed after the holiday. The extra week will make them slower, even if some firms such as Tencent, a tech giant, let employees work from home. Moreover, tens of millions of migrant workers, back in their hometowns for the holiday, may wait for the epidemic to recede before crowding onto trains and buses to return to their jobs.

| *I feel your pain*

One crucial difference compared with SARS is China's importance for the rest of the world. In 2003 China generated 4% of global GDP. Last year, it was 16%. The slowdown in consumption and the disruption to production will not stop at its borders.

Countries accustomed to big-spending throngs of Chinese tourists face a brutal stretch. China's government has ordered all tour groups to be suspended until the virus is contained. In Thailand, authorities expect the number of Chinese visitors will fall by 2m to 9m this year, reducing tourism revenue by some \$1.5bn. Share prices of airlines have plunged; past epidemics have caused huge, if temporary, drops in passenger traffic, and China is the world's biggest outbound international travel market.

Companies that have hitched themselves to China's fast-growing middle class are also vulnerable. Starbucks has temporarily closed more than half

of its 4,292 cafés in China. Footfall in those still open is scarce, with some posting signs that patrons may only enter if they are wearing face masks. Sales of masks are, indeed, a rare bright spot for companies such as 3M. Disney closed its resort in Shanghai for the new-year holiday, one of its busiest weeks of the year (adding insult to injury, China has just entered the Year of the Rat and the Chinese term for rats also refers to mice, a fine marketing opportunity for a brand built around them).

Factory closures will cascade through the global economy. Wuhan is a manufacturing hub, especially for autos. Nissan, Honda and General Motors have plants there. Bloomberg ranks Wuhan 13th out of 2,000 Chinese cities for its role in supply chains. One local company, Yangtze Optical Fibre and Cable, is the biggest maker of the wires that carry data around the planet.

Even if work stoppages elsewhere in China are milder, they will affect a wide range of sectors. Some are vital; roughly 80% of active ingredients for all medicines come from China. Others are less so; China supplies 90% of the world's plastic flowers. Shares in Foxconn, which makes phones for Apple, have fallen by 10%.

Many companies were already working to reduce their reliance on China's factories because of its trade war with America. The virus is a powerful reminder that, politics aside, a diversified base of suppliers is a good insurance policy. But the past year provided a lesson in how difficult that is; despite the tension with America, China's share of global exports actually increased. Companies will struggle to find substitutes for its manufacturing muscle.

Adding it all up, the Chinese economy is in for a grim start to the Year of the Rat, and this will cast a shadow globally. Chen Long of Plenum, a consultancy, thinks China's growth could slouch to 2% year-on-year in the

first quarter, its weakest in decades, down from 6% in the final quarter of 2019. But he expects a strong rebound when the country gets back to normal. People long cooped up will flock to shops and restaurants. Factories will rush to make up for lost time. To give the recovery a push, officials will increase infrastructure spending.

The unknown is when normality might resume. In Yu Gardens, Mr Li could not wait. With business way down, he has told the three assistants in his silk-scarf shop to stay at home, unpaid—typical for small businesses in China. The death toll from the coronavirus is rising. And the whole country is paying a price. ■



冠状病毒经济学

封城

中国的半隔离状态将损害国内外经济增长【新冠报道】

建于16世纪的豫园位于上海的心脏地带，这座遍布亭台楼阁和池塘的园林为春节假期装点得年味十足。通道两边高挂着色彩斑斓的灯笼，摊位上摆满了饺子，入口两侧有几十名保安在疏导人流。万事俱备，只欠一样：人。因为害怕冠状病毒，此时人们都待在家里。一家丝巾店的经理李新明（Li Xinming，音译）说：“今天能卖出去几条就算不错了。”春节假期本是整个豫园和园内商户的旺季，去年这一周这里吸引了70万名游客。李新明说，今年他的损失可能要用未来几个月的收入填补。

对于中国以及全球许多与中国经济相关联的企业和国家来说，眼前的一个疑问是李新明的煎熬是否意味着一个触角更广泛得多的麻烦。一个很容易想到的参照例子是2003年中国对抗另一种冠状病毒SARS的战斗。在疫情高峰期，经济增长急剧放缓，但在疫情得到控制后迅速反弹。近年几次其他流行病的爆发强化了一种认知：只要有好医生在岗位上，经济学家就不应过于担心。2006年的禽流感 and 2009年的猪流感都没有令全球前景变得黯淡。

不过，就连冷漠无情的投资者都在担心此次新疫病的情况是否更加严重。随着报告感染人数稳步增加，香港股市下跌了近10%。震荡也已经波及全球股市。

人们的主要担忧并不是这种病毒的严重程度（其致命性似乎低于SARS），而是中国控制疫情的行动的特性以及它可能持续多久。而作为世界第二大经济体，中国经济受到干扰将带来全球性后果。咨询公司龙洲经讯（Gavekal Dragonomics）的分析师写道：“关键不是疾病，是应对手段。”世界银行曾经估计，流行病造成的经济损失有90%源自人们对人际往来的恐惧——这导致办公楼和商店关闭。在中国，政府隔离疫区并在全国内限制人员接触的政策正在加剧这种恐惧。在公共卫生专家辩论这样的方

式是否正确的时候，经济学家考虑的是代价。

首当其冲受影响的是湖北省。省会武汉先被封城。之后这一人口近6000万的省份的其他地区也被封锁。除食品运输和医疗补给外，几乎没有什么可以进入其城乡，也没什么人被允许离开。如此大规模的隔绝是前所未有的公共卫生策略。除了医疗和在线看电影以外，几乎一切形式的经济活动都已渐渐停止。湖北省占中国GDP的4.5%，封锁将留下一个窟窿。

中国其他城市可能还没被隔离，但居民们的感受也差不多了。人们不与亲朋好友聚会，不逛庙会，不下馆子——放弃了所有因地域而有所差异的过年方式，留在家里闭门不出。政府劝导他们避免去人多的地方，许多人根本不用提醒。

这将拖累消费，影响的程度将取决于遏制住病毒传播所需的时间。但它发生的时间点已经够糟糕了。去年春节黄金周的零售额超过一万亿元，比平时的一周多三分之一。今年这一周的销售额肯定远远低于这一水平。

有些行业受到的打击尤其沉重。春节档占去年中国电影票房收入的9%。今年春节，全国1.1万家电影院几乎全部关闭。去年的国内旅游支出超过5000亿元，约占全年的8%。今年，因为担心感染病毒，人们纷纷取消了行程。

人们还担心这种病毒将对生产和办公造成怎样的影响。包括上海和广东省在内的几个主要经济中心已将新年假期延长一周，至2月10日复工。春节假期过后，中国企业恢复正常状态往往都很慢。延长一周后就更慢了，即使科技巨头腾讯等一些企业让员工在家远程办公。此外，数以千万计的外来务工人员回家乡过年，可能要等疫情消退，他们才会挤上火车和大巴返回工作岗位。

| 感同身受

与SARS相比，此次疫情的一个关键不同之处在于中国对世界其他地区的重要性发生了变化。2003年，中国贡献了全球GDP的4%，去年则是16%。消费放缓和生产中断将不会止步于中国的边境线。

习惯了大批中国游客涌入大把花钱的国家面临残酷的局面。中国政府已下令疫情受控前暂停所有团队游。泰国当局预计，今年的中国游客人数将减少200万，至900万人，旅游收入将减少约15亿美元。航空公司股价暴跌；过去的流行病也曾造成客流量大幅（尽管是暂时的）下降，而中国现在是世界上最大的国际出境游市场。

那些在中国中产阶级快速扩增之时搭上了便车的企业也容易受到冲击。星巴克在中国有4292家门店，现在已暂时关闭了一半以上。那些仍在营业的店里人流稀少，门口张贴了告示，要求顾客必须戴上口罩才能进入。对于3M等公司而言，口罩的销售确实是难得的亮点。迪士尼在春节期间关闭了上海园区，这是一年中人流最旺的几周之一（雪上加霜的是，中国刚刚进入鼠年，对于围绕米老鼠形象打造品牌的迪士尼来说，这本是极佳的营销机会）。

关闭工厂将在全球经济中产生级联效应。武汉是制造业中心，尤其是汽车制造业。日产、本田和通用汽车在这里都设有工厂。在彭博针对2000个中国城市在供应链中的地位的排名中，武汉排在第13位。当地企业长飞光纤光缆是全球最大的数据传输线缆制造商。

即使中国其他地方停工的现象没那么严重，也仍将影响众多行业。有些行业至关重要：所有药物的活性成分约有80%来自中国。其他行业没那么紧要：中国供应了全球90%的塑料花。为苹果生产手机的富士康的股价已下跌了10%。

由于中美贸易战，许多企业已经在努力减少对中国工厂的依赖。此次疫情又给它们敲了一记警钟：就算不考虑政治因素，让供应多元化也是一种明智的保障。但是，过去一年留给它们的一个教训就是供应多元化很难实现。尽管与美国关系紧张，中国占全球出口的份额实际上有增无减。企业将很难找到别国来替代中国的制造能力。

综上所述，中国经济在鼠年开年不利，而这将给全球经济蒙上阴影。咨询公司Plenum的陈龙（Chen Long，音译）认为，第一季度，中国经济的同

比增速可能会从2019年第四季度的6%下滑至2%，为几十年来的最低点。但他预计一切恢复正常后，中国经济将出现强劲反弹。在家憋坏了的人们将涌向商铺和餐馆。工厂将急于把耽误了的时间补回来。为了推动复苏，官员们将增加基础设施投入。

什么时候能恢复正常仍未可知。在豫园，李新明已经等不下去了。生意太糟了，他已经让丝巾店的三名店员留在家中不用去上班，期间没有工资拿——这是中国小企业的典型现状。冠状病毒造成的死亡人数在上升，而整个国家都在为此付出代价。 ■



Semiconductors

Memory loss and gain

After a bruising year, things are looking up for chipmakers

TO SEE JUST how fast microchips are eating the world, look at the Consumer Electronics Show (CES), an annual gadget-fest held in Las Vegas. This year's event includes everything from ultra-high-definition televisions, "smart" light bulbs and powered exoskeletons to concept cars that can drive sideways and house robots designed to deliver toilet paper. Every one of these must-have consumer trinkets is a computer in disguise, with innards made from microprocessors, memory chips and circuit boards.

Yet the industry upon which all this is built has been having a torrid time of late. Future Horizons, a chip-industry analysis firm, reckons that global semiconductor sales shrank by about 12% in 2019, to \$410bn. Samsung Electronics, a South Korean company that is the world's biggest maker of memory chips, reported a 56% fall in quarterly operating profits in October, dragged down by the poor performance of its chip division. Entire economies have been feeling the pain. Semiconductors account for a fifth of South Korea's exports, which have fallen for 12 months in a row, partly owing to the sector's weakness.

Now the slump seems to be ending. On January 8th Samsung predicted another fall in quarterly profits. But it was smaller than expected. The firm's share price rose. The price of memory chips is up. Shares in SK hynix, another South Korean chipmaker, have gained around 20% in the past month. Those of Micron, an American company, have done even better. Memory makes up about a third of semiconductor sales, and industry-watchers see it as a bellwether for the industry.

The nascent recovery reflects the nature of the chip business, where feast routinely follows famine. Despite its high-tech character, says Malcolm Penn, Future Horizons's founder, the market for microchips is as cyclical as that for pork, soyabeans or other commodities (see chart). When times are good, chipmakers boost capacity, adding high-tech factories that are expensive to build but cheap to run. That helps supply catch up with demand. To recoup costs, chipmakers carry on producing regardless. Prices sag. When demand eventually catches up with the extra capacity, the cycle begins anew. Memory chips, which are interchangeable by design, are particularly prone to this periodicity.

The patterns are amplified or suppressed by what happens in the rest of the economy. The most recent bust, which began in 2018, was particularly deep, says Len Jenilek, a semiconductor analyst at IHS Markit. The memory market consists of two main types of memory, known as DRAM and flash. Their cycles do not always synchronise, but last year they did. The car industry, which has become a big consumer of chips, had its worst year in a decade. Other big buyers, particularly large data-centre operators like Google, Microsoft and Alibaba, cut back on purchases. The start of a tech-flavoured trade war between America and China did not help.

Whether the rebound will be correspondingly strong likewise depends on broader trends. Economic growth in China, a big importer of chips, is cooling. The bull run in America's stockmarket is now the longest in history, spurring talk of a correction. American officials are working on a new round of trade restrictions that could rattle the industry.

But for those with strong nerves, chips look like a good long-term bet. Underlying the booms and busts is a growth in demand that, according to Mr Penn, has averaged 8% or so a year for 40 years. The industry's products have become millions of times more powerful in that period, while the world has grown hungrier for computing power. Mr Jenilek cites 5G phone

networks and chips customised for AI as two big new sources of demand.
This week Las Vegas brimmed with both. ■



半导体

恢复记忆

芯片制造商度过了艰难的一年，形势正在好转

若想一窥微芯片是如何迅速入侵我们的世界，不妨将目光投向一年一度的拉斯维加斯消费电子展（CES）。今年的展品从超高清电视、“智能”灯泡、动力外骨骼到可侧向蟹行的概念车、会递厕纸的家用机器人，应有尽有。这些消费者值得拥有的小玩意每一件都是一台“变相”的计算机，其内部是由微处理器、内存芯片和电路板组成的。

不过，支撑起这一切的半导体行业近来却经历了一段艰难时期。据芯片行业分析公司Future Horizons估计，2019年全球半导体销售额下降约12%，至4100亿美元。全球最大的内存芯片制造商韩国三星电子去年10月公布，由于该公司芯片部门业绩不佳，其季度营业利润下降了56%。整个韩国经济都受到了冲击。半导体占韩国出口总额的五分之一，部分由于半导体行业疲软，韩国出口额已连续12个月下滑。

现在，这轮下滑似乎即将结束。1月8日，三星预计季度利润会再次下降。但实际下降幅度小于预期。公司股价随之上涨。存储芯片的价格也已上扬。在过去一个月里，另一家韩国芯片制造商SK海力士（SK hynix）的股价已经上涨了20%左右。美国美光公司股价的涨幅还要大。存储芯片销售占到半导体销售额的三分之一左右，行业观察人士也视之为行业风向标。

复苏的开始反映了芯片业的特点——萧条之后总是繁荣。Future Horizons的创始人马尔科姆·佩恩（Malcolm Penn）表示，尽管微芯片是一种高科技产品，但与猪肉、大豆或其他大宗商品一样，芯片市场也存在周期性（见图表）。当形势大好时，芯片制造商会增建那些建设成本高、但运营成本低的高科技工厂来提高产能，这有助于供给赶上需求。而为了收回成本，芯片制造商会不顾一切地不断生产，这就导致价格下跌。当需求最终赶上额外产能时，循环再次开启，而被设计成可互换的存储芯片尤其容易呈现这种周期性特征。

经济其他部门的现状也可以加剧或抑制这种模式。埃士信（IHS Markit）的半导体分析师伦恩·简尼利克（Len Jenilek）表示，始于2018年的最近一次萧条尤其严重。内存市场主要包括两种类型的内存，即动态随机存储器（DRAM）和闪存（flash）。它们的周期并不总是同步，但是去年它们同步了。已成为芯片消费大户的汽车业经历了十年来最糟糕的一年。其他大买家，尤其是像谷歌、微软和阿里巴巴这样的大型数据中心运营商，削减了采购。中美之间和科技紧密相关的贸易战更是让事态雪上加霜。。

另外，反弹的幅度是否会和下滑同等大同样取决于更广泛的趋势。芯片进口大国中国的经济增长正在放缓。现在，美国股市现下的牛市是有史以来持续时间最长的一次，这引发了关于股市回调的讨论。而美国官员正在研究制定新一轮的贸易限制措施，这也可能令整个芯片行业忐忑不安。

但是对于胆大的人来说，芯片业看起来是一个不错的长期赌注。佩恩认为，繁荣与萧条的背后是需求的增长，在过去的40年中，需求的年平均增长率约为8%。在此期间，芯片产品的性能已经提高了数百万倍，而全世界对计算能力的渴求也越来越强烈。简尼利克认为，5G电话网络和专为人工智能定制的芯片已成为两大新的需求来源。而它们正是这次拉斯维加斯展会的主角。■



Property markets

The horrible housing blunder

The West's obsession with home ownership undermines growth, fairness and public faith in capitalism

ECONOMIES CAN suffer both sudden crashes and chronic diseases. Housing markets in the rich world have caused both types of problem. A trillion dollars of dud mortgages blew up the financial system in 2007-08. But just as pernicious is the creeping dysfunction that housing has created over decades: vibrant cities without space to grow; ageing homeowners sitting in half-empty homes who are keen to protect their view; and a generation of young people who cannot easily afford to rent or buy and think capitalism has let them down. Much of the blame lies with warped housing policies that date back to the second world war and which are intertwined with an infatuation with home ownership. They have caused one of the rich world's most serious and longest-running economic failures. A fresh architecture is urgently needed.

At the root of that failure is a lack of building, especially near the thriving cities in which jobs are plentiful. From Sydney to Sydenham, fiddly regulations protect an elite of existing homeowners and prevent developers from building the skyscrapers and flats that the modern economy demands. The resulting high rents and house prices make it hard for workers to move to where the most productive jobs are, and have slowed growth. Overall housing costs in America absorb 11% of GDP, up from 8% in the 1970s. If just three big cities—New York, San Francisco and San Jose—relaxed planning rules, America's GDP could be 4% higher. That is an enormous prize.

As well as being merely inefficient, housing markets are deeply unfair. Over a period of decades, falling interest rates have compounded inadequate

supply and led to a surge in prices. In America the frenzy is concentrated in thriving cities; in other rich countries average national prices have soared, especially in English-speaking countries where punting on property is a national sport. The financial crisis did not kill off the trend. In Britain inflation-adjusted house prices are roughly equal to their pre-crisis peak, while real wages are no higher. In Australia, despite recent falls, prices remain 20% higher than in 2008. In Canada they are up by half.

The soaring cost of housing has created gaping inequalities and inflamed both generational and geographical divides. In 1990 a generation of baby-boomers, with a median age of 35, owned a third of America's real estate by value. In 2019 a similarly sized cohort of millennials, aged 31, owned just 4%. Young people's view that housing is out of reach—unless you have rich parents—helps explain their drift towards “millennial socialism”. And homeowners of all ages who are trapped in declining places resent the windfall housing gains enjoyed in and around successful cities. In Britain areas with stagnant housing markets were more likely to vote for Brexit in 2016, even after accounting for differences in income and demography.

You might think fear and envy about housing is part of the human condition. In fact, the property pathology has its roots in a shift in public policy in the 1950s towards promoting home ownership. Since then governments have used subsidies, tax breaks and sales of public housing to encourage owner-occupation over renting. Politicians on the right have seen home ownership as a way to win votes by encouraging responsible citizenship. Those on the left see housing as a conduit for redistribution and for nudging poorer households to build wealth.

These arguments are overstated. It is hard to show whether property ownership makes better citizens. If you ignore leverage, it is usually better to own shares than to own homes. And the cult of owner-occupation has huge costs. Those who own homes often become NIMBYs who resist

development in an effort to protect their investments. Data-crunching by *The Economist* suggests that the number of new houses constructed per person in the rich world has fallen by half since the 1960s. Because supply is constrained and the system is skewed towards ownership, most people feel they risk being left behind if they rent. As a result politicians focus on subsidising marginal buyers, as Britain has done in recent years. That channels cash to the middle classes and further boosts prices. And it fuels the build-up of mortgage debt that makes crises more likely.

It does not have to be this way. Not everywhere is afflicted with every part of the housing curse. Tokyo has no property shortage; between 2013 and 2017 it put up 728,000 dwellings—more than England did—without destroying quality of life. The number of rough sleepers has dropped by 80% in the past 20 years. Switzerland gives local governments fiscal incentives to allow housing development—one reason why there is almost twice as much home-building per person as in America. New Zealand recoups some of homeowners' windfall gains through land and property taxes based on valuations that are frequently updated.

Most important, in a few places the rate of home ownership is low and no one bats an eyelid. It is just 50% in Germany, which has a rental sector that encourages long-term tenancies and provides clear and enforceable rights for renters. With ample supply and few tax breaks or subsidies for owner-occupiers, home ownership is far less alluring and the political clout of NIMBYs is muted. Despite strong recent growth in some cities, Germany's real house prices are, on average, no higher than they were in 1980.

| *A home run*

Is it possible to escape the home-ownership fetish? Few governments today can ignore the anger over housing shortages and intergenerational unfairness. Some have responded with bad ideas like rent controls or even more mortgage subsidies. Yet there has been some progress. America has

capped its tax break for mortgage-interest payments. Britain has banned murky upfront fees from rental contracts and curbed risky mortgage lending. A fledgling YIMBY—“yes in my backyard”—movement has sprung up in many successful cities to promote construction. Those, like this newspaper, who want popular support for free markets to endure should hope that such movements succeed. Far from shoring up capitalism, housing policies have made the system unsafe, inefficient and unfair. Time to tear down this rotten edifice and build a new housing market that works.





【首文】房地产市场

住房市场的可怕错误

西方对“居者有其屋”的执迷损害了经济增长、公平和民众对资本主义的信心

经济体既可能突然崩溃，也可能患上慢性病。富裕国家的住房市场同时引发了两种问题。2007到2008年，一万亿美元的不良按揭贷款摧毁了金融体系。但是几十年来，住房造成的逐渐加剧的功能障碍同样危害深重：城市充满生机，却没有发展空间；上了年纪的房主们坐在半空的屋子里，一心想想要视野不被遮挡；年轻一代租房或买房都吃力，对资本主义感到失望。这在很大程度上要归咎于扭曲的住房政策，这些起始于二战时期的政策与人们对“居者有其屋”的执迷交织在一起，引发了富裕国家最严重、持续时间最长的经济失败之一。现在迫切需要一个新的架构了。

这种失败的根源在于住房建设不足，尤其是在有大量就业岗位的繁荣城市附近。从悉尼到锡德纳姆（Sydenham），各种繁琐复杂的法规保护着有房精英人群的利益，令开发商无法建造现代经济所需的摩天大厦和公寓楼。由此导致的高房租和高房价让劳动者很难到生产率最高的地方落脚，进而造成经济增长放缓。美国住房总成本占GDP的比例从上世纪70年代的8%升至11%。如果仅放宽纽约、旧金山和圣何塞这三大城市的规划限制，美国的GDP可能增长4%。这样的增长是极其可观的。

住房市场不仅效率低下，也极不公平。数十年来，利率下降加剧了住房供应不足，导致房价飞涨。在美国，房价的疯狂上涨集中在一些繁荣的城市；而在其他富裕国家，全国平均房价都已飙升，英语国家尤其如此，那里全民都在押注房地产。金融危机也没有消除这一趋势。在英国，经通胀调整后的房价与危机前的峰值大致相当，而实际工资却没有增加。在澳大利亚，尽管房价近期有所下跌，但仍比2008年高出20%。在加拿大则比那一年高出了一半。

住房成本的飞涨造成了巨大的不平等，同时也加剧了代际和地区差异。按价值计算，1990年，年龄中位数为35岁的婴儿潮一代拥有美国三分之一的

房产。而在2019年，与他们人口规模差不多、中位年龄在31岁的千禧一代只拥有4%的房产。年轻人认为住房遥不可及——除非你是富二代——这有助于解释他们为什么会陆续转向“千禧社会主义”。而困守在经济衰退地区的所有年龄层的房主都对发达的城市及其周边地区的房主大发横财愤愤不平。在英国，即便将收入和人口结构差异考虑在内，住房市场不景气的地区在2016年公投中还是更支持脱欧。

你可能会认为，对住房的担忧和妒忌不过是人之情。事实上，“房地产病态”的根源在于上世纪50年代公共政策向推进自有住房的转变。自那以后，各国政府通过补贴、税收优惠以及出售公共住房等措施来推动扩大自有住房而非租房。右翼政客认为拥有住房能促进公民的责任感，从而为他们赢得选票。而左翼政客则认为住房是财富再分配以及帮助贫困家庭积累财富的方式。

这两种论调都言过其实。“有恒产者有恒心”这一点难以证明。如果不考虑杠杆率，持有房屋通常不如持有股票。而且，自有住房热会造成巨大的代价。为了保卫自己的投资，拥有房产的人往往会成为抵制住宅开发的邻避者。本刊的数据分析表明，自上世纪60年代以来，富裕国家的人均新建住房数量下降了一半。供应受限，再加上经济体制向自有住房倾斜，让大多数人觉得租房会让他们面临落于人后的风险。因此，政客们就重点补贴边际购房者，就像英国近年来的做法。这使资金流向中产阶级，进一步推高了房价。这也加剧了房贷积累，增大了发生危机的可能。

其实这种情形是可以避免的。并不是所有地方都在遭受“住房诅咒”方方面面的困扰。东京就不存在房地产供应不足的问题：2013年到2017年，东京在不损害生活质量的情况下，新建住房72.8万套，超过了英格兰。过去20年里，露宿街头的人数减少了80%。瑞士为地方政府开发住房提供财政支持，这是瑞士人均住房建设量几乎比美国高一倍的原因之一。新西兰频繁更新土地和房产的估价，并据此征收土地和房产税，收回房主的部分意外之财。

最重要的是，有些地方的自有住房率很低，也没有人对此大惊小怪。在德

国，自有住房的比例仅为50%，这里的房屋租赁业鼓励长租，并赋予租户明确而可行使的权利。由于房屋供应充足，而房屋所有者享受的税收优惠或补贴很少，自有住房的吸引力大打折扣，邻避者的政治影响力也降低了。尽管近期德国一些城市的房价涨势强劲，但平均而言该国的实际房价并没有高出1980年的水平。

| 向住房问题全线出击

有没有可能让人们不再迷信“居者有其屋”？如今，几乎没有政府能够对住房短缺和代际不公引发的怨愤视而不见。但有些政府祭出的却是昏招，比如控制租金，甚至提供更多房贷补贴。不过也能看到一些进步。美国对偿还房贷利息的税收优惠设置了上限。英国已经禁止在租房合同中暗箱收取手续费，并限制高风险的房贷。支持房屋建设的新兴“迎臂”运动

（YIMBY，“可以建在我家后院”）在很多繁荣城市如雨后春笋般涌现。那些和本刊一样希望自由市场能持续获得广泛支持的人们应该期望这样的运动取得成功。现行住房政策根本没能稳定资本主义，反而使它变得不稳固、低效和不公平。是时候推翻这座腐朽的大厦，建立一个行之有效的新住房市场了。■



Microprocessors

From bottom to top

China is slowly moving up the microprocessing value chain

THE FORTUNE PRECISION EQUIPMENT COMPANY makes chunks of metal. Hulking sheets of it are cut with millimetre accuracy using robot arms in room-sized enclosures bearing the brand of their German or Japanese manufacturers. The white spray of cooling lubricant makes the process look like an industrial-strength shower for some post-modern Cleopatra.

Based in Shenyang, five hours north-east of Beijing by train, Fortune is the bottom rung of the most important and complex supply chain on Earth: the one which produces the integrated circuits, or chips, found in smartphones and servers. Fortune's robots make parts for equipment which will be installed in factories in Taiwan and Oregon, and used to etch circuitry on silicon and make chips. Selling equipment to industry giants like Applied Materials in America makes it a small success for the semiconductor supply chain. Much of the rest of the industry is not doing so well.

Failure to make cutting-edge chips is not exactly China's fault. It is a difficult industry to kick-start. The factories that produce the chips are phenomenally expensive. The technology itself is even more complex than an internal-combustion engine. The intellectual property behind cutting-edge processes is fiercely guarded. In many ways the manufacturing of chips represents the supreme technological challenge for China, an amalgamation of all the other challenges presented in this report. It will have to call upon everything it has learned from successes and failures like nuclear plants and engines if it is to succeed.

The Chinese government is trying hard (the country's biggest chip factory, SMIC, a private firm, has settled many suits over IP theft). In October the

government raised 204bn yuan (\$29bn) from the finance ministry, state-owned firms and local governments for its domestic chipmaking efforts. That followed 139bn yuan raised in 2014. The problem is that the government's chip programme is optimising for the wrong thing. Instead of trying to stimulate a domestic chip industry to meet China's huge market needs, the funds are being spent on trying to reach parity with chip companies like Intel.

Chips are a vital product to China because they are fundamental to any technology-led growth that the country desires for its future, as well as for making weapons. PwC, a consultancy, estimates that the global market for chips will grow by 4.6% a year, to be worth \$575bn in 2022, driven by the requirements of cars, AI systems and communications networks.

Currently a huge share of that market value moves through China, but is not captured by it. The 418bn chips the country imported in 2018 cost \$312bn, a quarter more than it spent importing crude oil. And beyond grabbing a larger part of the value chain for itself, controlling the production of chips would also give China indirect control over myriad other industries, from social networking to personal computing.

Most of the state-led efforts have failed so far. SMIC is on the verge of producing chips at levels of sophistication roughly equivalent to those reached by Intel a decade ago. Its revenues—\$3.4bn in 2018—were about a tenth those of TSMC, its Taiwanese rival. SMIC is not yet globally known for its quality and reliability. But Fortune is making progress. It used to ship its metal components off to third parties in Japan and Taiwan to be cleaned up. Today it does not need to do that. The firm has its own clean rooms where it sands down its shiny aluminium components and gives them a smooth grey coating before vacuum packing them in thick plastic. The firm has also started shipping more complex components to its suppliers, simplifying what its customers have to do while capturing more of the value of the final

product.

Although Chinese firms are still behind in the manufacture of chips, they have recently achieved some success with designing them for AI applications. In late September the nerdier corners of Silicon Valley were abuzz after Alibaba, a Chinese tech-giant, released Hanguang 800, a chip designed specifically for carrying out machine-learning tasks. Even though Alibaba relied on TSMC in Taiwan to fabricate the chips, AI engineers in the Valley remarked on the Hanguang's performance, stating that it had beaten all other chips in its class. This was not supposed to happen, as China was thought to be well behind American chip companies.

| *Faster, higher, stronger*

On November 6th the latest results of MLPerf, an industry-standard benchmark for AI chips, were published. They showed that the Hanguang 800 chip was performing a standardised machine-learning task 13 times faster than the chip that Intel had just released (see chart). The comparison is not totally fair, as the Alibaba chip was made physically larger than the Intel chip, letting it draw more power and perform more calculations per second. But even compared with a bigger chip from Nvidia called the Titan RTX, the Hanguang 800 clocked in four times faster.

There are probably more caveats. Alibaba ran only one out of five tests. Poor performance in the others would betray a chip over-optimised for one task. But even in the most pessimistic scenario it is impressive. That a Chinese company has designed an AI chip which performs as well as, or better than, its Western competitors should alert American politicians and innovators to China's progress in this area.

Whereas Fortune's more industrial flavour of success in the manufacturing supply chain took a traditional route for Chinese firms—start at the bottom and work up—Alibaba's success in designing a chip is more interesting. It is

rooted in its wide deployment of machine-learning systems across its business, both in its Taobao online market and its Hema shops on the high street. The firm processes billions of images a day as part of its normal operations, and the machine-learning software it has trained to do that work is now very accurate and powerful.

The Hanguang 800's designers spent a lot of time sitting next to the coders who built those algorithms. Their job was to work out how to render the algorithms in silicon, so the more time they could spend learning from engineers writing high-performance algorithms, the better. By being close to the market in which AI is used, like Taobao's and Alibaba's offline shops, the Hanguang designers were able to tweak the design of the chip to optimise its performance on those tasks. Indeed, in many ways, the data-labelling grunt work that makes Alibaba's machine-learning algorithms as good as they are translates directly into the high performance of its new chip. China's strength in data-labelling at the very bottom of the AI supply chain is translating into design strength at the top.

| *Must do better*

In other parts of the semiconductor supply chain, things are less rosy. Several executives, who asked for their names not to be attached to criticism of government policy, said that the stimulus had been going to the wrong place in trying to catch up with Western giants such as Intel, or TSMC in Taiwan. While Hanguang 800 is remarkable, Alibaba's design work is a far less capital-intensive, less complex process than the physical manufacture of a chip (which, in Hanguang's case, was still done in Taiwan).

If catching up on internal-combustion engines was hard, doing so on traditional semiconductor manufacturing will be close to impossible. The market for chips is changing fast. Instead the government would do well to focus on stimulating both design and manufacture of chips aimed at

middle-end markets such as the internet of things, and emerging areas like AI.

In one way, China's challenge with chips is even harder than the problem it faced with combustion-engine cars. There is no completely new technology arriving which will free China from the need to catch up with the rest of the world. But China's chip companies should still listen to the market, not chase prestige.

Manufacturing and designing chips for the internet of things and AI applications offers an opportunity to leapfrog less agile chip companies, even if it is not the wholesale opportunity that electric vehicles present. If they can focus on these new areas and be patient, it is likely that the scale and depth of the country's resources could end up winning its companies a permanent spot high on the global supply chain for semiconductors. ■



微处理器

由底至顶

中国正在逐步向微处理价值链的上游攀登【技术季刊《中国的技术》系列之五】

富创精密设备公司生产大块金属。印有德国或日本制造商品牌的机柜有一个房间那么大，里面用机械臂在以毫米的精度切割大张金属板。冷却润滑剂的白色喷雾让这个过程看起来像是给某位后现代埃及艳后的工业级淋浴。

富创总部设在北京东北方向的沈阳，距离北京五小时火车车程。它是地球上最重要和最复杂的供应链中的最底层。这条供应链生产智能手机和服务器中的集成电路也就是芯片。富创的机器人生产的零部件会被嵌入台湾和俄勒冈州的工厂安装的设备中，这些设备在硅上蚀刻电路并制造芯片。把设备卖给美国的应用材料公司（Applied Materials）等行业巨头让它在半导体供应链上占有了一席之地。行业中许多其他公司的情况就没有这么好了。

未能制造出最先进的芯片并不是中国的错。这是一个很难启动的行业。生产芯片的工厂耗资极大。这种技术本身甚至比内燃机更复杂。尖端流程背后的知识产权受到严密保护。在许多方面，芯片制造代表了中国面临的最高技术挑战，是本专题报道中提出的所有其他挑战的大融合。要想成功，中国就必须利用它从成功和失败（如核电站和发动机）中学到的一切。

中国政府非常努力。中国最大的芯片工厂、私营公司中芯国际（SMIC）已就许多知识产权盗窃案达成和解。2019年10月，中国政府从财政部、国有企业和地方政府筹集了2040亿元人民币，用于研发国产芯片。在此之前，2014年时已筹集了1390亿元人民币。问题在于政府芯片计划的优化目标选错了。这些资金并没有试图刺激国内芯片产业来满足中国巨大的市场需求，而是将资金用于追赶英特尔等芯片公司。

芯片对中国而言是至关重要的产品，因为它们对于中国渴望在未来实现的

任何技术主导型增长以及武器制造来说都是一种基础。咨询公司普华永道估计，在汽车、人工智能系统和通信网络的需求推动下，全球芯片市场将以每年4.6%的速度增长，到2022年将达到5750亿美元。

目前，这一市场价值中有极大一部分流经中国，但未被中国捕获。中国在2018年进口了4180亿枚芯片，花费3120亿美元，比在进口原油上的支出还多四分之一。除了把价值链中更大的一部分留给自己外，控制芯片的生产还可以使中国间接控制从社交网络到个人计算机的无数其他行业。

迄今为止，大多数国家主导的努力都以失败告终。中芯国际即将生产的芯片的成熟度大致与英特尔十年前的水平相当。它的收入（2018年为34亿美元）约为台湾竞争对手台积电（TSMC）的十分之一。中芯国际尚未以质量和可靠性享誉全球。但富创正在取得进展。它以前会将它生产的金属部件运送到日本和台湾的第三方清理。今天它不需要这样做了。公司拥有自己的洁净室，在其中打磨闪闪发亮的铝制部件，喷上光滑的灰色涂层，然后再用厚塑料真空包装。它还开始向供应商供应更复杂的元件，从而简化了客户要做的处理，同时捕获了最终产品中更多的价值。

尽管中国公司在芯片制造方面仍然落后，但它们最近为人工智能应用设计芯片方面取得了一些成功。去年9月下旬，中国技术巨头阿里巴巴发布了专门用于执行机器学习任务的芯片“含光800”，让硅谷的书呆子们议论纷纷。尽管阿里巴巴依靠台湾台积电制造芯片，但硅谷的人工智能工程师还是对含光的性能发表了评论，称其击败了同级别的所有其他芯片。这真是出人意料，因为人们认为中国远远落后于美国芯片公司。

| 更快更高更强

去年11月6日，人工智能芯片的行业标准化基准MLPerf发布了最新测试结果。它表明，含光800芯片执行标准化的机器学习任务的速度是英特尔刚刚发布的芯片的13倍（见图）。这种比较并不完全公平，因为阿里巴巴芯片的物理尺寸要比英特尔的芯片大，这让它的功耗更高，每秒执行更多的计算。但即使与英伟达尺寸更大的芯片Titan RTX相比，含光800的处理速度也要快上四倍。

它很可能还有更多不足。阿里巴巴只进行了五分之一的测试。在其他测试中表现不佳会揭示出一种芯片针对某项任务过度优化了。但哪怕出现最悲观的情况，也足以令人印象深刻了。中国公司设计的人工智能芯片的性能相当于甚至优于西方竞争对手，这应该使美国的政客和创新者警惕中国在这一领域的进步。

富创在制造业供应链中偏工业化的成功模式走的是中国公司的传统路线——从最底层开始逐渐向上游走，而阿里巴巴在芯片设计方面的成功更耐人寻味。它植根于广泛部署在公司所有业务（包括网上市场淘宝和商业街上的盒马鲜生店）中的机器学习系统。作为日常运营的一部分，这家公司每天要处理数十亿张图片，而它经过训练来做这件事的机器学习软件现在已经非常准确且强大。

含光800的设计师花了很多时间坐在构建这些算法的程序员身边。他们的工作是弄清楚如何把算法搬上硅片，因此花在向工程师学习编写高性能算法上的时间越多越好。由于靠近淘宝和阿里巴巴的线下商店等使用人工智能的市场，含光的设计人员能够调整芯片的设计来优化它在这些任务上的性能。确实，从许多方面来说，数据标注的艰巨工作让阿里巴巴的机器学习算法达到了今天的出色水准，也直接转化成了新芯片的高性能。中国在人工智能供应链的最底层——数据标注——方面的优势正在转化为顶层的设计优势。

| 必须做得更好

在半导体供应链的其他部分，情况则没那么乐观。几位高管（要求在批评政府政策时隐去姓名）表示，试图赶上英特尔这样的西方巨头或台湾的台积电的刺激措施是用错了地方。尽管“含光800”非常出色，但相比芯片的物理制造（含光依然是在台湾制造的），阿里巴巴的设计工作的资本密集度和复杂度要低得多。

如果在内燃机上实现赶超很难，那么在传统半导体制造上就几乎是不可能的。芯片市场瞬息万变。相反，政府更好的做法是专注于刺激针对物联网等中端市场以及人工智能等新兴领域的芯片设计和制造。

在一个方面，中国在芯片方面的困难甚至比内燃机汽车面对的问题还要艰巨。在芯片领域还没有哪种全新的技术出现，可以让中国无需赶超世界其他地区。但中国的芯片公司仍然应该倾听市场，而不是追逐虚名。

制造和设计用于物联网和人工智能应用的芯片为中国提供了一个机会来超越那些不太敏捷的芯片企业，哪怕这个机会不像在电动汽车领域那样俯拾即是。如果它能够专注于这些新领域并保持耐心，那么以中国资源的规模和深度，很可能最终为它的企业赢得全球半导体供应链上的永久高点。■



Global trade

Welcome to the jungle

It has become harder to prosper through exports

BONNIE TU IS laughing. She just discovered the crisp red “Make America Great Again” hat that a colleague left on her desk as a joke. The chairwoman of Giant, the world’s biggest bike manufacturer, is no fan of Donald Trump. His tariffs have messed with her supply chains and driven up costs. “It’s a tax on biking, the healthiest activity in the world,” bemoans the feisty 70-year-old, an avid cyclist herself. In response, Giant has scaled back production in China and ramped up in Taiwan. “We had no choice,” she says.

Giant is not alone. Scores of Taiwanese companies have come back recently, including Compal, a computer manufacturer; Delta Electronics, a power-component supplier; and Long Chen, a paper company. In 2018 the government launched the “Invest Taiwan” office, promising low-cost loans for companies’ relocation expenses. It has already accepted applications from over 150 firms.

All this might make it sound like Taiwan has benefited from the trade war. Singapore and South Korea have also gained market share in America at China’s expense. But it would be a mistake to conclude that the trade war is good for the tigers. Overall, it hurts. It is disrupting three things on which they intimately depend: an open global trading system, their Asia-based production networks and their biggest market, China. Goldman Sachs analysts looked at how 13 economies in Asia were faring relative to their potential last year; the Asian tigers occupied four of the five bottom slots.

That trade friction should unsettle them is only natural. Exports, after all, have been at the heart of their post-war success. South Korea began with

tinplate, plywood and textiles. Its exporters benefited from cheap credit, exemptions from import duties and a devaluation of the won in 1964 (ironically, urged on it by America). From February 1965 until his assassination in 1979, President Park Chung-hee attended nearly every monthly meeting of the country's export-promotion committee, sampling products and rallying businessmen over lunch. He cried when South Korea's exports exceeded \$100m in 1964, declaring a national holiday known as "export day" (later renamed "trade day").

Taiwan also started with cheap credit and tax breaks for exporters. Entrepreneurs soon emerged. Ms Tu remembers her uncle, King Liu, founder of Giant, remarking with astonishment in 1972 that "Americans are bringing cash here to buy bikes". He soon found that local Taiwanese suppliers were not reliable: rubber tyres had a habit of falling off rims. So Mr Liu travelled around the island to persuade other manufacturers that they would all fare better if they adhered to the same dimensions.

Singapore and Hong Kong are often seen as entrepôts. But they, too, were once exemplars of labour-intensive manufacturing. For a time, in the 1970s, Hong Kong was the world's biggest toy producer. When Singapore became independent in 1965, it pitched itself as a base of production. Rivalry with Hong Kong was there from the outset: one of Singapore's first big catches was GE, which chose to set up a clock-radio factory in the city-state, worried that the violence of China's Cultural Revolution might spill over to Hong Kong.

Even as the tigers have grown far wealthier, exports have remained part of their DNA. Their companies became more sophisticated over time, prodded by their governments (which were themselves often prodded by ambitious industrialists). In South Korea, after a decade of success in light industry, officials promoted heavier industries, such as shipbuilding and chemicals. Taiwan created science parks for advanced industries from optoelectronics

to semiconductors. Singapore established a National Computer Board in 1981 to train high-tech workers.

Much of the world has lost ground to China over the past 20 years. Yet the tigers' share of global merchandise exports has been steady at 10% (see chart). Japan, their erstwhile mentor, has seen its share fall to less than 4%, half what it was in 2000.

Like other wealthy economies, they have shifted much of their basic manufacturing to China. Most emblematic is Foxconn, a Taiwanese electronics company known now as the main assembler of iPhones. It opened its first plant in China in 1988; 30 years later it employs roughly 1m people there. But as they offloaded low-end work to China, the tigers moved upstream. South Korea is the world's biggest maker of memory chips. Taiwan has the biggest capacity for fabricating semiconductors. As a result, they each account for more than 12% of China's final demand for electronic and computer products, twice as much as any other trade partner. They are, put simply, making things that China cannot.

They have also ridden on China's coat-tails. As firms have clustered together in China, Asia as a whole has become a more powerful manufacturing region. Asia's share of the global trade in parts and components rose from 19% to 30% between 2000 and 2016. Mainland China is home to four of the world's seven busiest container ports; the others are in Singapore, Busan and Hong Kong.

Both Singapore and Hong Kong have strengthened their roles as the management hubs of "Factory Asia". More than 4,000 companies have chosen Singapore as a regional headquarters, often to oversee South-East Asia. Hong Kong has fewer, with roughly 1,500 headquarters, but it has been far more successful than Singapore at luring Chinese companies to its stock exchange. Its stockmarket is worth more than \$4trn; Singapore's is

closer to \$700bn.

All these connections, however enriching, create vulnerabilities. America's trade war is intended to inflict pain on China. But the tigers are, in many ways, more exposed to the damage because they are smaller and more open. In China, exports are worth about 20% of GDP. In South Korea it is more like 45%; in Taiwan, 65%; and in Singapore and Hong Kong, closer to 200%.

In tearing supply chains asunder, Mr Trump's tactics pose a particular danger to the tigers' cosmopolitan model of manufacturing. They remain highly dependent on inputs from other countries. They also serve an ecumenical range of clients, including some whom the Americans distrust. Taiwanese foundries produce chips for top American firms but also for Huawei, the Chinese telecoms giant that Americans accuse of spying. "We are everyone's foundry. We exclude no one," says an official at TSMC.

Faced with all the uncertainty, the tigers have a couple of options. One is to diversify their customers and their products. Taiwan has long pushed its companies to explore emerging markets other than China. South Korea's government is keen to promote a wider range of products. On the most recent "trade day", President Moon Jae-in of South Korea applauded new industries such as electrical vehicles and robots.

Another response is to try to patch up the global trading order. Before 2000 the tigers were party to just five regional trade agreements; they have since joined 49 more. Singapore was an originator of both the Trans-Pacific Partnership (a trade deal that once aimed to join America, Japan and ten other Pacific-Rim countries) and its supposed rival, the Regional Comprehensive Economic Partnership, which includes China. It is also among the countries working to broker a compromise between China and America that will keep the World Trade Organisation functioning.

But the tigers have little ability to dodge a full Sino-American clash. Hong Kong is most at risk. Its distinctiveness is recognised in American law, which treats it as a separate customs territory from the rest of China. That means it is a non-combatant in the trade war. But some companies appear to be exploiting this, routing goods through Hong Kong middlemen to lower the tariffs they face. America might yet tighten its scrutiny of goods from the city.

Problems in Asia can also be home-grown. A political dispute between South Korea and Japan, rooted in Japan's occupation of South Korea in the first half of the 20th century, has morphed into a 21st-century trade squall. Japan has restricted sales to South Korea of materials vital for making semiconductor chips. The global division of labour is so finely sliced that it is difficult for South Korean chipmakers to find close substitutes.

The upshot of all the turmoil is that it is getting harder for companies to know where to operate and with whom to trade. At Giant Ms Tu's conclusion is that companies need to stick to what they can control. "We have to focus on efficiency and automation," she says. That quest for efficiency is shared across the tigers. Automation is one way to achieve it. But there are others. ■



全球贸易

欢迎来到丛林

通过出口寻求发展变得越来越难【专题报道《亚洲四小龙》系列之一】

杜绣珍在笑。她刚刚发现了一顶鲜红色的“使美国再次伟大”的帽子，这是一个同事开玩笑留在她桌子上的。这位巨大集团的董事长可不是唐纳德·特朗普的粉丝。他的关税打乱了这家全球最大的自行车制造商的供应链，抬高了成本。“这是对骑车征税，这可是世界上最健康的活动。”这位精神矍铄的70岁老人叹道。她本人就是骑行的狂热爱好者。巨大集团的应对办法是减少在中国大陆的产量，而在台湾扩大了产量。“我们别无选择。”她说。

巨大集团并非特例。最近有几十家台湾公司回归本土，包括计算机制造商仁宝、电源组件供应商台达电子，还有造纸公司荣成纸业。台湾政府于2018年设立了“投资台湾”办公室，承诺为公司的搬迁费用提供低成本贷款。它已经接受了150多家公司的申请。

所有这些听起来可能像是台湾从贸易战中得了好处。新加坡和韩国也从中国大陆手中抢到了美国的市场份额。但是，得出贸易战对四小龙有利的结论是错误的。总体来说它是有害的。它破坏了它们密切依赖的三件事：开放的全球贸易体系、它们基于亚洲的生产网络，以及最大的市场——中国。高盛的分析师研究了去年亚洲13个经济体相对于其潜力的表现。四小龙占据了末五位中的四个。

贸易摩擦会使它们不安是很自然的，毕竟出口一直是它们在战后经济腾飞的核心。韩国从马口铁、胶合板和纺织品起步。它的出口商受益于廉价信贷、免征进口关税以及韩元在1964年贬值（讽刺的是，这是美国要求的）。从1965年2月直到1979年被暗杀，朴正熙总统几乎参加了该国出口促进委员会的每一次月度会议，抽检产品并在午饭期间会见商人。1964年，当韩国的出口额超过1亿美元时，他喜极而泣，宣布设立国定假日“出口日”（后更名为“贸易日”）。

台湾也从为出口商提供便宜的信贷和税收减免起飞。企业家很快涌现。杜女士记得她的叔叔、巨大的创始人刘金标在1972年惊讶地发现“美国人带着现金来这里买自行车”。他很快发现台湾本地供应商并不可靠：橡胶轮胎常常脱离轮辋。因此，刘金标在台湾四处劝说其他制造商遵循相同的尺寸，让大家日子都能更好过。

新加坡和香港通常被视为转运口岸，但它们曾经也是劳动密集型制造业的典范。1970年代时，香港一度是世界最大的玩具生产地。新加坡于1965年独立后，便自我推销为生产基地。与香港的竞争从一开始就存在。新加坡拿下的首批大公司之一是通用电气（GE）。由于担心中国大陆文化大革命的暴力蔓延到香港，该公司选择在这座城市国家建造一座钟表收音机工厂。

虽然四小龙的富裕程度已今非昔比，出口仍然是它们的DNA的一部分。在政府的督促下，随着时间的推移，它们的企业变得越来越老练（雄心勃勃的工业家也常常敦促政府）。在韩国，在轻工业上经历了成功的十年后，官员们推动了重工业的发展，例如造船和化工业。台湾为从光电到半导体的先进产业建设了科学园区。新加坡于1981年成立了国家计算机委员会来培训高科技工作者。

在过去的20年中，世界上许多地方面对中国大陆都节节败退。然而，四小龙在全球商品出口中的份额一直稳定在10%（见图）。日本一度是它们的导师，但如今它所占的份额降至不到4%，是2000年时的一半。

和其他富裕经济体一样，四小龙已经将许多基本制造业转移到了中国大陆。最具代表性的是台湾电子公司富士康，现在因作为iPhone的主要组装商而知名。它于1988年在中国大陆开设了第一家工厂。30年后，它在当地雇用了约100万名员工。但是，当四小龙将低端工作转移到中国大陆时，它们自己就向上游移动了。韩国是世界上最大的存储芯片制造商。台湾拥有最大的半导体制造能力。结果，它们各自占了中国大陆对电子和计算机产品最终需求的12%以上，是任何其他贸易伙伴的两倍。简而言之，它们生产中国生产不了的东西。

它们也借了中国大陆的东风。随着企业在中国大陆形成集群，整个亚洲已成为一个更强大的制造业地区。2000年至2016年间，亚洲在全球零部件贸易中所占的份额从19%上升至30%。中国大陆拥有世界上七个最繁忙的集装箱港口中的四个；另外三个是新加坡、釜山和香港。

新加坡和香港都加强了自身作为“亚洲工厂”管理中心的作用。4000多家公司选择新加坡作为地区总部，通常负责管理东南亚。香港的总部数量较少，大约有1500家，但在吸引中国公司上市方面远比新加坡成功。香港股票市值超过4万亿美元，新加坡股市接近7000亿美元。

所有这些联系（虽然带来了财富）都造成了脆弱性。美国的贸易战旨在给中国大陆带来痛苦。但四小龙在很多方面都更容易受到伤害，因为它们更小、更开放。在中国大陆，出口价值约占GDP的20%。韩国的这一比例接近45%，台湾是65%，新加坡和香港则接近200%。

在撕碎供应链的过程中，特朗普的策略对四小龙的国际化制造模式构成了特别的威胁。它们仍然高度依赖其他国家的输入。它们还为各式各样的客户提供服务，其中包括一些美国人不信任的客户。台湾代工厂不仅为美国顶级公司生产芯片，也为美国人指称从事间谍活动的中国电信巨头华为生产芯片。“我们是每个人的代工厂。我们不排除任何人。”台积电一位要员说。

面对所有的不确定性，四小龙有两种选择。一种是让顾客和产品多样化。台湾长期以来一直在推动其公司开拓除中国大陆以外的新兴市场。韩国政府积极推广更多种类的产品。在最近的“贸易日”，韩国总统文在寅对电动汽车和机器人等新兴产业表示赞赏。

另一种回应是尝试修补全球贸易秩序。2000年之前四小龙只加入了五个区域贸易协定，之后又加入了49个。新加坡是“跨太平洋伙伴关系协定”（曾希望让美国、日本和其他十个环太平洋国家加入的贸易协议）和据称是竞争性的“区域全面经济伙伴关系协定”（其中包括中国）的发起者。它也是努力协调中美达成妥协以维持世贸组织运转的国家之一。

但四小龙没有能力躲避一场全面的中美冲突。香港的风险最大。美国法律已承认了它的独特性——将其视为独立于中国其他地区的关税区。这意味着它在贸易战中是非参战方。但一些公司似乎正在利用这一点，通过香港中间商运送货物以降低面临的关税。美国可能还会加强对来自这座城市的商品的审查。

亚洲的问题还可能来自本土。韩国与日本之间的政治争端源于20世纪上半叶日本对韩国的占领，如今已演变为21世纪的贸易风暴。日本限制了对韩国销售半导体芯片制造中不可或缺的材料。全球分工是如此之细，以至于韩国芯片制造商很难找到近似的替代品。

所有这些动荡的结果就是公司越来越不清楚应该在哪里开展业务，以及该与谁做生意。杜女士的结论是，公司需要坚持自己能控制的东西。她说：“我们必须专注于效率和自动化。”对效率的追求是四小龙的共同之处。自动化是一种实现方式。但还有其他。■



Demography

Endangered species

Will age weaken the tigers?

AT 4.30AM hundreds of people are already spilling into the road outside Seoul's Namguro station. They are not here for the trains, which will not begin for another hour. Nor are they attracted by the dawn cafeterias (offering blood sausage and flatbread), the upstairs song rooms (offering the comforts of crooning) or the basement spas (offering who knows what). They are gathered instead to offer their labour in return for a day's wages, at whatever building site needs extra hands. As they wait for a bidder, they smoke, squat and cough. And they speak not in Korean but in gravelly Mandarin.

South Korea used to be a net exporter of labour. In the 1970s its workers built roads in Saudi Arabia, often at night by torchlight. But immigrants, including the Chinese gathered at Namguro, now make up a growing proportion of the workforce.

For all the fear in the tigers about jobs, their unemployment rates remain enviably low: less than 4% in all of them. Their long-term worry will be a shortage not of jobs but of people young enough to do them. The population of traditional working age (aged 15-64) is already declining in all four. By 2040 they will have fewer people in this age bracket, relative to their elderly population, than Japan has today. In a span of 20 years, the tigers will have aged as much as Japan did in more than 30.

The tigers' fertility rates rank in the bottom ten worldwide: low enough that each new cohort is expected to be only 55% the size of its parents' generation. Their governments have tried, without much subtlety or success, to reverse this trend. Some have even tried their hand at

matchmaking. Singapore's Social Development Network organises dinners, films and board games. One network-certified dating agency will help you find your ideal partner with the help of Lego bricks. In Taiwan the government has organised speed-dating and bike tours, among other events. But one senior official is blunt in her assessment: "Totally useless."

One reason is the tigers' work culture. "If a country requires its people to be locked up in their workplace, no wonder the birth rate is so low," says Joyce Yang, who quit her public-relations job in Taipei after too many midnight finishes to the day. In South Korea, President Moon's government has cut the maximum workweek to 52 hours (although exceptions persist). Ms Yang chose a more radical solution: moving to Australia, from where she urges her 30,000 Facebook followers to quit their workaholism. "Taiwanese don't have time for life," she says.

Time is one constraint; another is cost. Although society as a whole benefits from the vigour of each new generation, the cost of raising them falls squarely on one group: women of childbearing age. With elderly parents to worry about, little help from their husbands (men do only a fifth of the household chores in South Korea) and inadequate help from the state, many women have chosen to marry late, if at all, and have one child, if any.

Their predicament is worsened by one of the tigers' proudest boasts: their commitment to education. Although the tigers all provide decent public schooling, many parents feel obliged to splash out on expensive private alternatives and additional tutoring. Some of this extra effort may add to a child's knowledge and future productivity. But much of it is mere credentialism, an attempt to improve a child's position in the queue for the best universities, and hence the best jobs. Education has become an arms race in which one parent's additional outlay of time and money forces others to follow suit.

In South Korea, Mr Moon has promised various acts of collective educational disarmament. He wants to merge universities into a single network, flatten the schools hierarchy and even discourage employers from hiring on the basis of academic credentials. Some of these proposals seem unworkable. His critics call it a “war on meritocracy”. But there is a distinction between merit, which should be rewarded, and wasteful attempts to signal merit, which are damaging. Tiger parents risk hurting the tigers.

Faced with this burden, some parents fabricate their children’s qualifications. One academic paper in 2009 on the genetic precursors of disease was supposedly co-written by the daughter of Cho Kuk, Mr Moon’s justice minister, even though she was only a schoolgirl at the time. He was forced to resign in shame.

| *Shy, but not retiring*

To improve their unfavourable age structure, the tigers will have to combine shorter working weeks with longer working lives. They will need more people like Neo Kwee Leng. As he approached 60, he gave up his life as a small businessman to spend his days at the “Loving Heart” centre, an activity hub for the elderly in Singapore. It was not an act of retirement: he joined as a manager. Nor, as it turned out, was it much of a downshift. About 100 people drop in daily, each with different needs. Some come for medical check-ups, others to play ukulele, still others just to chat.

So Mr Neo upgraded his managerial skills, learning Excel and data analysis. “The hardest part is my eyesight,” he says. He has also run seminars on using smartphones. His training—of himself and others—is part of SkillsFuture, a government programme to promote lifelong learning.

In the tigers, lifelong can be lengthy indeed. Just as they have some of the lowest fertility rates, they also have some of the highest life expectancies.

Even at 60 their people can still expect to live another 25 years or more, enough time to master both Excel and the ukulele.

Another way for the tigers to cope with their ageing is to permit more immigration. The foreign population accounts for 6% of the workforce in Taiwan and about 3.3% in South Korea. That is low by Western standards, but higher than Japan, where foreigners make up only 2%. In the two tiger cities the reliance on immigrants is far more dramatic. Much of Hong Kong's population (39%) was born elsewhere, including over 2.2m from other parts of China. The foreign-born still occupy prominent positions in the courts, regulatory bodies and even the police. The city also relies on over 380,000 maids and nannies (mostly from the Philippines and Indonesia), who constitute over 8% of the workforce.

Singapore has 1.4m foreign workers, more than a third of its labour force. The government believes immigrants are needed to do the lower-skilled jobs that Singaporeans will no longer do. A white paper in 2013 forecast a population of up to 6.9m by 2030, from 5.7m today. In so doing, it inadvertently revealed the limits of openness in the city-state. The projection fuelled worries that immigrants would overburden the city's infrastructure and public services. In the rarest of scenes for Singapore, a few thousand people protested in a park, some holding aloft signs such as "Singapore for Singaporeans".

Immigration is not the only way to take advantage of more abundant workforces elsewhere. As well as importing labour, the tigers can, and have, exported capital. By lending and investing abroad, they have accumulated claims on the output of foreign workforces, without all the difficulties of bringing those workers to their shores. In Hong Kong, the net annual income from these foreign assets already amounts to almost \$2,500 per person.

The tigers have accumulated these overseas investments by consistently selling more things to the rest of the world than they buy from it. Singapore's current-account surplus last year was a whopping 18% of GDP. These trade imbalances have not yet provoked much scrutiny or condemnation from America. But that could change. These four economies are, after all, worthy of the world's close attention. ■



人口结构

濒危物种

它们已经老态龙钟了？【专题报道《亚洲四小龙》系列之三】

凌晨4点30分，已有数百人涌入首尔南九老站外的道路。他们不是来这里乘火车的，因为火车还有一个小时才开。吸引他们的也不是早餐店（提供血肠和大饼）、楼上的歌厅（提供浅吟低唱的慰藉）或是地下室洗浴中心（提供谁知道什么东西）。他们聚集在这里是为了在任何需要额外人手的建筑工地上出卖劳力，换取一天的工资。在等待买主时，他们一边蹲着吸烟，一边咳嗽。他们说的不是韩语，而是低沉的普通话。

韩国曾经是劳动力的净出口国。在1970年代，它的工人经常在晚上点着火把在沙特阿拉伯修筑道路。但现在，包括聚集在南九老的中国人在内的移民在劳动力中所占的比例越来越高。

尽管四小龙都在担心工作的问题，但失业率仍然低得令人羡慕：四国的失业率都不到4%。长期担忧并不是职位不足，而是缺少足够年轻的人去工作。四小龙的传统劳动年龄人口（15-64岁）都已开始下降。到2040年，这一年龄段相对于老年人口的比例将比如今的日本还低。在20年的时间里，四小龙就会走过日本30多年的老龄化历程。

四小龙的生育率在全球排名倒数前十：低到每一代人的数量预计只有父母一代的55%。它们的政府都尝试过扭转这一趋势，但手法不巧妙也不成功。有些政府甚至尝试过给民众做媒。新加坡的社会发展网络组织晚宴、电影和桌游。一家经该网络认证的婚介所会借助乐高积木帮助人们找到理想伴侣。在台湾，政府组织了速配和自行车骑行等活动。但一位高级官员的评语直言不讳：“完全没用。”

原因之一是四小龙的工作文化。“如果一个国家需要把人们锁在职场，那就难怪生育率这么低了。”在太多次加班到午夜后辞掉了台北一个公关工作的杨乔说。在韩国，文在寅总统的政府已将每周的最长工作时间减少到

52小时（尽管例外情况仍然存在）。杨乔选择了一个更激进的解决方案：搬到澳大利亚，从那里她敦促她的三万位Facebook粉丝别再做工作狂。她说：“台湾人没有生活的时间。”

时间是一个约束，成本是另一个。尽管整个社会都受益于新生代的活力，但抚养他们的成本却毫不含糊地落在了一个群体身上：育龄妇女。由于有年迈的父母要关心，丈夫又帮不上什么忙（韩国男人只做了五分之一的家务），而国家的帮助不足，许多女性选择晚婚（如果结婚的话），且只生育一个孩子（如果生的话）。

让这一困境雪上加霜的是四小龙最引以为傲的事之一：对教育的投入。尽管四小龙都提供了体面的公立学校教育，但许多父母还是觉得有责任在昂贵的私立教育和额外的补习上一掷千金。这些额外的努力有些可能会增加孩子的知识和未来的生产力。但大部分只是为了一纸证书，希望让孩子在争夺最好的大学（因此也有最好的工作）的队伍中挤在前列。教育已成为军备竞赛，一个家庭额外的时间和金钱支出让其他人也不得不效仿。

在韩国，文在寅已承诺采取各种整体性的教育裁军行动。他希望将所有大学合并为一个单一网络，使学校的等级结构扁平化，甚至不鼓励雇主根据学历聘人。其中一些建议似乎并不可行。他的批评者称之为“对唯才是举宣战”。但是，才能（应予奖励）和试图标识才能的浪费性的努力（有害）之间是有区别的。虎爸虎妈可能会伤害四小龙。

面对这种压力，一些父母开始捏造孩子的资历。2009年，一份有关疾病基因前兆的学术论文据称是由文在寅的法务部部长曹国的女儿共同撰写，尽管她当时只是一名高中生。曹国被迫引咎辞职。

| 害羞，但不退休

为了改善并不乐观的年龄结构，四小龙必须把较短的工作时长与更长的工作年限结合起来。它们将需要更多像梁贵仁（音译）这样的人。当他快60岁时，他不再做小生意，而是加入了新加坡一个老年活动中心“爱心服务中心”。这不是退休——他是经理的身份加入的。事实证明这也没有清闲

多少。每天约有100人来访，每个人都有不同的需求。有些来做身体检查，有些来弹尤克里里，还有些人就是来聊天的。

因此，梁先生提升了自己的管理技能，学习了Excel和数据分析。他说：“最难的部分是我的视力。”他还举办了如何使用智能手机的讲座。他这种对自己和他人的培训是“未来技能计划”（SkillsFuture）的一部分，这个政府计划旨在促进终身学习。

在四小龙，“终身”可能真的很漫长。它们的生育率排名垫底，预期寿命却也排在榜首。即使已经60岁了，这些国家的国民仍然可以期望再活25年或更久，足以让他们学好Excel和尤克里里。

四小龙应对衰老的另一种方法是接纳更多移民。台湾的外来人口占其劳动力的6%，韩国约占3.3%。以西方的标准来看这是很低的比例，但仍高于外国人仅占2%的日本。两个小龙城市对移民的依赖要严重得多。香港人口有很大一部分（39%）出生在其他地方，包括来自中国其他地区的220万人。外国出生的人仍然在法院、监管机构甚至警察队伍中占据重要职位。香港还依靠超过38万女佣和保姆（主要来自菲律宾和印度尼西亚），占其劳动力的8%以上。

新加坡有140万外国工人，占其劳动力的三分之一以上。政府认为需要移民来做新加坡人不愿再做的低技能工作。2013年的白皮书预测，到2030年，人口将从目前的570万增加到690万。它在无意间却揭示了这座城市国家开放的局限性。该预测加剧了人们对移民将让该市基础设施和公共服务不堪重负的担忧。新加坡出现了最为罕见的场景：数千人在公园里抗议，其中一些人举着“新加坡人的新加坡”之类的标语。

移民并不是利用其他地方更充足劳动力的唯一途径。四小龙不仅可以进口劳动力，还可以出口资本。通过向国外贷款和投资，它们积累了对外国劳动力产生的所有权，而避免了将这些工人带回本国的所有困难。在香港，这些海外资产的年净收入已接近每人2500美元。

通过不断向世界其他地区多卖少买，四小龙积累了这些海外投资。新加坡

去年的经常账户盈余高达GDP的18%。这些贸易失衡尚未引起美国的严格审查或谴责。但这一点可能会改变。毕竟这四个经济体值得全世界的密切关注。 ■



Cars

Electric leapfrog

China never mastered internal-combustion engines. Electric cars will be different

AT A SHINY new factory in the suburbs of the port city of Wenzhou in south-eastern China, a sturdy robot arm picks up a curved sheet of glass. As a vehicle crawls past it on a conveyor belt, the arm gently nestles the windscreen into its housing, then swivels back to get its greedy suction cups on the next one. Bleepy electronic versions of “Greensleeves” and “Baa Baa Black Sheep” blare out over the factory floor every so often, signalling break time for one of the various groups of human workers.

This is the first factory of a newish Chinese firm called WM Motor. At the end of the production line, brand new electric SUVs roll out into the world at a rate of about 16 every hour, two-thirds of the factory’s maximum rate. Though it currently makes only the one model, the company’s global ambitions are clear. The car’s Chinese name is Weima, which means “powerful horse”. Its Western name is a German word, Weltmeister, which means “world champion”. The German name is the one to focus on. Executives in China’s electric-vehicle industry believe it has a chance to do something that its older internal-combustion-engine carmakers never managed—become a global force.

That is quite an ambition for a Chinese car company. Though China may now make nuclear-power plants able to dominate the world market, its domestic internal-combustion-engine cars cannot dominate even the Chinese market. The best-selling manufacturers are VW and Honda, whose vehicles are built by local joint ventures. This is because nuclear reactors, although they need extremely strong and carefully engineered components, are basically souped-up kettles. A car, and especially its engine, is something much finer, its pistons and valves continuously

dancing, the string of explosions in each cylinder perfectly timed, the amount of torque transferred through the camshaft to the wheels just what the driver expects, all of it owned by someone who wants to devote as little time to maintaining this mechanical miracle as possible—ideally, none.

No amount of technology transfer, legitimate or otherwise, can boost a country to pole position in such an industry. As Japan and South Korea have shown, it takes decades of intense investment, hard graft and astute leadership to develop the engineering know-how and the intricate supply chains that make such things possible. China does not have the patience for that. “You would have to invest billions of dollars for another 20 years, and maybe then we would be getting close to the Germans,” says Freeman Shen, WM’s founder. “It’s hopeless.”

Tapping into existing supply chains might make things easier; but although China has the access this takes in electronics, in cars it does not. And the car industry’s supply chains are lines of co-operation as well as commerce. To make affordable, high-quality cars you do not just need the likes of Bosch to sell you off-the-shelf components. You need their active co-operation in creating just the right parts. If providing that co-operation means risking established business with bigger, better incumbents, it is unlikely to be completely forthcoming.

| *No ICE, baby*

Chinese EV firms like WM think that the fact that they depend on a completely different—and more electronic—set of components means they can do an end-run around the internal-combustion incumbents, taking the lead in a new industry rather than catching up in an old one. And they are the only ray of light in a very gloomy Chinese carmaking outlook. The rest of the car market has been shrinking for 16 straight months. Sales of EVs have been set back by cuts to the government subsidy programme in 2019, but nonetheless the government still wants a quarter of all cars sold by

2025 to be electric. Today they account for only 7% of the market. But China being China, that still works out as 1.5m vehicles a year, making it the largest EV market in the world.

The market is dominated by Chinese incumbents moving from internal-combustion vehicles to EVs. But there is also a pack of startups. Nio may be the most famous, but WM is perhaps the most ambitious. It owns and operates all of its factories, and although it said it had delivered only 12,600 cars in 2019 when your correspondent visited in October, it says it will soon have the capacity to produce 200,000 a year in Wenzhou, and that a slightly bigger plant in Huanggang, 630km inland in Hubei province, will make another 300,000 cars a year when it is completed.

These facilities come with the compliments of the provincial governments in Zhejiang and Hubei. Officials see the factories as bringing their provinces jobs, prestige and VAT receipts, which in China are collected when the car leaves the factory. And if WM succeeds, the officials associated with it will earn the sort of kudos that can elevate them a long way in the party hierarchy. Nio and Xpeng, WM's venture-capital-backed competitors, have not yet benefited from quite this level of largesse. They are having their cars made by contract manufacturers, which is less capital-intensive but also yields less control over the process.

Getting high-tech factories built for nothing gives WM a chance to achieve something that China's combustion-engine car companies never managed: develop core technology that is globally competitive. Mr Shen, a car-industry veteran, says he has had 1,000 engineers dedicated to working on electric vehicles for the past four years. "I guarantee that the largest car company in the world, Volkswagen, does not have 1,000 engineers dedicated to electric vehicles," he says.

Mr Shen's focus is on the EV's battery packs and the power-management

systems that distribute electricity around the vehicle. Because the battery pack is the most expensive part of the car, squeezing the same range out of less battery is a competitive advantage; that is what WM's innovative battery-cell configurations are meant to do. Mr Shen says WM holds 1,200 patents, with the most important ones around the car's battery, electric motor and control system. That is because such innovations could be reverse-engineered. The software that manages the battery's thermal properties in a crash, on the other hand, is a complex trade secret.

Mr Shen says he expects the best electric-car companies to start building their own batteries eventually. Those have hitherto been sourced from giant companies like CATL, a Chinese firm which holds a large share of the global electric-vehicle-battery market. Big car companies would never source their engines from third parties; integrating them closely into the design and production process improves overall performance. Mr Shen expects electric cars to be no different.

Beside Nio and Xpeng, WM's stiffest competition in China will come from two foreign firms, Tesla and VW. Tesla's boss, Elon Musk, says the company's Shanghai gigafactory will be making 1,000 cars a week by the end of 2019; they will mostly be its Model 3, which is both its cheapest car and, at 355,800 yuan (\$50,000), still very expensive for the Chinese market. The factory, built in just eight months, is designed to make 500,000 cars a year.

Meanwhile, Volkswagen is refitting one existing Chinese factory and building a brand new factory to produce 600,000 EVs a year. It expects to produce 1m electric cars a year in the country by 2022 and to have manufactured 11.6m electric cars in China by 2028. If those ambitions are fulfilled the firm's EVs will have captured about 5% of the total Chinese car market.

| *Plug me in, beam me up*

All this ambition suggests that there may be a bust on the way, and that the EV startups may suffer badly from it. WM is hoping to turn those particular lemons, grown through overzealous and incontinent state aid, into lemonade. It expects many of its smaller competitors to go bust over the next few years, especially now that the subsidy programme has been stopped. That will free up talented engineers.

A more rationally delivered advantage that the state is providing for WM and others hoping to sell EVs in China is charging infrastructure. This makes buyers more confident. The state also facilitates the roll-out of advanced technical features for the benefit of the public at large. Mr Shen says that WM is planning a pilot with State Grid, China's largest utility, in 2020 whereby the batteries in its customers' cars will be used as grid storage to help balance the flow of electricity in Beijing and Shanghai.

Even if WM fails, China is set to be a large market for EVs long before any other country, and that will benefit the industry as a whole. Because the government demands that all cars sold in China are made with Chinese components, the country will come to host the world's most important supply chains for electric cars. This opens up the possibility that Chinese supply chains will eventually be used to provide components for the rest of world, as with smartphones.

It also suggests that such a strategy could see Chinese EV makers capture a lot of the value from vehicles made elsewhere. Their simplicity, compared with cars powered by internal combustion, makes EVs easier to manufacture in sections. Because there are no cooling fluids to pump around the vehicle, no drivetrain to run through the floor of the cabin, and no engine block poised to crush occupants in the event of a crash, the top and the bottom of the car can easily be separated out and produced independently. The bottom part, which contains the complexity of battery

and power-management electronics, is called the “skateboard”, and embodies the lion’s share of the value of the car.

Mr Shen imagines a scenario in which his firm’s skateboards are shipped around the world to be integrated with bodies and interiors created by other manufacturers that have failed to create their own core EV technology. It would be a complete reversal of the situation today, where Chinese car companies need Western firms to supply the most valuable components. China’s huge market for EVs is creating a supply chain that startups like WM and self-reinventing incumbents like vw will rely on. That may end up being an advantage for the Chinese industry on a global scale. ■



汽车

电动飞跃

中国从没能精通内燃机。电动车会不一样【技术季刊《中国的技术》系列之二】

在温州郊区一家崭新的工厂里，一条粗壮的机械臂吸起一块弧形玻璃板。当一辆车从它旁边的传送带上缓缓经过，它把这块挡风玻璃轻轻嵌进框内，然后回转，把那贪婪的真空吸盘按到下一块玻璃板上。车间里不时乐声大作——《绿袖子》和《咩咩小黑羊》的电子乐片段——表示到了某一组工人的休息时间。

这是创建不久的中国公司“威马汽车”的第一间工厂。在它生产线的尽头，全新的电动SUV以每小时16辆左右的速度问世，是这家工厂最高生产速度的三分之二。尽管目前只产一种车型，这家公司的全球野心已表露无遗。这款车的中文名字意思是“彪悍的马”，它的洋名是一个德语单词Weltmeister，意为“世界冠军”。这个德国名字才是重点。中国电动车行业的高层认为，它有机会做一件中国老一代内燃机汽车制造商一直没能做到的事——拥有全球影响力。

对一家中国汽车公司来说，这是一个相当大的野心。尽管中国现在有能力建造出能主导全球市场的核电厂，其国产内燃机汽车甚至无法主导自家市场。在中国最畅销的车型产自大众和本田，这些车均由本地合资企业生产。究其原因，虽然核反应堆需要极为坚固和精心设计的组件，它们从根本上说就是升级版烧水壶。而汽车——尤其是汽车的发动机——要精巧得多。它的活塞和气门不断跳动；每个气缸中的一次次小型爆炸都分秒不差；通过凸轮轴传递到车轮的扭力大小完全如司机所愿。而拥有这一切的汽车主人只想花尽可能少的时间来维持这一机械奇迹的运作——最好是根本不需要。

在这样一个产业里，再多的技术转移——不论合法与否——都无法把一个国家推至领先地位。正如日本和韩国证明的那样，需要几十年的大量投资、艰苦努力以及精明的领导才能培育出工程技术知识和错综复杂的供应

链，让这样的奇迹成为可能。中国没有这种耐心了。“还得再花20年，投资几十亿美元。可能到了那时候我们才能接近德国人的水平，”威马的创始人沈晖说，“没指望了。”

借助现有的供应链可能会让事情容易些。但是，尽管中国在电子产业拥有这种渠道，在汽车产业却没有。而汽车产业的供应链不仅是贸易链，还是合作链。要制造国人买得起的优质车，不仅需要博世（Bosch）这样的公司出售现成的零部件，还需要它们积极合作来生产恰好合适的部件。如果提供这种合作可能危及与更大、更好的老牌企业的现有业务，那它就不那么容易发生了。

| 自己来吧

像威马这样的中国电动汽车公司认为，既然自己依赖一套完全不同、更电子化的组件，就可以绕过制造内燃机汽车的老企业，在一个新的行业里取得领先，而不是在一个老行业里追赶别人。而且，它们也是中国汽车制造业十分黯淡的前景中唯一的一缕曙光。这个汽车市场的其余部分已经连续16个月萎缩。电动车销售因2019年政府补贴削减而受挫，尽管如此，政府仍希望到2025年电动车占到新车销量的四分之一。目前它们仅占7%。不过，这毕竟是中国，目前这个比例仍然意味着每年150万辆车，令它成为全球最大的电动车市场。

这个市场由那些从内燃机汽车转向电动车的中国老牌企业主宰，但也有一批创业公司。蔚来可能是其中名声最大的，但野心最大的可能当属威马。它拥有并运营旗下所有工厂。尽管本文作者10月份到访时，它自称在2019年只交付了12,600辆车，但也说不久它将在温州拥有年产20万辆车的产能，而在往内陆630公里的湖北黄冈，一座规模稍大些的工厂在建成后每年再生产30万辆车。

这些设施由浙江和湖北省政府免费提供。官员们认为这些工厂为当地带来了工作岗位、声誉和增值税收据（在中国是在汽车出厂时收取）。而如果威马成功了，与之相关的官员将荣誉加身，在党内的地位青云直上。威马两个靠风险资本支持的竞争对手蔚来和小鹏尚未得到过这种程度的慷慨投

资。它们的汽车交由合同制造商生产，相对而言不需要那么多资金，但对整个过程的控制也相应较少。

自己不花一分钱就建成高科技工厂，这让威马有机会实现中国内燃机汽车公司从未取得的成就：研发出具全球竞争力的核心技术。在汽车行业摸爬滚打多年的沈晖说，过去四年，他手下有一千名工程师专门研发电动车。“我可以打包票说，全球最大的汽车公司大众也不会有一千名工程师专门做电动车。”

沈晖专注的重点是电动车的电池组和向汽车各部分输送电力的电力管理系统。因为电池组是汽车最昂贵的组件，用更少的电池跑相同的里程数就成了一种竞争优势。这正是威马创新电池配置的目标。沈晖说，威马有1200项专利，其中最重要的那些涉及电池、电动机和控制系统。这是因为这类创新是能被逆向工程解析的。而在车辆碰撞事故中管理电池热特性的软件本身是复杂的行业机密。

沈晖说，他预期一批最杰出的电动车公司最终会开始自产电池。到目前为止，这些电池都是从宁德时代新能源科技公司这样的大企业采购。这家中国公司在全球电动车电池市场中占据了很大的份额。大型汽车公司永远不会从第三方采购引擎，这是因为把引擎密切融合到设计和生产工序中能够提高汽车的整体性能。沈晖预计电动车也一样。

除蔚来和小鹏外，威马在中国遭遇的最激烈竞争将来自两家外国公司：特斯拉和大众。特斯拉的老板伊隆·马斯克曾表示，到2019年底该公司在上海的超级工厂将每周生产1000辆车，主要是Model 3这款特斯拉最便宜的车型，售价为355,800元——对中国市场而言仍然很贵。这座工厂仅用了八个月时间建成，目标年产50万辆车。

与此同时，大众正在翻新一家中国旧工厂，同时在建一座全新工厂，总共将年产60万辆电动车。它预期到2022年在中国年产100万辆电动车，到2028年，在中国生产出的电动车总数将达到1160万。如果这些雄心壮志得偿所愿，那么该公司的电动车将占据中国整个汽车市场5%左右的份额。

| 充上电，送我上路

所有这些野心都显示出中途折翼的可能性，而电动车创业公司可能遭受重创。威马希望，那些依赖狂热、无节制的国家补助发展起来的公司倒下将是坏事变好事。它预期自己那些较小的竞争对手中有许多会在未来几年里破产，尤其是因为补贴项目已经中止。而这将释放出一批有才华的工程师。

面对威马和其他希望在中国销售电动车的企业，中国政府在一个方面提供了更理性的助力：充电基础设施。这让电动车买家更有信心。政府也在提供便利来促进企业推出能造福普罗大众的先进技术功能。沈晖表示，威马正在规划与中国最大的公用事业公司国家电网在2020年开展一个试点项目，让买家的车内电池被用作电网蓄电池，帮助北京和上海的供电平衡。

即使威马失败了，中国也将远早于其他任何国家成为电动车大型市场，而这将使整个行业受益。中国政府要求在中国销售的所有汽车实现零部件国产化，这将让它成为世界上最重要的电动车供应链的所在地。这就开辟了一种可能性：中国的供应链最终将为世界其他地区提供零部件，就像在智能手机领域那样。

这也表明这种策略可以使中国的电动车制造商从世界其他地方生产的汽车中捕获很多价值。与内燃机驱动的汽车相比，电动车的简洁使它更易于分拆制造。电动车上没有冷却液被泵送至车的各个角落，没有动力传动系统穿过车厢底板，也没有会在撞车时挤压乘客的发动机缸体，所以汽车的顶部和底部可以被轻松分离开来独立生产。包含复杂的电池和电力管理电子元件的底部被叫做“滑板”，它占了汽车价值中最大的一块。

沈晖想象这样一种情景：自己公司生产的滑板被运往世界各地，与其他没能自行创造出核心电动车技术的制造商所生产的车身和内饰整合在一起。这将完全扭转今天的局面——目前中国的汽车公司需要西方企业提供最有价值的组件。中国庞大的电动车市场正在创建一条供应链，威马等创业公司和大众这类自我革新的老企业都将依赖它。这最终可能成为中国电动车产业在全球范围里的一大优势。■



Intellectual property

Laser brain

Chinese inventiveness shows the weakness of the law

AS THE DOTCOM boom was approaching its peak in 1999, Yi Li was working for JDS Uniphase, a Silicon Valley company that made lasers and optical fibres. JDS was a high-flyer, with a market capitalisation five times the value of Apple at that time. Investors loved the firm for its role in building out the infrastructure of the internet. But when boom turned to crash JDS's share price plunged by 99.8%. Employees whose stock options had made them paper millionaires lost it all overnight. "I got killed by the bubble," says Mr Li. "I was too young, too naive. But it was a very good lesson."

The lesson was one that Mr Li would put to good use back in his native China. But even though he went on to make the fortune that he missed out on with JDS, he discovered first-hand the problems that Chinese entrepreneurs face in protecting their inventions in a nation where protections for intellectual property are nascent at best. His tussles to retain control of his inventions typify a big barrier to China's technological advancement.

As he picked himself up, Mr Li asked himself where all the money that had poured into JDS had gone. Had it really just evaporated? He decided that, in fact, the apparent financial destruction of the company was what physicists call a phase change—the stuff was still there, but arranged in different forms. The money that had poured into the manufacture of communications equipment had made that equipment cheap, made the construction of a global internet feasible, and the future growth of internet companies a possibility. He developed a thesis for future success: in the wake of any over-investment there would always be a related opportunity to build upon its ashes in the form of newly cheap supply chains. The

money that had been in JDS had flowed off towards the next generation of internet companies that its infrastructure had enabled: Google, Amazon and eBay.

Next time he saw a bubble, Mr Li was ready. It was 2004 and money had poured into the manufacture of light-emitting diode (LED) bulbs designed to illuminate rooms much more efficiently than incandescent bulbs. The price of the bulb's fundamental component, the blue diode, had crashed. Mr Li saw that as an opportunity to develop a new kind of product: a laser projector that relied on the same supply chain that was pumping out cheap blue LEDs. At the time laser projectors were bulky and expensive because they needed three different types of laser, one to project each of the three additive primary colours of red, blue and green. But only the cost of blue laser components had crashed. Red and green lasers were still expensive.

Mr Li started thinking about how to make a laser projector using just blue light. Most cheap LED bulbs work by shining blue light generated by a semiconductor through a phosphorescent filter that absorbs it and re-emits red and green light in its place, thereby producing white light from the mixture. The same works with a laser but, because its light is so intense—1,000 times brighter than an LED—the phosphor filter burns out immediately. Mr Li came up with a ridiculously simple solution. Instead of keeping the filter static in front of the blue laser light, he set it spinning, a disc of phosphor which, if kept moving, could pump out red and green light, as well as blue, while relying on just a blue laser source. The spinning filter did not burn out, because no single spot was ever subjected to enough light intensity for long enough. Mr Li had found a way to tap the cheap blue-LED supply chain and build a laser projector that was ten times cheaper than the competition.

Once he had his design, Mr Li set up Appotronics in Shenzhen, as close to the LED supply chain as he could get. This cemented his first-mover

advantage. His system for making a fully fledged laser projector out of a single blue diode was simple and easy to reverse-engineer, so he had to rely on patents for protection. If he had tried to keep it a secret and corner the market, competitors would have torn his devices apart and quickly copied them.

The design was a global hit. If you have recently used a cheap, portable projector that throws a surprisingly good image, it is likely to contain Mr Li's design. He estimates that Appotronics is the only Chinese firm that holds a patent that has been cited as "prior art" more than 400 times, a sign that large numbers of companies are using the idea. Apple, the beacon of Silicon Valley innovation, has only a few dozen patents cited so often. A suitably bloodthirsty competitor can license the patent, then use it to develop a better product. But Appotronics' proximity to the Chinese LED supply chains meant it could move much faster than its competitors in building improved new versions of the product.

While China's supply chains have buoyed up his company, its intellectual-property (IP) system has held Mr Li and his firm back. The American government reels off a long list of problems with the Chinese system, such as trade-secret theft, failure to respect intellectual property and failure to license software (a \$6.8bn hole, according to the American government). Mr Li's problem is the cap on compensation for patent breaches. He says it is too low to disincentivise IP theft. This year the cap was raised from 1m to 5m yuan but that is still not very much. "The average payout in the American system is \$2m. In China it's 80,000 yuan (\$11,300)," says Mr Li. "People [in China] are not going to waste money doing patent litigation. You discourage local companies from doing innovation."

| *So sue me*

If Chinese companies do take patent disputes to court, the process often takes years—a lifetime for a young startup. But that is still progress. China

did not have any patent law until 1985. Specialised courts for hearing IP cases were introduced in 2014. An analysis of those courts' performance carried out by Renjun Bian of the law school at University of California, Berkeley, shows that, perhaps surprisingly, they have so far favoured non-Chinese patent holders over domestic ones. Ms Bian found that foreign patent holders were winning more cases, receiving injunctions at higher rates, and being awarded larger damages than domestic ones. Those results are probably a reflection of the legitimate nature of foreigners' grievances—but they are also a sign of the courts' good faith.

China's progress on intellectual property (see chart) is not proving enough for America's trade hawks. But internal pressure from innovators like Mr Li is more likely to create positive change in China's IP system than a trade war is. This presents a conundrum for American policymakers. The best path to a Chinese system which respects and protects intellectual property is for China itself to become more innovative. And yet that very same Chinese innovation, and the more efficient use of resources as a nation that it makes possible, is unsettling to Americans.

The obsessive focus on the handling of IP in China also misses the bigger picture. Access to intellectual property is just one aspect of successful technology development. Mr Li's valuable IP is sensitive because his design is simple and does not require a complex supply chain to produce (though being right next to the LED factories of Shenzhen has certainly been an advantage). His patent portfolio is the biggest edge he has.

In the case of more complex technologies like vehicles, nuclear plants or semiconductors, other factors matter more—relationships with suppliers, access to affordable labour, the know-how to use the IP at all. As the West grapples with China's technological rise, it should remember that it holds great power in these less tangible areas beyond IP, areas from which it is hard to pilfer. ■



知识产权

懒惰的大脑

中国人的创造力反映出法律的不足【技术季刊《中国的技术》系列之三】

互联网热潮在1999年接近顶点时，李屹正在硅谷的捷迪讯光电（JDS Uniphase）任职。这家制造激光和光纤的公司表现杰出，当时的市值是苹果公司的五倍。投资者追捧它在构建互联网基础设施上的作用。但是，互联网泡沫破裂时，捷迪讯的股价暴跌了99.8%。持有公司股权的员工本已成为纸上百万富翁，却在一夜之间化为乌有。“我被泡沫杀死了，”李屹说，“我那会儿太年轻，太天真。但它是个很好的教训。”

这个教训日后会在李屹回到祖国后派上用场。但是，即便接下来他把在捷迪讯错过的财富赚了回来，他亲身体会了一个困境——在这个知识产权保护顶多还只是新生事物的国家，创业者难以保护自己的发明。他要费劲维持对自己的发明的控制权，这显现出中国技术进步存在的一大障碍。

重新打起精神后，李屹问自己，那些投入到捷迪讯里的钱都去哪了？真的就人间蒸发了？他得出一个结论：这家公司表面上的财务崩溃实际上是物理学家口中的“相变”——物质仍然存在，但改变了排列的形式。投入到通信设备制造中的资金让相关设备变便宜，令全球互联网的建设切实可行，也令互联网公司未来的成长成为可能。他提出了一个促成他日后取得成功的论断：在任何过度投资之后，在灰烬之上总会以新的廉价供应链形式产生一个相关联的机遇。捷迪讯的钱已经流向了它创造的基础设施催生的下一代互联网公司：谷歌、亚马逊和eBay。

下一次再遇见泡沫时，李屹已经准备好了。那是在2004年，大量资金已经投入到LED这种照明效率远高于白炽灯的灯泡的生产中。其基本元件蓝色二极管的价格暴跌。李屹认为这是开发新产品的好机会：和廉价的蓝色LED分享同一条供应链的激光投影仪。当时激光投影仪笨重又昂贵，因为它们需要三种不同的激光，分别投射红、蓝、绿三基色。但只有蓝色激光元件的成本大跌，红绿激光仍然很贵。

李屹开始思考如何仅仅用蓝光制造激光投影仪。大部分便宜的LED灯泡的工作原理都是在荧光滤光片前点亮半导体产生的蓝光，让滤光片吸收蓝光而重新发射红光和绿光，由此混合光线产生白光。激光也一样，但它的光强度太大（比LED亮1000倍），荧光滤光片会立即熔毁。李屹想出了一个简单到好笑的解决方案。滤光片不能静止在蓝色激光前，而是要旋转起来。这个磷光碟持续旋转，可以输出红、绿光以及蓝光，但仅仅依靠蓝色激光源。旋转的滤光片不会烧毁，因为它上面没有哪一个点被长时间照射了强光。就这样，他找到了一种方法来利用廉价的蓝光LED供应链，制造出比竞争对手要价便宜十倍的激光投影仪。

一旦设计成型，李屹便在深圳创建了光峰光电技术公司。这是尽可能靠近LED供应链的地点，这巩固了他的先发优势。他这个用单个蓝色二极管制成完备的激光投影仪的系统非常简单，容易被逆向工程破解，因此他必须依靠专利来加以保护。如果他试图对其保密并垄断市场，那么竞争对手必定已经拆开了他的设备，迅速地复制了它们。

这项设计风靡全球。如果你最近使用过一台价格便宜的便携式投影仪，其影像出奇的好，那么它很可能包含了李屹的设计。他估计光峰光电是唯一一家有一项专利被引述为“现有技术”超过400次的中国公司，这表明大批公司在使用这个创意。硅谷的创新灯塔苹果也只有几十项专利被如此频繁引用。如你所料，那些凶狠的竞争对手可以取得专利许可，再用它研发出更好的产品。但光峰光电毗邻中国的LED供应链，这让它能以比竞争对手快得多的速度开发出产品的升级版。

尽管中国的供应链撑起了李屹的公司，它的知识产权体系却又拖了他和公司的后腿。美国政府罗列了中国该体系的一堆问题，比如窃取商业机密、不尊重知识产权、未经许可使用软件（据美国政府称这一漏洞达68亿美元）。李屹的困境是专利侵权赔偿的上限。他说这个上限太低，不足以遏制知识产权盗窃。今年，这个上限从100万元提高到了500万元，但仍不算多。“在美国的体系中赔偿的平均数目为200万美元。在中国是8万元人民币，”李屹说，“[在中国]人们不会在专利诉讼上浪费钱。这打击了地方企业创新的积极性。”

如果中国企业真的把专利纠纷告上法庭，这个过程通常要花好几年，这对于年轻的创业公司而言简直就是一辈子。但这仍然是一种进步。中国在1985年以前还没有任何专利法。到了2014年才有了专门审理知识产权案件的法院。加州大学伯克利分校法学院的边仁君分析了这些法院的办理情况，结果发现——也许颇令人惊讶——到目前为止它们的裁决更有利于非中国专利持有人，而不是国内专利持有人。边仁君发现，外国专利持有人赢得了更多案子，获得禁制令的比例更高，获得的损失赔偿更多。这些结果可能反映出外国人提出申诉确有其道理，但同时也显现出法院的诚意。

对美国的贸易鹰派来说，中国在知识产权方面取得的进步（见图表）还不够。但是，与贸易战相比，来自李屹等创新者的内部压力更可能给中国的知识产权体系带来积极的变化。一个两难困境呈现在美国的政策制定者面前。在中国建立起尊重和保护知识产权的制度的最佳途径是中国本身变得更具创新力。但中国的这种创新，以及使之成为可能的国家对资源的更高效利用，却让美国人感到不安。

执着于中国如何处理知识产权也没能看到大局。获得知识产权只是技术实现成功发展的一个方面。李屹宝贵的知识产权很敏感，因为他的设计很简单，不需要复杂的供应链即可生产（尽管紧邻深圳的LED工厂无疑是一个优势）。他的专利组合是他最大的优势。

而在汽车、核电站或半导体这类更复杂的技术中，其他因素更为重要：与供应商的关系，价格合理的劳动力供应，甚至是使用知识产权本身所需的技能。在西方世界努力应对中国的技术崛起之时，它应该记住，中国在知识产权以外那些更无形的领域里拥有强大的能力，而这些领域你很难窃取什么。■



Innovation

A sea change

Governments are steering their economies with a lighter touch

FOR AN OPERATION that originated in Singapore, it was improbably grim and bloody. In November Jack and 49 others boarded a transport aeroplane and parachuted onto an island. Their mission was simple: kill or be killed. Jack picked up grenades and worked his way to an abandoned factory. He crouched for safety, thinking he had escaped detection. He was wrong. After a hail of bullets, silence descended. Jack had once again failed to pass level one.

Welcome to Free Fire, one of last year's most downloaded fighting games for phones. Its developer is Sea Group, an internet company founded in Singapore a decade ago, now worth \$17bn. As well as its hit game, the group also has an e-commerce app, Shopee, which is far more popular in South-East Asia than Amazon. Its success reflects an important shift in the tigers' economies.

During their boom years, many of their biggest companies were outgrowths of government policy. South Korea's *chaebol* were showered with cheap credit and tax breaks. Taiwan's semiconductor champions were spin-offs from an official research institution. Hong Kong's tycoons cultivated close ties with officials and benefited from its land policies. Singapore's biggest firms were ultimately owned by the state.

Sea represents something else. Its success has few direct links to government policy. Singapore's technocrats, the authors of many detailed economic blueprints, presumably never dreamt of a multiplayer fighting game that includes such characters as a beauty queen turned arms dealer. Lee Kuan Yew would have been unamused. Officials today are grateful.

Industrial policy was a big factor in the tigers' take-off. Even the International Monetary Fund, traditionally a sceptic, published a lengthy paper last year about the success of their government-led models. But what works for a developing country does not necessarily help a wealthy one. In the 1970s, the tigers could follow others. South Korea's focus on heavy industry borrowed liberally from Japan. They could also license advanced technology, as Taiwan did in its semiconductor sector. And they could poach researchers.

| *Progress won't drive itself*

Now the challenge is different. When officials and entrepreneurs look ahead, they see only the mists of the future. It might sound clever to develop national strategies for artificial intelligence or quantum computing. But how? There is no technology to copy because it has not been created yet. Genuine innovations are inherently difficult to spot in advance. So the game is more about creating the right conditions for companies to press ahead and to seize on breakthroughs when they arrive.

The tigers' plans these days can sometimes sound like old-fashioned industrial policies. President Tsai Ing-wen in Taiwan has her "5+2 Innovative Industries Plan", eyeing sectors such as green energy and smart machinery. Singapore has its 23 Industry Transformation Maps, covering everything from food manufacturing to aerospace. South Korea aims to invest 30trn won (more than \$25bn) over five years in eight emerging industries, from artificial intelligence to autonomous vehicles.

But look a little more closely, and the difference with the schemes of yesteryear becomes clear. These are not top-down exercises in planning but rather the outcome of deliberations with companies and experts. And the point is not to recommend subsidies for this or that sector but rather to work out what building blocks are needed. "The process of developing the plan was just as important as the final product," says Gabriel Lim,

permanent secretary of Singapore's Ministry of Trade and Industry.

Some of the elements are obvious: good infrastructure, from ports to internet; openness to trade; highly educated workforces; and high spending on research and development (see chart). But the tigers also have innovative ways to promote innovation.

Taiwan has one of the world's most robust frameworks to encourage lending to small- and medium-sized enterprises (SMEs), the kinds of firms that have ideas but few resources. It combines a centralised information-sharing system about company performance with a menu of credit guarantees, giving banks more confidence. "When I explain our system to bankers in other countries, you can see them salivate," says Lee Chang-Ken, president of Cathay Financial Holdings, Taiwan's largest financial group. Loans to SMEs now account for 64% of bank loans to private enterprises in Taiwan, up from 41% in 2005. Singapore has created a large demonstration factory that gives SMEs access to state-of-the-art 3D printing and robotic equipment. Similar facilities exist in Hong Kong. If an entrepreneur has a brilliant idea, they no longer need a giant dollop of capital to bring it to life.

Nevertheless, the tigers' officials also know their limits. The big decisions these days are made in corporate boardrooms: Samsung's bet on foldable screens; TSMC's huge investment in capacity in Taiwan; the rise of startups like Sea in Singapore; the Hong Kong Stock Exchange's quest to remain Asia's premier financial market (even if its bid for the London Stock Exchange was ill-fated). Economic technocrats now lead from behind.

The tigers have also started to concentrate on the parts of their economies that remain far behind the technological frontier. Despite their flair for manufacturing, their service-sector productivity is little more than half that of America, according to some estimates. Part of the reason is the tyranny of small markets: a retail chain in a country of 6m people is more

constrained than one in a market of, say, 1.3bn. But partly it is self-inflicted. South Korea imposes high regulatory barriers on its service and network industries—higher than in any other OECD member except Belgium.

Singapore has been the boldest in trying to whip its service sector into shape, from its restaurants to its construction firms. It has refined its gauges for measuring productivity (for example, floor area completed by a construction worker each day). It identifies promising companies and offers help: developing new business plans, say, or guiding them abroad to expand. Edward Robinson, chief economist of the Monetary Authority of Singapore, believes that rich Asian countries ought to have an advantage in modernising their service sectors. Given that so many of their people are trained for high-tech work, they are well-placed to deploy digital tools to serve the population more efficiently.

| *Not keeping up*

In Hwaseong, 35km south of Seoul, a newly built village enjoys 5G network speeds that would be the envy of any city. Visitors will find other essential amenities, such as a school, a car wash and a restaurant offering chicken's feet. But lest it sound too appealing, be warned: the buildings are all fakes. The counterfeit town, built by the Korean Automobile Testing and Research Institute, is used to test autonomous vehicles, like the Kia car that successfully completed a circuit one recent afternoon. Reaching speeds of almost 70kph, the car coped with flashes of dazzling sunlight and road-markings that can confuse computer vision. The technician in the driver's seat kept his hands on his chest as the wheel turned itself.

South Korea has some of the best infrastructure in the world for autonomous vehicles, including world-class chipmakers and carmakers, as well as a growing 5G network. The government is supportive, permitting tests on real roads for vehicles that prove themselves at test sites. Why then is South Korea ranked only 13th by KPMG, a consultancy, on a list of

countries best prepared for autonomous vehicles?

One reason is the country's ambivalence towards other related technologies, such as ride-sharing apps. A popular version, Kakao Mobility, was vociferously opposed at rallies in Seoul by the drivers of traditional taxis. In protest at the emergence of such apps, four older drivers have set themselves on fire.

Innovation, though glorified by businessmen and policymakers, adds nothing to an economy's productivity until it is widely adopted. As Paul David of Stanford University long ago pointed out, it was not until the 1920s, four decades after Thomas Edison's first power station, that manufacturers embraced a killer app for electricity, designing factories to accommodate dynamo-powered assembly lines.

South Korea's wariness towards ride-sharing apps highlights the infrastructure in which the tigers are most lacking: well-functioning social-security systems. The key to progress in a new technology, like autonomous vehicles, may not be a better 5G network but a better pension system. Without a cushion for those left behind by technological progress, it is harder to marshal support for that progress in the first place.

The tigers have always been good at mobilising resources quickly. They are becoming better at allocating them creatively. But as recent signs of social discontent attest, some of them now struggle to muster public support effectively. ■



创新 巨变

政府在驾驭经济时动作放轻【专题报道《亚洲四小龙》系列之二】

对于一次从新加坡发起的行动来说，它严酷而血腥得令人难以置信。去年11月，杰克和其他49人登上一架运输机，跳伞降落到了一个岛屿上。他们的任务很简单：杀人或被杀。杰克拿起手榴弹，艰难地挪移到了一家废弃的工厂。他蹲下身子寻求庇护，以为自己没被发现。他错了。一阵弹雨扫来，接着是死一般的沉寂。杰克又没能通过第一关。

欢迎来到“我要活下去”（Free Fire）——去年全球下载最多的战斗类手游之一。它的开发者是Sea集团（Sea Group），这家十年前在新加坡成立的互联网公司目前市值已达170亿美元。除了热门游戏外，该集团旗下还有一款电子商务应用“虾皮购物”（Shopee），在东南亚的普及程度远远超过亚马逊。这家公司的成功反映出四小龙经济的一种重要转变。

在四小龙腾飞的年代，它们的许多大公司都是政府政策的产物。韩国的财团（*chaebol*）享受大量廉价信贷和税收减免。台湾的半导体行业领军企业都是从一家官方研究机构衍生出来的。香港的大亨积极打造与官员的密切关系，从当地的土地政策中受益。新加坡最大的那些企业归根结底都属国有。

Sea集团却体现出一些别的东西。它的成功与政府政策没什么直接关联。新加坡的技术官僚们谱写了许多精细的经济蓝图，但他们应该从来没有幻想过一款多玩家战斗游戏——其中还有从选美皇后变成军火商这样的角色。李光耀是不会喜欢这种路数的。今天的官员却心怀感激。

产业政策是促成四小龙腾飞的重要因素。就连过去一直持怀疑态度的国际货币基金组织去年也发表了一篇长论文，探讨其政府主导模式取得的成功。但是，对发展中国家有效的方法不一定能帮到富裕国家。在1970年代，四小龙可以效仿其他国家。韩国大力发展重工业就大量借鉴了日本。

它们还可以拿到先进技术授权，比如台湾在半导体行业的历程。它们也可以挖走科研人才。

| 进步无法“自动驾驶”

当前的挑战不同以往。当官员和企业家放眼前路时，只看到未来的迷雾。为人工智能或量子计算制订国家战略听起来似乎很聪明，但具体怎么做呢？没有什么技术可拿来复制，因为它们还没有被创造出来。真正的创新本身很难被预先识别。因此，这场挑战更多的是要为企业创造适宜的条件来推动它们前行，以及在突破到来之时抓住机遇。

四小龙今天的计划有时听起来可能像老一套产业政策。在台湾，蔡英文政府推出了“五加二”产业创新计划，着眼于绿色能源和智能机械等领域。新加坡的产业转型蓝图涵盖从食品制造到航空航天等23个领域。韩国计划在五年内向人工智能、无人驾驶汽车等八个新兴产业总共投资30万亿韩元（超过250亿美元）。

但稍微靠近观察，你就会发现它们与过去那些方案的差异。它们不是自上而下的规划，而是与企业 and 专家商议的成果。其重点也不是建议给这个或那个部门补贴，而是要弄清楚需要哪些模块。新加坡贸易和工业部常任秘书长加布里埃尔·林（Gabriel Lim）说：“制定计划的过程与最终方案同样重要。”

有些要素显而易见：从港口到互联网的良好基础设施；贸易开放；受过高等教育的劳动力队伍；高昂的研发支出（见图表）。但四小龙也有创新的方式来促进创新。

台湾鼓励对中小企业放贷的强健架构在全球数一数二，这些企业有想法但缺乏资源。这个架构把一个公布企业经营业绩的集中式信息共享系统和一个信用担保列表结合起来，给予银行更多信心。“当我向其他国家的银行官员解释我们的系统时，他们非常羡慕。”台湾最大的金融集团国泰金融控股（Cathay Financial Holdings）的总裁李长庚说。中小企业贷款目前占台湾银行向私营企业放贷的64%，2005年为41%。新加坡建立了一个大

型示范工厂，让中小企业可以使用最先进的3D打印和机器人设备。香港也有类似的设施。如果企业家想到一个绝妙的创意，他们不再需要手握巨大的资本才能实现它。

但四小龙的官员们也明白自身局限性。如今，重大决策都是在公司董事会里做出的：三星押注可折叠屏幕；台积电大力投资台湾产能；像新加坡的Sea集团这样的创业公司兴起；香港证交所寻求保住亚洲第一金融市场的地位（即使它对伦敦证交所的收购要约夭折了）。经济技术官僚如今是从幕后领导。

四小龙也开始专注于其经济中远远落后于技术前沿的部分。据一些估计，尽管它们在制造业上天赋突出，服务业的生产率却仅略高于美国的一半。部分原因是“小市场的暴政”：在一个六百万人口的国家经营一家零售连锁店比在一个13亿人口的市场更受限。但还有部分原因是自我加害的。韩国对其服务和网络产业设置了很高的监管壁垒——比除比利时外的所有经合组织成员国都高。

从餐馆到建筑公司，新加坡以最果敢的姿态努力打造服务业。它完善了衡量生产率的标准（例如，一名建筑工人每天完成的建筑面积）。它鉴别有前途的企业并为其提供帮助，比如制定新的业务计划或引导它们在海外扩张。新加坡金融管理局首席经济学家爱德华·罗宾逊（Edward Robinson）认为，亚洲富裕国家在服务业的现代化方面应该有其优势。当地有这么多人接受了高科技工作所需的教育和培训，这些国家已完全准备好部署数字工具来更高效地服务民众。

| 跟不上

在首尔以南35公里处的华城，一个新建的村庄享有的高速5G网络会让任何城市欣羡。访客还会发现其他便利设施，比如一间学校、一个洗车场和一家卖鸡爪的餐厅。但也别太动心了——这些建筑物都是假的。由韩国汽车测试研究所（Korean Automobile Testing and Research Institute）建造的这座虚假的小镇是用来测试无人驾驶汽车的。近来某个下午，一辆起亚汽车就在这里成功完成了一次环行。它达到了近70公里的时速，经受住了刺

眼的阳光，“看懂”了可能令计算机视觉困惑的路标。坐在驾驶座上的技术人员双手一直环抱胸前，任方向盘自行转动。

韩国拥有世界上最杰出的一些无人驾驶基础设施，包括世界一流的芯片制造商和汽车制造商，以及不断发展的5G网络。政府很支持该产业，让研发人员在真实道路上测试已经在测试场上过关的车辆。那么，在咨询公司毕马威对无人驾驶成熟度的全球排名中，韩国为何只排在第13位？

一个原因是该国对其他相关技术的矛盾态度，比如共乘应用。在传统出租车司机于首尔举行的集会上，广受欢迎的应用Kakao Mobility遭到了强烈抵制。四名年长司机自焚以表达对这类应用的抗议。

商人和政策制定者赞美创新，但在一项创新被广泛采用之前，它对一个经济体的生产率并无贡献。正如斯坦福大学的保罗·戴维（Paul David）很久前指出的那样，直到1920年代，也就是爱迪生创建世界第一座发电站的40年后，制造商才采纳了电力的杀手级应用，设计工厂来部署发电机供电的装配线。

韩国对共乘应用的谨慎态度凸显了四小龙最欠缺的基础设施：运转良好的社会保障系统。发展无人驾驶汽车等新技术的关键可能并非更好的5G网络，而是更好的养老金系统。如果不为那些被技术进步抛在后头的人们提供缓冲保护，那一开始就更难为这种进步集结支持。

四小龙一向善于迅速调动资源。现在他们在分配资源上正变得更有创造力。但最近一些社会不满的迹象显示，它们中有一些现在难以有效地争取公众支持。■



Data

A new trinity

Success at AI has relied on good data and cheap labour

CHINA IS THE land of face recognition. Cameras able to extract face prints from passers-by are common in the streets of large cities like Guangzhou and Shenzhen. Boxy vending machines at airports offer to let you pay for a cup of orange juice, robot-squeezed for perfect freshness, by scanning your face. From December 1st all people applying for an account with one of China's telecoms companies such as China Mobile must have their face scanned. Previous regulations required proof of identity, but the possession of users' face prints will let firms verify identities in real-time via smartphone cameras.

Considering the oppressive purposes to which this technology is being put—most notably in the Muslim-majority areas of north-west China—it would not be appropriate to call China's rapid adoption of it anything more than a technical success. The underappreciated fact that companies leaping ahead in the field are more reliant on cleverly deployed cheap labour for their progress than on any technological edge, suggests another reason for caution before declaring a Chinese victory in the tech wars. But understanding how China has got face recognition to flourish is nonetheless instructive. Two of the world's most valuable startups, Megvii and SenseTime, worth \$4bn and \$7.5bn respectively, are Chinese AI companies specialising in the field. Their application of it alone would make it one of the most widely deployed forms of artificial intelligence in the world.

Like most companies deploying intelligent software, Megvii and SenseTime rely on a technique called machine learning. They do not ask their human coders to program computers with rules that distinguish between one face

and another. Instead the coders provide the computer with masses of data about faces, usually photographs, and write software which trawls through those photos looking for patterns which can be used reliably to tell one unique face from another. The patterns picked up by that learning software make better rules for recognising faces than anything a human coder could describe explicitly. Humans are good at recognising faces but, with the right software, computers can learn to be much better. Face-recognition software is much easier and cheaper to deploy than human recognisers. It just needs software, powerful computers and data—the new trinity of AI.

It is in the third of those categories, people will warn you, that China's great advantage lies. It has loads of data. But its advantage is subtler than that. Data alone are not much use for building AI software. They must first be labelled. This means that the data set must be endowed with the contextual information that computers need in order to learn statistical associations between components of that data set and their meaning to human beings.

To learn to differentiate between cats and dogs, a computer is first shown pictures in which each animal is correctly labelled. To learn to distinguish between one person's face and another, a computer must first be shown what a face is, using labelled data, and then how to tell the difference between cheekbones and brows, again via human labelling. Only with enough labelled instructions will it be able to start recognising faces without human help.

Underpinning companies like Megvii and SenseTime is a sprawling digital infrastructure through which data are collected, cleaned and labelled before being processed into the machine-learning software that makes face recognition tick. Just as Apple adds its brand to phones mostly assembled by cheap Chinese labour, so too the Chinese AI companies design and brand AI software and services which sit atop a data supply chain using cheap labour at Chinese data factories no one has ever heard of. Megvii has

spent 218m yuan (\$31m) on labelled data in the past three and a half years, according to its IPO prospectus. Many of the algorithms used contain little that is not available to any computer-science graduate student on Earth. Without China's data-labelling infrastructure, which is without peer, they would be nowhere.

Charles Liu is the founder of one of China's largest data factories, known in English by the initials MBH. He employs 300,000 data labellers across China's poorest provinces. Each labeller works a six-hour shift each day, tagging a stream of faces, medical imagery and cityscapes. MBH pushes a stream of data to them as if on a digital conveyor belt, and they churn through it, creating the syllabus from which machines learn. They can turn it off to take a bathroom break, but that is the extent of their control. They do not choose which data to label but have them chosen for them.

Mr Liu claims that MBH's trick is not just numbers, but the methods the firm uses to distribute labelling work efficiently to its workers. This is done using the same kind of machine-learning systems that Amazon, an American e-commerce giant, uses to recommend products to its customers. Instead of suggesting stuff to shoppers, MBH assigns labelling tasks to workers. First, it gathers data from its workers as they carry out labelling jobs. Mr Liu says the company records its workers' gaze, mouse movements and keyboard strokes. It also takes note of what sort of data-labelling task the worker is performing, from medical-imagery labelling to text translation. By measuring performance according to the type of task, he says, he is able to find workers who are better at some tasks than others, and steer those tasks to those workers.

All of this happens automatically as MBH's customers feed tasks into the company. At its most finely tuned, Mr Liu says these systems let his army of workers classify data almost in real time. In work for TikTok, a popular short-form video app owned by ByteDance, a company based in Beijing, he

says MBH's data labellers handle imagery which TikTok's automated system cannot be sure is not pornographic. MBH shows the putative porn to hundreds or thousands of human workers who, like Justice Potter Stewart, know it when they see it. The company then returns their aggregated answer to TikTok in less than a second.

| *AI arbitrage*

For their efforts, MBH's workers are paid an average salary of 3,000 yuan (\$425) per month, three times more than the average worker in China's poorest regions. Mr Liu can deploy wage arbitrage between the richest and poorest places, using the internet. In many ways MBH's business works like Uber, a ride-hailing firm, as a crowdsourcing platform connecting supply of labour with demand. But the minimum wage that Uber can reasonably expect its drivers to take home is constrained by geography, as its drivers must live within a few hours of their markets. This restricts them to urban areas with high living costs, putting a lower bound on even the stingiest wage. Mr Liu suffers no such constraints. Workers from areas in which 3,000 yuan per month is a fine wage can happily label data for AI companies in Shenzhen, where it is not.

Many provincial governments are keen to get Mr Liu to open a data factory in their region and offer much-needed jobs. For every 5,000 workers MBH employs in a given month, local governments pay the firm 50,000 yuan. Across all 300,000 workers that adds up to 3m yuan (\$425,000) in government money every month.

Mr Liu says that his firm sees fewer and fewer face-recognition labelling tasks these days compared with the boom of 2017. Increasingly common now are labelling requests for medical imagery from which software can learn to diagnose disease. There are also endless streetscapes which, once labelled, can teach autonomous cars about the cities they must navigate. Those are more difficult labelling tasks. Whereas every human knows what

a face looks like, not everyone understands what a tumour looks like in an X-ray. Labelling such conditions requires specialist knowledge, and means that MBH must pay its labellers more money. Still, those labelling requests are indicative of the kinds of AI service that may reach widespread adoption in China in a few years' time. Mr Liu says he will expand his workforce by 50% next year.

Without this data-labelling infrastructure, China's AI services would not have taken off. Labelling services like MBH are what have allowed Alibaba to create a powerful machine-learning service like Taobao's image-based product search. An Alibaba shopper can take a photo of an item in a shop window and immediately be steered to a page where they can purchase it. Alibaba processes a billion images like this a day. It also relies on labelled data for the machine-learning algorithms that are used in its retail stores, which operate under the brand Hema. Cameras installed throughout the glitzy new supermarkets track shoppers around the store and identify the products they take off the shelves.

Masses of labelled data don't just make for powerful machine-learning software. By studying the inner workings of the software, microprocessor architects can concoct powerful new chips designed specifically to run machine-learning tasks. China's digital infrastructure has produced some of the world's most powerful such systems. Now those systems are producing, in turn, AI chips that are competitive with the best Silicon Valley has to offer. ■



数据

新三合一

人工智能的成功倚赖优良的数据和廉价的劳动力【技术季刊《中国的技术》系列之四】

中国是人脸识别之国。在广州和深圳等大城市的街道上，能够从路人身上提取面部图像的摄像头随处可见。在机场四四方方的自动售货机前，你可以扫描面部来购买一杯机器人现榨的绝对新鲜的橙汁。从去年12月1日起，所有向中国移动等中国的电信公司申请帐户的人都必须提交面部扫描。以前的规定要求提供身份证明，而拥有用户的面部照片将使公司能够通过智能手机的摄像头实时验证身份。

考虑到这项技术的压制性用途（尤其是在中国西北部穆斯林占多数的地区），中国对它的迅速推广最多只能说是一项技术上的成功。人们不大注意到的一个事实是，这个领域里的领头羊的发展更依赖于巧妙部署的廉价劳动力而不是任何技术优势。这是要在宣布中国赢得技术战争时要谨慎的另一个原因。但尽管如此，了解中国如何让人脸识别蓬勃发展大有裨益。全球估值最高的两家创业公司——旷视科技和商汤科技——都是专注于这一领域的中国人工智能公司，分别价值40亿美元和75亿美元。仅凭它们的应用就将让人脸识别成为世界上部署最广泛的人工智能形式之一。

像大多数部署智能软件的公司一样，旷视和商汤依靠一种被称为“机器学习”的技术。它不要求人类程序员把区分一张脸和另一张脸的规则写进计算机程序。相反，程序员会向计算机提供有关人脸的大量数据（通常是照片），并编写软件来读取这些照片，以寻找能够可靠地将每一张独特的脸区分开来的模式。机器学习软件获得的模式比人类程序员能够明确描述的任何规则都能更好地识别人脸。人类很善于识别人脸，但使用了正确的软件的计算机可以通过学习而远胜于人类。相比人类识别者，人脸识别软件的部署要容易得多也便宜得多。它只需要软件、功能强大的计算机，以及数据——这就是人工智能的新三合一。

人们会提醒你，中国的最大优势在于这第三项。中国拥有大量数据。但它的优势比这更精细。单凭数据本身对于构建人工智能软件来说派不上多大用场。必须先给它们做上标记。也就是说数据集必须具有计算机所需的上下文信息，才能了解该数据集的成分之间的统计关联，以及它对人类的意义。

为了学会区分猫和狗，首先要给计算机看正确标注了每只动物的图片。为了学会区分一个人和另一个人的脸，必须首先使用标注好的数据向计算机展示是什么脸，然后是颧骨和眉毛有什么差异——同样靠人工标注。只有有了足够多的做好标记的指示，它才能在没有人工帮助的情况下开始识别人脸。

支持旷视和商汤等公司的是一个庞大的数字基础架构。通过它，数据被收集、清理和标注，然后再处理成可以快速识别人脸的机器学习软件。就像苹果公司给主要由廉价的中国劳动力组装的手机打上品牌那样，中国的人工智能公司设计人工智能软件和服务并创建品牌。它们位于一个数据供应链的顶部——这个供应链在默默无闻的中国数据工厂中使用廉价劳动力。从招股说明书来看，旷视在过去三年半中在已标注数据上花费了2.18亿元人民币。它们使用的许多算法中并没有多少内容是地球上随便哪个计算机科学研究生拿不到的。没有中国无与伦比的数据标注基础设施，这些数据成不了气候。

刘端阳是中国最大的数据工厂莫比嗨客的创始人之一。他在中国最贫穷的省份雇用了30万数据标注人员。每名标注员每天工作六小时，为一连串人脸、医学图像和城市景观做标注。莫比嗨客把数据流推给他们，就好像有一条数字传送带一样。然后他们处理数据，为机器学习创建课程提纲。他们可以把它关掉去上个洗手间，但也仅此而已了。他们不能选择要标注的数据，数据已经为他们做出了选择。

刘端阳称，莫比嗨客的诀窍不仅在于数字，还在于该公司向工人高效分配标注工作的方法。它的做法和美国电子商务巨头亚马逊向客户推荐产品的机器学习系统类似，只不过它不是向购物者推荐商品，而是将标注任务分

配给工人。首先，它会在员工执行标注工作时收集数据。刘端阳说，公司记录了工人的目光、鼠标移动和键盘击键。它也记录下工人正在执行哪种数据标注任务，是医学图像标注还是文本翻译等等。他说，通过根据任务类型衡量绩效，就能够找到在某些任务上尤为娴熟的工人，并将这些任务分给那些工人。

当莫比嗨客的客户向这家公司提供任务时，所有这些都会自动发生。刘端阳说，经过最精细的调整，这些系统使他的员工队伍几乎可以实时对数据进行分类。在为总部位于北京的字节跳动公司的流行短视频应用“抖音”工作时，他说自己的数据标注员们处理抖音的自动化系统无法判定是否为色情的图像。莫比嗨客向数百或数千名人类员工推送这些可能属于色情的图片，而他们就像波特·斯图尔特大法官一样，在看到时就知道它是不是色情。然后，公司会在不到一秒钟的时间内将汇总的答案返回给抖音。

| 人工智能套利

莫比嗨客的工人每月平均工资为人民币3000元，是中国最贫困地区人均工资的三倍。刘端阳可以使用互联网在最富有和最贫穷的地区之间进行工资套利。莫比嗨客的业务在许多方面都与网约车公司优步相似——它是将劳动力供需联系在一起的众包平台。但是，优步可以合理预期其司机拿到手的最低工资受到地理位置的限制，因为司机必须居住在距离市场几个小时以内的地方。这将他们限制在生活成本高的城市地区，公司再吝啬也有个下限。刘端阳则没有任何此类限制。来自那些月薪3000元已算很不错的地区的工人会很高兴地为位于深圳的人工智能公司标注数据，而在深圳这点工资就行不通了。

许多省政府都渴望让刘端阳在其辖区开设数据工厂，提供人们急需的工作。在每个月里，地方政府都会向莫比嗨客支付每5千名本地工人5万元人民币的资助。公司共雇有30万名工人，所以每个月的政府资助就达300万元人民币。

刘端阳说，与2017年顶峰时期相比，如今公司接到的人脸识别标注的任务越来越少。现在越来越多的是对医学图像的标注请求，让软件从中学学习如

何诊断疾病。还有无穷无尽的街景，一旦标注好，就可以让无人驾驶汽车了解它们将要驶过的城市。这些标注任务难度更大。每个人都知道脸是什么样，但并不是每个人都知道X光片上的肿瘤是什么样。标注这些疾病需要专业知识，这意味着莫比嗨客必须向标注员支付更高的酬劳。尽管如此，这些标注要求表明了几年后中国可能会广泛采用什么样的人工智能服务。刘端阳表示，明年他将把员工队伍扩大50%。

没有这种数据标注基础设施，中国的人工智能服务就无法起飞。像莫比嗨客这样的标注服务使阿里巴巴能够创建强大的机器学习服务，例如淘宝基于图像的产品搜索。阿里巴巴的购物者可以在实体商店里拍下某件商品的照片，然后立即被导向可以买到它的淘宝页面。阿里巴巴每天处理十亿张这样的图像。它还依赖已标注数据来实现在其盒马品牌零售商店中部署的机器学习算法。在这些时尚的新超市中安装的摄像头可以跟踪商店中的购物者，并识别他们从货架上拿走的商品。

大量已标注数据不仅仅支撑起了功能强大的机器学习软件。通过研究这些软件的内部工作原理，微处理器架构师们可以炮制出功能强大的新芯片，专门用于运行机器学习任务。中国的数字基础设施已经催生了一些位列世界最强大的机器学习系统。现在，这些系统又在生成能与硅谷最好的产品竞争的人工智能芯片。 ■



The future

Of coupling and decoupling

Technological development could still lead to fireworks

CHINA'S TECHNOLOGICAL rise, brought about by an authoritarian state actively guiding a market-oriented industrial base with access to global supply lines, is unlike anything in history. That does not necessarily make it unstoppable, or world-beating. But the possibility that it will provide a definitive edge in technologies vital to 21st-century success makes the West anxious.

America, in particular, is unsettled by the prospect of Chinese technological capabilities that might erode its geopolitical dominance. Behind their legitimate concerns that China has stolen IP and that some of its companies cheat, American politicians worry that China's approach to technological development can produce results which America's mostly market-led model cannot.

It is true that China has shown that a determined state can do much to accelerate the appropriation, diffusion, development and large-scale implementation of new technology and technology from elsewhere. It is also true that the processes by which it does so can be damaging—the state can misallocate resources, follow foolish fashions, refuse to accept that it is barking up the wrong tree. Patronage lends itself to corruption. China shows all these failings and more.

At the same time, alignment between the state and the companies that develop and build technologies is important not just because it allocates, or misallocates, funding. The state may call on technology to answer questions that the market, left to itself, would not. In China the alignment between government policy and corporate technology development can be

seen in the shift towards electric vehicles, largely to cut air pollution. Government-led invention has a strong history in America, too. The network which became the internet was developed to test new approaches to military communication. But it has fallen from fashion.

Some suggest that the world could divide into techno-camps, with the current system in which most technology spreads globally unpicked—“decoupled”—into competing systems, one controlled by America, another by China. This would be very hard to bring about. Published research, patents, people, contracts, supply chains and technical standards all link Chinese technology to that which underpins all the other advanced economies—and vice versa. The location of the mind fomenting the next world-changing invention is impossible to predict. China can capture supply chains and rule its markets with an iron fist. But it cannot capture all the world’s ideas.

Indeed, contributing at the highest level requires the country to change. A smallish cadre of researchers with some independence will often be more effective than an army of boffins required to optimise their output to hit political targets, as can be the case in China. This does not mean that freedom of political thought is necessary for high levels of technological achievement. Rather it suggests that when you use your time to hit mandated goals you will skip real invention in favour of political box-ticking.

One reason not to fear imminent decoupling is that, even at its most successful, China’s model of technological development can proceed only so fast. When a technology is complex and expensive, progress is slow, as is shown in the manufacture of semiconductors. Even assuming you know how to build and run a cutting-edge chip factory, it takes tens of billions of dollars to do so. It also requires close co-operation with an array of high-tech suppliers who are already tightly bound to the existing market leaders.

Since China will not be capturing a large slice of the semiconductor manufacturing pie any time soon, and because semiconductors are vital to future economic growth, the world's existing locus of chip production gains heightened strategic importance. That the locus is Taiwan—over which China claims sovereignty, and where America has enough influence to urge restrictions on exports—further complicates the situation. Both American and Chinese firms rely on Taiwan for chip supplies, adding to its potential as a cause of conflict. If the tension between America and China keeps ratcheting up, the island nation could well come under pressure from both sides to curtail its supplies to the other. Any meddling risks upsetting the existing delicate balance and leading in a dangerous direction.

That would have been unthinkable a decade ago. At that time China's technological progress was mostly unopposed by other powerful countries, which profited from it. But the age of perceived mutual benefit is over. It is hard for the world's powerful countries, particularly America, to tolerate a China with a global outlook, access to advanced technology and real geopolitical heft. America has reportedly already started pressing the Taiwanese to restrict chip exports to Huawei, the Chinese tech giant, though the Taiwanese government denies it.

America should be careful about such interventions. A clumsy attempt to kneecap Huawei has shown that the Trump administration has little grasp of the dynamics of the technology ecosystem in which it is intervening. Its understanding of other aspects of Chinese technological development is probably even hazier. The threat posed by a technologically enabled Chinese Communist Party is real. In responding to it, America must be sure not to become its own worst enemy. ■



未来

挂钩与脱钩

技术发展仍可能导致激烈冲突【技术季刊《中国的技术》系列之六】

中国这场技术崛起在历史上绝无仅有，它由一个专制政府带来，而这个政府又积极引导一个市场导向的、能够利用全球供应链的工业基础。这并不意味着这种崛起不可阻挡或领先世界。但是，在那些对21世纪的成功发展至关重要的技术领域，它可能会带来明确的优势，这一点让西方世界焦虑。

特别是美国。中国的技术能力有可能削弱它在地缘政治中的主导地位，这让它不安。美国政客很关切被中国窃取了知识产权、有些中国企业作弊的问题。在这些合理的关注的背后，他们在担心中国推动技术发展的方式会取得美国主要由市场主导的模式无法取得的成果。

诚然，中国已经向世人展现，当一个国家下定决心，它可以在加速挪用、普及、发展和大规模实施新技术以及来自其他地区的技术上大有所为。同样真实的是，这么做的过程可能造成破坏：中央政府可能会错误配置资源，遵循愚蠢的方式，拒绝承认自己走错了路。政治恩庇本身就是腐败的温床。中国显现出了所有这些缺陷甚至更多问题。

同时，政府与开发构建技术的企业之间的协调一致之所以重要，不仅仅是因为政府负责分配或错误分配资金。国家可以要求技术部门解答市场不会自行解决的问题。在中国，政府政策与企业技术发展之间的一致性从向电动汽车的转变中可见一斑。这一调整主要是为了减少空气污染。美国也有政府主导发明的悠久历史。后来演变成互联网的网络就是为测试新的军事通信方法研发的。但这种创新模式已不再流行。

一些人指出，世界可能会分化为不同的技术营地。目前大多数技术都在全球范围内传播，而这个系统会拆解或者说“脱钩”成两个相互竞争的系统，一个由美国控制，另一个由中国控制。这样的前景很难成真。已经发表的

研究成果、专利、人员、合同、供应链和技术标准都把中国的技术与支撑所有其他发达经济体的技术连结在一起，反之亦然。下一个改变世界的发明会从哪里起源无法预测。中国可以抢占供应链，铁腕统治本国市场。但它无法俘获世界上所有的创意。

实际上，要做出最高水平的贡献，中国必须做出改变。一小群拥有一定独立性的研究人员通常成效都要好过一支被要求优化产出以达到政治目标的专家大军——后者可能就是中国的情形。这并不是说政治思想自由对实现高水平的技术成就是必须的，而是说当要花费时间去达到强制目标时，人们会为了在政治清单上打勾而放弃和错失真正的创新。

不用担心脱钩会很快发生的一个原因是，即使在最成功的情境下，中国的技术发展模式顶多也只能以这样的速度推进。当一项技术复杂又昂贵时，其进展会很缓慢，就像半导体制造业显示的那样。即使你真的知道如何建造和运营一座尖端芯片工厂，也还需要几百亿美元来做这件事。此外还需要和已与既有市场领导者紧密绑定的一系列高科技供应商密切合作。

由于中国不会很快从半导体制造的蛋糕中分走一大块，而半导体对未来的经济增长至关重要，因此全球现有的芯片生产中心在战略上就变得更加重要。这个中心位于台湾——中国称之为主权领土，而美国在这里有足够的影响力敦促限制出口——这一点让情势变得更加复杂。美国和中国公司又都依赖台湾供应芯片，令这里更可能成为冲突之源。如果中美之间的紧张局势继续加剧，台湾很可能两面受压，都要求它减少对另一方的供应。任何干预都可能破坏现有的微妙平衡而滑向危险的方向。

这在十年前是无法想象的。那时中国的技术进步大体上没有遭到其他强国的反对——它们从这种进步中受益。但被视为互惠互利的时代已经结束。世界强国，尤其是美国，很难容忍一个具有全球视野、获得先进技术和真正的地缘政治影响力的中国。据报道，美国已经开始敦促台湾限制向中国科技巨头华为出口芯片，但台湾政府否认了这一消息。

美国在做出此类干预时应当慎重行事。笨拙地严惩华为的行动显示出特朗

普政府对自己干预的技术生态系统的运作方式知之甚少。它对中国技术发展的其他方面甚至可能更没有头绪。一个科技武装的中国共产党所构成的威胁是真切的。在应对它时，美国必须确保别做了自己最大的敌人。■



Success stories

Reactors and railways

The state has helped the nuclear industry and the high-speed-train network to become world class

WITHIN THE cavernous factory of Dongfang Heavy Machinery Company (DFHM), a state-owned firm based in Guangdong province, lies what looks like a suit of armour built for a mis-shapen giant. In fact, they are parts built to contain something even more fearsome—nuclear reactors and the high-pressure, high-temperature steam that they produce. Some are still being worked on. Some are almost ready to head off, by barge, to sites along the southern coast where China is expanding its nuclear-power industry with greater ambition than any other country in the world.

In 1996, with the help of Framatome, a French firm with a lot of nuclear history, China built a reactor at Ling Ao, 60km (37 miles) from Hong Kong. Part of the deal was that Framatome would share its know-how. It helped a local firm that had previously made boilers learn how to make the hulking metre-thick metal vessels that can safely contain a nuclear reaction. That firm became DFHM. As well as the main reactor vessels, it also now makes the steam generators which turn the nuclear heat into something which can drive turbines and make electricity. Zou Jie, a DFHM executive, says his firm's products are now competitive with Framatome's.

One reason for this progress is that China's nuclear industry has gained experience quickly. In the past 20 years China has built nuclear plants faster than any other country; its nuclear capacity is now 43GW, third only to that of France (63GW) and America (99GW). Unlike in those two countries, though, China's capacity is growing. And whereas in 1996 just 1% of the value of its first nuclear plants came from domestic firms, that figure is now 85%.

A very similar story can be seen in the country's high-speed-rail network, though with a telling interlude. China committed to high-speed rail, as to nuclear plants, under Deng Xiaoping in the early 1990s. But it started off down a home-grown technological dead end of trains which, instead of running on wheels, levitate above their track on magnetic fields. Engineers around the world had failed to make such systems work; Chinese engineers proved no exception. So in the 2000s China swallowed its pride and commissioned more traditional trains from overseas providers who promised to let subcontractors indigenise the technology.

| *They've been workin' on the railroad*

As with nuclear, once committed, the country pushed hard. By the end of 2018 China had 29,000km of high-speed track, two-thirds of the global total. Chinese-designed trains do not yet match their Japanese and European counterparts. But one of the four high-speed-train models deployed on the network is now fully Chinese-made, and ready for export.

China's development of nuclear power and high-speed trains shows that the power of technology does not, as is often assumed, lie primarily in innovation. What matters most about a technology is that it should be both useful and used. And the factors that make it so may be a matter of politics more than ever better widgets.

For any technology that seems to meet a national need but faces right-of-way issues during its deployment, as high-speed rail does, or concerns about public safety, as nuclear does, there is no greater ally than the Chinese Communist Party. When 1m people in Hong Kong signed a petition against the construction of a nuclear plant nearby, a Chinese minister shut down their complaints by stating that "unscientific objections" would not stop the project.

Knowing things can be built quickly makes the commitment to really big

engineering projects more feasible in China than elsewhere. It is the same in Russia, the other authoritarian power where nuclear plants are still built for domestic use and export. Even with few political risks and lots of fairly skilled cheap labour the upfront capital costs of building nuclear plants are huge; but China's governments, national and provincial, and state-owned companies had no worries about their balance-sheets.

Being a one-party state does not blind China to public concerns about safety. When 40 people died in a high-speed-train collision near the city of Wenzhou in 2011, the public was outraged. Passenger numbers fell; work on new lines was paused; safety procedures were scrutinised. There has not been a similar accident since. After the Fukushima nuclear meltdown in Japan that same year, the Chinese government's position on new plants went from "active" to "conservative", says Mr Zou of DFHM, and deployment slowed down. That means China will miss the target of 58GW of nuclear-generation capacity it set itself for 2020. But if, as Mr Zou expects, China continues to build up to eight reactors a year, it should meet the lower end of its target of 120GW by 2030.

Some of these reactors are still of foreign design. Versions of both the AP1000, an American design, and the EPR, a French one, have begun operating in China over the past two years. But that underlines China's edge. It is the only country, including France and America, yet to have successfully built either design. Rather than importing more nuclear technology, Mr Zou and others are looking to export their own.

The reactor of choice—Mr Zou says that Li Keqiang, China's prime minister, has ordered that it be given pride of place—is China's brand new Hualong One. It is developed from reactors based on French designs, as those were in turn based on American designs, but can reasonably claim to be completely Chinese. Although none has yet been finished (the first is due to be connected to the grid in Fujian province in 2020), two are being built

near Karachi in Pakistan. Another is planned for Argentina, and Britain is evaluating plans to build one at Bradwell in Essex. One advantage of such exports is that the Chinese will get the design scrutinised by independent regulators abroad. That China's nuclear regulator is part of the same government that is urging the industry's expansion brings with it some serious concerns about safety.

The reactor-export business development of China's nuclear industry has gone well. Technology-transfer agreements with foreign companies like Framatome were carried out without controversy. Lower wages for manufacturing workers combined with cheap state-backed loans meant that Chinese nuclear plants are some of the most affordable in the world. There have been no accidents in 20 years of operation.

Though many Western experts believe that nuclear power has a real, if smallish, role in the energy systems of the future, exporting nuclear plants may never be a huge business. In most places, the zero-carbon electricity they offer will not be as cheap as wind or solar. The Chinese are aware of this, too. Their renewables industry has grown even faster than nuclear power and the two sources are providing the country with broadly similar amounts of power. Again, the story is one of taking a foreign technology, indigenising it and scaling it up massively. Whether it be turbines, reactors, trains or satellite launchers, China has mastered this procedure. ■



成功故事

反应堆和铁路

国家帮助核工业和高速列车网络跻身世界一流【技术季刊《中国的技术》系列之一】

在总部位于广东省的国有企业东方电气重型机器（DFHM）宽阔的厂房里，一个东西看起来像是为畸形巨人建造的盔甲。实际上，这些零件用来包裹的是更可怕的东西——核反应堆及其产生的高温高压蒸汽。一些零件尚未完工，一些则差不多准备好乘驳船前往南部沿海的各个工地——在这里，中国拓展核电工业的雄心比任何其他国家都要大。

回到1996年，在拥有丰富核经验的法国公司法马通（Framatome）的帮助下，中国在距香港60公里的岭澳建造了一座反应堆。交易中写明法马通将分享其专有技术。它帮助一家以前制造锅炉的当地公司学习了如何制造厚达一米的笨重金属容器，用以安全地容纳核反应。这家公司后来变成了东方电气。除了反应堆主容器之外，它现在还制造蒸汽发生器，将核能转化为能驱动涡轮机并发电的东西。东方电气的高管邹杰说，公司的产品现在已经可以和法马通一争高下了。

取得这一进展的原因之一是中国的核工业已迅速获得了经验。在过去的20年中，中国建设核电站的速度超过任何其他国家。目前其核电容量为43吉瓦，仅次于法国（63吉瓦）和美国（99吉瓦）。但是，与这两个国家不同，中国的容量数字正在增长。在1996年，其首批核电厂的价值中只有1%来自国内公司，而现在这一数字已达到85%。

中国的高铁网络也经历了非常相似的历程，不过其中有过一个插曲，它很能说明问题。在1990年代初，邓小平领导下的中国开始投入到高铁的建设中，就和建核电站一样。但是自行研发从一开始就走进了技术上的死胡同：不是让火车在车轮上行驶，而是靠磁场悬浮在轨道上方。世界各地的工程师都没能让这样的系统有效运作，事实证明中国的工程师也不例外。因此，在2000年代，中国放下了骄傲，从海外供应商那里购买了更多传统火车，这些供应商答应让分包商把相关技术本地化。

| 他们一直搞铁路

就像核能一样，中国一旦投入就会全力以赴。截至2018年底，中国拥有29,000公里的高速铁路，占全球总数的三分之二。中国设计的火车尚未达到日本和欧洲的水平，但现在铁路网上部署的四种高速列车型号中，有一种完全由中国自行生产，并可以出口。

中国的核电和高铁发展表明，技术的力量并不像人们通常想象的那样主要在于创新。一种技术最重要的一点是它应该既有用，又得到应用。而在实现这一点的因素中，政治可能比越来越好的产品更重要。

对于任何似乎能满足一个国家的需求，但在部署过程中会遇到通行权问题（如高铁）或公共安全担忧（如核能）的技术，没有比中国共产党更好的“盟友”了。当香港有一百万人联署一份反对在附近建造核电站的请愿书时，一位中国部长说“不科学的反对”不会阻止该项目，就让反对声闭嘴了。

既然知道建设可以非常快地推进，在中国追求非常庞大的工程项目就比其他地方更加可行。在俄罗斯（另一个威权国家）也是如此——该国仍在建造核电站供国内使用和出口。哪怕没有政治风险，而且有大量技能还算不错的廉价劳动力，建造核电站的前期资本投入仍然很高。但在中国，无论是中央、省级政府还是国有企业，都对自己的资产负债表毫不担心。

一党领导并没有让中国对公众的安全担忧视而不见。2011年，40人在温州附近的一次高速火车相撞事故中丧生，激起了民愤。旅客人数下降，新线路的建设被喊停，安全程序得到了仔细检查。从那以后再没有发生过类似的事故。东方电气的邹杰说，同年日本福岛核事故发生后，中国政府对新核电站的立场从“积极”转变为“保守”，部署也有所放缓。这意味着中国将无法实现给自己定下的到2020年核电装机容量58吉瓦的目标。但是，如果按照邹杰的预期，中国继续每年建造8座反应堆，那么到2030年应该能达到目标下限120吉瓦。

这些反应堆中仍有一些是国外设计的。过去两年中，美国设计的AP1000

和法国设计的EPR都开始在中国运行。但这突显了中国的优势。哪怕算上法国和美国自己，中国都是唯一一个把这两种设计建设完成的国家。邹杰等人没有进口更多核技术，而是希望出口自己的技术。

最受偏爱的反应堆——邹杰说中国总理李克强已下令给它最显赫的地位——是中国全新的“华龙一号”。它是从基于法国设计的反应堆发展而来（那些法国反应堆又是基于美国的设计），但却可以合理地声称完全是中国自有的。尽管尚未有哪个“华龙一号”建成（第一个定于今年与福建省电网连接），但有两个正在巴基斯坦的卡拉奇附近建造。还有一个计划在阿根廷建设，而英国正在评估在埃塞克斯郡的布拉德韦尔建造的计划。这种出口的优势之一是中国的设计会得到国外独立监管机构的审查。中国的核监管机构隶属于政府，而这同一个政府正在敦促这个行业扩张，这带来了安全性的严重担忧。

中国核工业的反应堆出口业务发展顺利。与法马通等外国公司的技术转让协议执行顺畅，没有争议。制造业工人的工资较低，加上国家支持的廉价贷款，这意味着中国的核电站在全球最经济实惠之列。它已无事故运行了20年。

尽管许多西方专家认为核电在未来的能源系统中将占有实实在在（哪怕较小）的一席之地，但出口核电站可能永远不会是一门大生意。在大多数地方，它们提供的零碳电力不会像风能或太阳能那样便宜。中国人也意识到了这一点。他们的可再生能源产业的增长速度甚至超过了核电，而目前这两种能源为该国提供的电量大致相当。这又是一个引进外国技术，将其本土化再大规模推广的故事。无论是涡轮机、反应堆、火车还是卫星运载火箭，中国对这套程序可谓驾轻就熟。■



The tigers' future

Fearful symmetries

Where do they go from here?

EVEN IN THEIR prime, the tigers had their detractors. Twenty-five years ago, Paul Krugman, an economist, wrote an article in *Foreign Affairs*, an American policy journal, entitled “The Myth of Asia’s Miracle”. He argued that Asia’s seemingly dynamic economies displayed, on closer inspection, “startlingly little evidence of improvements in efficiency”. Their growth relied instead on rapidly increasing inputs of labour, capital and so on. It was a miracle based on “perspiration” not “inspiration”. Singapore, in particular, “grew through a mobilisation of resources that would have done Stalin proud”, Mr Krugman wrote.

This sweaty growth model faced some natural limits. Employment rates could not increase for ever. And the accumulation of capital would eventually run into diminishing returns. Therefore the tigers’ pace of expansion would inevitably slow.

On the last point Mr Krugman was unquestionably right. The Asian tigers have averaged growth of 3% last decade, down from 8% in the early 1990s. But their mix of perspiration and inspiration is now better than Mr Krugman feared. As inputs of labour have grown more slowly, total factor productivity, an oft-cited (if theoretically controversial) gauge of efficiency, has made a bigger contribution. Between 2000 and 2017, it grew at least twice as fast in the tigers as in America, according to the Asian Productivity Organisation in Tokyo.

The comparison that most scares the tigers is not with the Stalinist industrialisation of the Soviet Union but with Japan’s elegant stagnation. Life in Japan is, for many, comfortable and affluent. But its economy has

lost ground. Japan's GDP per person, at purchasing power parity, reached 85% of America's in 1990; today it is closer to 70%. One cause of Japan's prolonged slowdown is ageing: it is now older than anywhere except tiny Monaco. But in the coming three decades the tigers will age even more quickly than Japan has done. The tigers also see much of themselves in Japan's economic model, which once served as an example for their own. South Korea and Taiwan are far stronger in manufacturing than in services and all four are unusually reliant on exports to generate growth in demand. Will they replicate Japan's failure as faithfully as they copied its success?

Emulating Japan's drift would not be a total disaster: many countries, worried about a supposed middle-income trap, would dearly love to fall into the Japan-income trap. But the tigers can still aspire to do better. Despite their parallels with Japan, they are different in many respects.

Compared with Japan during its bubble years, they are paragons of financial conservatism. Since the market mayhem of the Asian financial crisis of 1997-98, they have insisted on big capital buffers for their banks and pioneered macroprudential limits on borrowing. In addition, the tigers are even more deeply ensconced in the global trading system and have also shown great determination to stay at the global leading edge. All four love to boast of their positions at, or near, the top of global rankings like the World Economic Forum's global competitiveness index or the World Bank's "ease of doing business" rankings.

If the tigers stumble, it will be for their own reasons, not because they are repeating Japan's mistakes. Taiwan wants to lessen its economic entanglements with China, but that is difficult now that China is the centre of Asian economic gravity. Anger at the concentration of economic power in South Korea has led to demands for a fairer system. But many of the government's responses have been ineffectual or counterproductive.

Singapore's carefully managed political system has come under more strain, and a backlash against immigration shows that it is not immune to the populism that has reared its head throughout the world. Hong Kong, sadly, is the tiger most at risk of going backwards. Its people, successful and sophisticated, understandably want to make big decisions for themselves. Yet their rulers will have none of it.

So it is only sensible to remain grounded about the tigers. There is still much that can go wrong for them. Nevertheless, there is also much that can continue to go right. They each have plenty of strengths. South Korea has emerged as a research powerhouse, at the same time as building up strong global brands, from smartphones to pop idols. Taiwan, in the toughest of geopolitical circumstances, has made itself an essential player in global supply chains, while also developing a thriving ecosystem of small businesses. Hong Kong, for all its current woes, has established itself as the financial conduit between China and the world. Singapore is top of the tiger class in many ways: it has a diversified economy, despite being a small city-state, and it has mitigated the inequality that has come with its recent flourishing.

The tigers also matter to the rest of the world. Their record in their boom years remains a vital reference for other developing countries trying to get ahead. Their experience over the past two decades shows how countries can climb from middle-income levels to greater heights. Of particular interest to the developed world will be their record in the coming few decades.

The quartet can be seen as test cases for the future. They are often the pioneers for new technologies thanks to their innovative firms. And their societies are facing distilled versions of many of the dilemmas now haunting the rich world: how to cope with ageing; how to cushion workers from the effects of automation; how to revive productivity growth; how to

stay close to both America and China; and how to push up stagnant wages and hold down soaring property prices.

Decades before they were nicknamed the tigers, Asia's smaller economies were likened to a different kind of animal: "flying geese", fanning out behind Japan. In nature, as in economics, trailing geese find it easier to fly in the leader's wake, benefiting from the extra lift its wings create. But what the original metaphor forgot is that birds take turns leading and following. Hong Kong, Singapore, Taiwan and South Korea spent decades flying comfortably behind more advanced economies. The good news and the bad is that there is now no one left to follow. ■



四小龙的未来 可怕的对称

它们将从这里飞往何方？【专题报道《亚洲四小龙》系列之四】

即便在它们腾飞的年代，四小龙也不乏批评者。25年前，经济学家保罗·克鲁格曼（Paul Krugman）在美国政策期刊《外交》（*Foreign Affairs*）上发表了题为《亚洲奇迹的迷思》（*The Myth of Asia's Miracle*）的文章。他指出，仔细观察会发现，亚洲这些看似充满活力的经济体“在提升效率方面的证据少得惊人”。相反，它们的增长依赖迅速加大劳动力和资本等投入。这是一种基于“汗水”而非“灵感”的奇迹。尤其是新加坡，“它的发展所倚赖的那种对资源的调集会让斯大林都称心满意”，克鲁格曼写道。

这种“汗水成长模式”面临天然的局限。就业率不可能永远提高。资本积累终将遭遇收益递减。因此，四小龙的扩张速度将不可避免地慢下来。

克鲁格曼无疑说对了最后一点。亚洲四小龙过去十年的平均增长率为3%，低于1990年代初的8%。但是，它们如今将汗水与灵感结合起来的情况要好过克鲁格曼的担忧。随着劳动力投入放缓，全要素生产率这个经常被引用的效率指标（尽管在理论上存有争议）对经济的贡献增大。根据东京的亚洲生产力组织（Asian Productivity Organisation）的数据，2000至2017年间四小龙这一指标的增速至少是美国的两倍。

让四小龙最害怕的对照并非苏联时代斯大林集权式的工业化，而是日本那种优雅的停滞。对许多人来说日本的生活舒适而富足，但它的经济已经丧失优势地位。按购买力平价计算，日本的人均GDP在1990年达到美国的85%，如今跌至近70%。日本经济长期放缓的一个原因是老龄化：目前其国民比除摩纳哥这个袖珍小国以外的所有地区都要老。但四小龙在未来30年里人口衰老的速度比日本经历的还要快。它们也在这个曾视为榜样的国家的经济模式中看到许多自身的问题。韩国和台湾的制造业远远强过服务业，并且它们四个全都异常依赖出口来促成需求增长。它们会像复制日本的成功那样忠实地复制它的失败吗？

模仿日本的逐渐失势不会是全然的灾难：许多担心所谓的“中等收入陷阱”的国家会非常乐意跌入日本式收入陷阱。但四小龙仍可立志做得更好。尽管与日本有相似之处，它们在许多方面与之不同。

与泡沫时期的日本相比，它们堪称金融保守主义的典范。自1997-1998年亚洲金融危机造成市场动荡以来，它们坚持为自己的银行提供大量资本缓冲，并开创了对借款实行宏观审慎限制的操作。此外，它们如今更深入地扎根于全球贸易体系，也表现出了要保持全球领先地位的巨大决心。它们全都喜欢夸耀自己在全球排名，比如世界经济论坛的全球竞争力指数或世界银行的营商便利度排名中处于或接近榜首。

假如四小龙跌倒了，那也会是因为它们自身的原因，而不是因为重复日本的失误。台湾想要减少与中国大陆的经济纠缠，但鉴于中国已经成为亚洲经济的重心所在，这一点难以做到。韩国经济权力日趋集中引发了愤怒，人们呼唤更公平的体系，但该国政府的应对措施许多都无效或适得其反。

新加坡精心管理的政治体制承受的压力增大，而民众强烈的反移民情绪表明新加坡也不能幸免于在世界各地抬头的民粹主义的冲击。香港不幸地是四者当中倒退风险最大的。它的民众事业成功又见多识广，可以理解他们想要为自己做出重大决定，但他们的统治者不会答应。

因此，对于四小龙的前景，只有现实的态度才是明智的。它们仍有许多可能出错之处，却也有很多可以继续正确操作的地方。它们每个都拥有诸多强项。韩国打造了从智能手机到流行偶像的强大全球品牌，与此同时已崛起为科研强国。虽然面临最严峻的地缘政治环境，台湾已经让自己成为全球供应链中至关重要的一环，同时还发展出了一个欣欣向荣的小企业生态系统。尽管目前深陷困境，香港已经成为连接中国与世界的金融渠道。新加坡在许多方面都位居四小龙团队之首：虽只是一个小型城市国家，它已经实现了经济多元化，还减轻了近年繁荣发展带来的不平等。

四小龙对世界其他地区也很重要。它们在自己的腾飞时期取得的成就仍然是其他力争上游的发展中国家的重要借鉴。它们在过去20年里的经验表明

了各国如何能从中等收入水平攀升至更高的高度。而它们在未来几十年里的表现将尤其令发达国家感兴趣。

四小龙可以为未来提供测试案例。因为有那些勇于创新的企业，它们常常是新技术的先驱。而它们的社会正面对目前困扰着富裕世界的诸多困境的浓缩版本：如何应对老龄化；如何让工人少受自动化影响的冲击；如何重振生产率增长；如何同时与美国和中国保持亲密关系；如何提高停滞的工资水平并抑制飞涨的房产价格。

在它们获名“四小龙”的几十年前，亚洲较小的经济体被比作另一种动物：“飞雁”——它们在日本的后头整齐铺开队形。在自然界——正如在经济中一样——尾随的大雁发现自己能借助领头大雁的羽翼所产生的额外动力，因而飞起来更省力。但这个比喻忘记了鸟儿们会变换位置，轮流带队。香港、新加坡、台湾和韩国几十年来在更发达的经济体后头舒适地飞行。好消息——也是坏消息——是现在没有可以追随的领头雁了。 ■



Bartleby

A manager's manifesto

Eight resolutions to adopt in 2020

THE START of the year is traditionally the time to make resolutions to change your behaviour. Hardly anyone keeps them, of course, but in the spirit of optimism, here are Bartleby's eight suggestions for what managers ought to resolve to do in 2020.

1. Give out some praise. People don't come to work just for the money. They like to feel they are making a valuable contribution. Praise doesn't have to happen every day and it cannot be generic. Pick something specific that a worker has done which shows extra skill or effort and single them out; ideally so that others can hear the compliment. This is particularly important for the most junior employees, who will feel anxious about their status.
2. Remember that you set the tone. If a manager is angry and swears a lot, that will be seen as acceptable behaviour. If bosses barely communicate, they are unlikely to receive useful feedback. If they fail to keep their promises, workers will be less likely to co-operate. And if a manager frequently belittles a particular employee, that person is unlikely to get the respect of their colleagues. In contrast, a more relaxed, open boss is likely to lead to a relaxed, open workplace.
3. The buck also stops with you. If a team member makes a mistake, it needs to be fixed. And the manager is responsible for making that happen. It may well be that the mistake stems from inadequate instructions or giving the task to the wrong person. So the manager, as well as the staff member, needs to learn a lesson from the failure.

4. Make your priorities for the next year clear, and communicate them well. Is the company (or division) trying to launch a new product? Or to boost sales of existing products? Or to control costs? If you are not sure, then those who work for you will have no idea. That can lead to a lot of wasted effort.

5. To that end, cut out the jargon. The use of pretentious phrases and complex acronyms is generally designed to obfuscate rather than elucidate. In Bartleby's experience, the reason people use unclear language is that they have nothing clear to say. If you are sending a general memo to all the staff, look carefully through it and ask whether you would have understood it on your first day of work. If not, make it simpler. Remember George Orwell's maxim: "Never use a foreign phrase, a scientific word, or a jargon word if you can think of an everyday English equivalent." It applies to other tongues, too.

6. Listen to your staff. They are the people who are dealing with customers and suppliers, and grappling with the bureaucracy of the organisation. Their feedback is essential, beyond annual engagement surveys. You hired them for their skill and expertise: learn to rely on it. If you don't trust their judgment, you have hired the wrong people. If you don't like listening to employees, go and set up as a sole trader.

7. Keep meetings short. Ideally, a meeting should be the length of a sitcom episode not a film by Martin Scorsese. Bartleby's law is that 80% of the time of 80% of the people at meetings is wasted. If you doubt the numbers, have a think about the last big meeting you attended. Did everyone speak or was the discussion dominated by a small subset? How many people were gazing at their phones? A lot of people attend meetings out of a sense of duty or FOMO (fear of missing out). And what is the purpose of the meeting? If it is just to update people on progress, that can be done in an email or in a one-to-one conversation (which has the added benefit of allowing you to talk to

your staff). Big meetings involving all the staff should be reserved for big news like acquisitions or lay-offs.

8. Drop the team-building exercises. Paintballing in the woods, tackling an army assault-course, constructing a model of the Empire State Building from matchsticks—no one wants to do this stuff. They don't want to go to an awayday weekend, either; they would much rather be at home with their families. Why not build a team by introducing its members and explaining what you want each of them to do? It is a lot cheaper. It also wastes a lot less of everybody's valuable time.

Will following these eight rules lead to instant business success? Of course not. None of this will work if the company lacks an attractive product or a decent business plan. But these rules might just make your firm a more efficient and pleasant place to work. And that is a reasonable goal for 2020. ■



巴托比

管理者宣言

可在2020年树立的八个决心

新年伊始历来都是下决心洗心革面的时候。当然了，几乎没有人能坚持下来。但本着乐观主义的精神，本专栏在此向管理者们提出八条建议，供他们在2020年树立决心之用。

1. 给予一些表扬。人们工作不仅仅是为了钱，还希望感受到自己做出了可贵的贡献。表扬的话不是每天都要说，也不能太笼统。找出员工展现出额外技能和付出额外努力的具体事例，单挑出来予以表扬。这样的夸赞最好也能让其他员工听到。这对那些资历最浅、对自己在公司的处境感到焦虑的员工来说尤为重要。

2. 记住，定调子的人是你。管理者发脾气或大骂脏话，其他人就会认为这种行为可接受。如果老板们很少与人沟通，就难以得到有用的反馈。如果他们没能信守诺言，员工就不大可能好好配合工作。而如果管理者经常贬低某个员工，那个人就很难得到同事的尊重。相比之下，一个更放松和开放的老板应该也会营造出放松和开放的工作环境。

3. 你同样需要承担责任。如果团队某个成员工作出错，就需要做出补救。而管理者的责任就是确保对失误做出补救和纠正。发生错误的原因很可能是未给予足够的指导，或用人不当。因此，除员工外，管理者也需要从失败中吸取教训。

4. 理清下一年的工作重点，并向员工清晰传达。公司（或部门）是否正尝试推出一款新产品？还是要提高现有产品的销量？还是要控制成本？如果你自己都不清楚，那你的手下也会很茫然。这会白白浪费大量功夫。

5. 要表述清晰，就不要说行话。使用唬人的词语和复杂的缩略语通常都是为了混淆视听，而不是阐明观点。以本专栏作者的经验，人们之所以使用

含混的语言，是因为他们没有明确的见解要表达。如果你要向全体员工发送一篇通用备忘录，先仔细通读，并自问假如自己是第一天工作，能不能看得懂。如果不能，就写得再简单些。记住乔治·奥威尔的准则：“如果能想到日常的英语词汇，就决不使用外来词、科学词汇或者行话。”这对其他语言也同样适用。

6. 倾听员工的声音。和客户和供应商打交道的是他们，和机构的繁文缛节做斗争的也是他们。他们的反馈极为重要，超过年度员工参与度调查。你雇用他们是因为他们的技能和专长，学着去信赖他们的本事吧。如果你不相信他们的判断，那就说明你招错人了。如果你不喜欢听员工的意见，那干脆一个人单干好了。

7. 开会要短。一次会议的时长最好像一集情景喜剧，而不是马丁·西科塞斯的电影。本专栏作者有一个定律：80%的人在会议上浪费了80%的时间。如果你对这两个数字存疑，不妨想想最近一次参加的大型会议。是所有人都发言了，还是一小撮人主导了讨论？有多少人在盯着手机？许多人参加会议都是出于责任感或是害怕错过什么的心态。开会的目的又是什么？如果只是知会大家最新的进展，发封电子邮件或来场一对一的谈话就可以了。一对一谈话还有额外的好处：可以让你和员工沟通。所有员工都要参加的大型会议应该只在宣布并购或裁员这样的重大消息时再举行。

8. 不搞团建。没人愿意在林子里拿彩弹枪互射、应付军事野战训练、用火柴棍搭出一个帝国大厦的模型。他们也不想来个周末轻松游。他们更情愿待在家里，和家人在一起。要想建设一个团队，何不介绍一下团队成员，并讲清你期待他们每个人都担当起什么职责？这样做经济实惠得多，还能大大节省每个人的宝贵时间。

遵循这八条建议就能立刻取得商业成功吗？当然不是。如果企业没有吸引人的产品或像样的商业计划，一切都是空谈。但这几条建议或许能让你的公司成为更有效率、更宜人的工作场所，而这是一个为2020年制定的合理目标。■



Free exchange

Planned obsolescence

China's industrial policy has worked better than critics think, but the model is creaking

EARLY IN ITS trade dispute with China, America declared that Chinese industrial policy was a form of “economic aggression”. America’s negotiators hoped to rein it in. No such luck. The very week in December that America and China announced a mini-deal on trade, China’s president, Xi Jinping, vowed that the Chinese government would do more in 2020 to support strategic sectors, ranging from robotics to biomedicine. Having seen its vulnerability to American export controls, China is more determined to build up its domestic abilities than it was before the trade war began.

This raises an obvious question: does industrial policy work? Since at least Jean-Baptiste Colbert, France’s finance minister under Louis XIV in the 17th century, governments have used taxes, tariffs and subsidies to cultivate national champions. Colbert worried about the dominance of Venetian glassmakers; Mr Xi worries about the dominance of American chipmakers.

In principle industrial policy looks attractive. When markets are highly imperfect—a fact of life in developing countries—governments can use their muscle to stimulate activities that would otherwise be unthinkable for private entrepreneurs. When such policies succeed, the targeted sectors flourish, as South Korea’s chemicals industry did in the 1970s. That, in turn, can lead to technological advances and productivity gains for the wider economy.

But in practice industrial policy is hard to get right. Helping companies is as likely to promote laziness as competitiveness. Moreover, officials may be no better—and perhaps much worse—than businesspeople in choosing

which industries to support.

Although China is far from alone in deploying industrial policy, it stands out for the sheer scale of its efforts. Since the 1980s it has produced dozens of plans and lavished public spending on sectors from solar power to film-making. One industry has been a big unintended beneficiary: the academic study of industrial policy. A large and growing economic literature considers China's record.

A recent volume, edited by Loren Brandt of the University of Toronto and Thomas Rawski of the University of Pittsburgh, examines the electricity and telecommunications sectors. These are natural candidates for government intervention, given the high cost of building power grids and phone networks, plus the benefits to society. But China has done more than build basic systems; it has also tried to reach the frontier of global innovation.

It has had some success. State Grid Corporation of China is a world leader in ultra-high-voltage transmission. China has gone, the authors say, from "pygmy to emerging giant in civilian nuclear power". But elsewhere it has come up short. Despite decades of support, its semiconductor firms are laggards. It has also failed to challenge Airbus and Boeing, or to produce any truly international car companies.

One tentative conclusion is that China's industrial policy works better when natural monopolies are involved. There is a clear role for a central authority with strong organising power to develop a power-transmission system or a high-speed rail network. Yet that same authority can stifle competition in sectors that need it. Alternatively, as often occurs in China, if lots of provincial governments try to foster their own champions, nominally in pursuit of national objectives, the outcome is extreme over-capacity, which undermines the targeted sector.

China's shipbuilding industry provides a textbook example. Panle Jia Barwick and Nahim Bin Zahur, both of Cornell University, and Myrto Kalouptsidi of Harvard University estimate in a recent paper that between 2006 and 2013 the government directed policy support worth 550bn yuan (roughly \$80bn at the time) to shipbuilders. Most went as subsidies for entrants to the sector, attracting subpar firms. China became the world's biggest producer of ships. But the increase in net profits was just a fifth of the subsidies. Even the electricity sector, an ostensible success, is plagued by excess. A well-run power network should have back-up generating capacity equivalent to about 15% of peak load. The average among China's provinces is more than 90%.

That, though, is not the end of the story. Ultimately, the value of industrial policy is in its wider economic impact. In a separate paper, Ernest Liu of Princeton University argues that state support is most effective when it targets those sectors that make the most essential inputs for others. Generally, these are upstream; turning raw materials into products used in a range of industries. Subsidies for them, even via state firms, can raise overall efficiency. As it happens, China has focused its support on the right sectors in Mr Liu's calculations, such as steelmaking and machinery. China, put bluntly, might never have become the economic power that it is today without ambitious industrial policy.

| *L'industrie, c'est moi*

Mr Liu's model does not indicate when subsidies are too high, nor does it set out how best to design policies. There is evidence that China's heavy-handed intervention is becoming increasingly ineffective. Total factor productivity growth in China in recent years has been a third of what it was before the 2008 global financial crisis (see chart). Productivity has also slowed in other countries, but the World Bank, in a recent book about Chinese innovation, notes that China's slowdown has been unusually

sharp.

After conducting extensive case studies of the vehicle and renewable-energy sectors, among others, the bank ascribes some of the blame to Chinese industrial policies that undermine fair competition. It argues that rather than targeting support at specific firms, China should shift to more market-oriented policies. Even-handed regulations and incentives, which treat state firms no differently from private companies or foreign investors, would do more than lavish subsidies to promote entrepreneurship.

Such a shift would have the convenient side-effect of dealing with America's concern that China's mammoth subsidies undercut competitors globally. Industrial policy is always contentious. But it now looks like that rarest of things, an issue on which Chinese and American interests are aligned. Whether their leaders see it that way is another matter. ■



自由交流

计划报废

中国产业政策的效果好于批评者所想，但这种模式的作用正在变弱

在与中国的贸易争端爆发的初期，美国宣称中国的产业政策是一种“经济侵略”。美国的谈判代表希望遏止它，但没这份运气。就在去年12月美中宣布达成“迷你”贸易协议的同一周，中国国家主席习近平宣告，中国政府将在2020年给予从机器人技术到生物医学的各个战略产业更多支持。在发现自己容易受到美国出口管制的影响之后，中国比贸易战开打之前更加坚定了要增强自身实力的决心。

这就引出了一个显而易见的问题：产业政策是否起作用？最晚自17世纪法国路易十四时期的财政大臣让·巴蒂斯特·科尔伯特（Jean-Baptiste Colbert）起，各国政府就一直通过税收、关税和补贴来发展国家领军行业。科尔伯特担心威尼斯玻璃制造商的市场支配地位，习近平则担心美国芯片制造商的霸主地位。

原则上说，产业政策看起来很有吸引力。当市场很不完善时（发展中国家就是如此），政府可以动用自己的力量来推动产业实现私人企业家难以想象的发展。此类政策一旦成功，目标产业就会像上世纪70年代韩国的化工业那样蓬勃发展。这进而又为更广泛的经济带来技术进步和生产率提升。

但在实践中，产业政策很难不出错。帮助企业提高竞争力同样会鼓励懈怠。此外，在选择支持哪些行业的时候，官员可能不见得能比商人做得更好，甚至可能远不如商人。

尽管中国绝不是唯一实施产业政策的国家，但它推行政策的力度之大引人注目。自上世纪80年代以来，它已经制定了数十项计划，并将大量财政支出投入到从太阳能到电影制作的各种行业中。有一个领域意外地成为了受益者：对产业政策的学术研究。由此产出了大量有关中国产业政策成效的经济文献，而且还在增加。

最近的一部是由多伦多大学的洛伦·勃兰特（Loren Brandt）和匹兹堡大学的托马斯·罗夫斯基（Thomas Rawski）编选，研究了中国的电力和电信行业。考虑到建设电网和电话网络的高成本以及对社会的益处，这两者都是政府干预的自然之选。但是，中国政府不仅建立了基础系统，还试图进入全球创新的前沿。

它已经取得了一些成功。中国国家电网公司是超高压输电的世界领先企业。两位作者说，中国已经从“民用核能领域里的侏儒变成了新兴巨人”。但它在其他方面却没有这么大的进步。尽管数十年来一直有政府扶持，但中国的半导体企业仍然落后。中国也没能挑战空中客车和波音，也没有培育出任何真正的国际汽车制造企业。

一个初步的结论是，中国的产业政策在自然垄断行业中能更好地发挥作用。具有强大组织能力的中央机构在开发输电系统或高铁网络时可以发挥明确的作用。然而在需要竞争才能发展的行业，同样的中央机构却会扼杀竞争。另外，如果众多地方政府以实现国家目标为名培养自己的领军企业，就会导致产能严重过剩，破坏目标行业的发展，就像在中国经常发生的那样。

中国的造船业就是一个教科书般的例子。康奈尔大学的贾攀乐和纳西姆·本·扎赫尔（Nahim Bin Zahur）以及哈佛大学的米尔托·卡卢普兹迪（Myrto Kalouptsidi）在近期的一篇论文中估计，中国政府在2006年至2013年间向造船企业提供了5500亿元的政策支持，大部分用于补贴该行业的新进者，由此吸引了众多低水平企业。中国成为了世界上最大的船舶生产国，但净利润的增长仅为补贴的五分之一。即使是表面看来很成功的电力行业也受到产能过剩的困扰。运行良好的电网需要相当于峰值负载15%的备用发电容量，而中国各省的平均水平超过90%。

但是，讨论不能就此画上句号。产业政策的价值最终要看它更广泛的经济影响。普林斯顿大学的刘恩思在另一篇论文中指出，在那些为其他行业提供最基本生产要素的行业里，国家支持最为有效。通常这些都是上游行业，将原材料转化为其他各行业使用的产品。向它们提供补贴能够提高整

体效率，即便是通过国有企业。中国恰好将政策支持集中在炼钢和机械等刘恩思所认为的正确行业。坦率地说，如果没有雄心勃勃的产业政策，中国可能永远不会成为今天这样的经济强国。

| 行业为王

刘恩思的模型没有说明补贴到什么程度就太高了，也没有说明该如何最好地设计政策。有证据表明，中国的强力干预正变得越来越无效。近些年，中国的全要素生产率增速一直是2008年全球金融危机之前的三分之一（见图表）。生产率增长在其他国家也有所放缓，但世界银行在近期有关中国创新的出版物中指出，中国的下滑异常迅猛。

在对汽车和可再生能源等行业进行了广泛的案例研究之后，世行将这种下跌的部分原因归咎于破坏了公平竞争的中国产业政策。它认为，中国不应该针对特定企业提供支持，而应该转向制定更以市场为导向的政策。不管是国有企业、民营企业还是外国投资者，监管和激励都应一视同仁，这在促进创业方面的作用要比大把补贴有效得多。

这种转变将带来有利的附带作用，有助于消除美国对中国的巨额补贴会削弱全球竞争对手的担忧。产业政策总是伴随着争议。但现在看来，中美两国的利益在此问题上极为罕见地达成了一致。不过两国领导人是否也这样看就是另一回事了。■



Climate change and energy

A bid for better batteries

Clean energy grids will not thrive unless the world gets better at storing power

SOLAR AND wind power are the glamorous twins of the clean-electricity revolution. It is thrilling to see a field of glistening panels absorbing the sun's energy or a vast turbine twirling above the ocean. Stationary power storage does not have quite the same allure—think of a large metal shed stuffed with piles of big batteries. Nonetheless, the ability to stockpile energy on a massive scale will be of supreme importance if the world is to wean itself off filthy fossil-fuel power plants. The technology is gradually getting cheaper and attracting investment. But more needs to be done to ensure that it sparks.

To see why storage is important, work backwards from the most common strategy to limit climate change. Plans typically reduce emissions from electricity generation by switching it away from fossil fuels, then electrify other carbon-belching activities, such as driving cars and heating buildings. Abundant, reliable, clean electricity is the foundation on which many green investments and policies rest. And to work well, clean electricity in turn depends on storage.

Nuclear plants could supply steady clean power, but they attract fierce opposition and are beset by cost overruns. Solar and wind are the fastest-growing alternatives. Today they account for 7% of global generation, twice the share in 2013. But the sun does not always shine and the wind may not blow. As the share of intermittent sources rises, so will demand for energy to offset swings in supply. In the short run, dirty coal and gas will have to provide flexibility. Eventually, however, storage must play that role, and the sooner the better. The aim is to capture solar and wind power when it is plentiful and release it as needed.

Today pumped hydropower is the most common way to store energy. When it is sunny or windy any excess electricity from solar and wind farms can be used to pump water uphill into reservoirs, to be released later to generate hydropower. But lots of places lack mountains, rain and room. Batteries are an alternative. They can smooth jumps and drops in supply and store renewable energy when it is abundant, as in California on a sunny afternoon, and then release it in the evening, when demand rises. They could transform big emerging markets that still plan to expand their use of fossil fuels. The International Energy Agency reckons that, excluding coal projects already planned, batteries have the potential to cut the number of coal plants built in India after 2030 by three-quarters.

If batteries are to realise their potential, they need to become cheaper and better. Progress is being made. Lithium-ion batteries have become 85% less expensive since 2010, as firms have poured capital into factories to mass-produce batteries for electric vehicles. Investment in storage capacity will hit about \$9bn next year, predicts BloombergNEF, a data firm, four times the level in 2017. But technical problems persist. For example, lithium-ion batteries are bad at storing energy for long periods, which is important in countries with rainy seasons. Happily, firms are experimenting. Tycoons, including Jack Ma of Alibaba and Jeff Bezos of Amazon, have invested in startups that are pursuing energy storage using everything from novel battery designs to molten salt to pressurised water pumped underground.

For firms and capital markets to work their magic, a policy is needed—if only because, more than in other industries, the state sets the rules in power. Vested interests and out-of-date thinking lead to a bias against batteries. In 2018 America's energy department granted \$28m in research awards for long-term storage—a pittance compared with, say, the \$150m the country spent on a tax break for coal royalties. Many places offer subsidies or mandates for wind and solar power, but not for the storage it will depend on to work at its best.

All too often storage technologies do not enjoy the same access to power grids and customers as dirtier sources of power do. Last year America's federal electricity regulator ordered the country's regional power markets to be opened up to storage, but implementation has been sluggish. The shift to clean energy will not happen unless it can be more easily stored. It is time for a high-voltage jolt to help an essential technology thrive. ■



气候变化与能源

改进电池

除非蓄电能力有所改进，否则清洁能源电网将无法蓬勃发展

太阳能和风能是清洁电力革命中闪耀的双子星。大片闪闪发光吸收着太阳能的电池板或在海上旋转着的巨大风力涡轮机都让人为之振奋。而固定不动的蓄电设施就没有这样的魅力——想想那堆满了大型电池的大金属棚吧。尽管如此，如果我们的世界要摆脱对污染环境的化石燃料发电厂的依赖，那么大规模存储能源的能力将至关重要。这项技术的成本正在逐渐下降，并开始吸引投资。但要确保它能真正腾飞还需要更多努力。

要了解为什么蓄电很重要，可以从限制气候变化的最常见策略来倒推。通常的策略是逐步淘汰化石燃料以减少发电产生的排放，然后将其他碳排放活动（如开车和供暖）电气化。充足、可靠又清洁的电力是许多绿色投资和政策的基础。而清洁电力要充分发挥作用，就要依靠存储能力。

核电站可以提供稳定的清洁能源，但它们引来了激烈的反对，并有成本超支的困扰。太阳能和风能是增长最快的替代能源，现在共占全球发电量的7%，是2013年的两倍。但太阳并不总是当空照耀，风也不是一直吹。随着间歇发电的能源占比增加，对于能平衡波动的电力的需求也会相应增加。短期内仍须依靠污染环境的煤和天然气来提供灵活性，但最终还是要靠蓄电来发挥作用，而且越快越好。未来的目标是在太阳能和风能充足的时候蓄电，在需要时释放。

如今，抽水蓄能发电是最常见的蓄电方式。晴天或大风时，太阳能和风力发电场的任何多余电力都可用来将水抽到高处的水库，之后再放水发电。但在很多地方，山、雨以及空间都不够。电池是另一种选择。电池可以稳定供应上的波动，在可再生能源充沛时（例如在加州一个阳光明媚的下午）存储电力，然后在需求增加的夜间释放。电池可以改变仍计划扩大化石燃料消耗的大型新兴市场。国际能源署估计，除已经规划完毕的燃煤发电厂外，电池有潜力把印度将在2030年后建设的燃煤发电厂数量减少四分

之三。

要发挥电池的潜力，必须降低成本，提高性能。进展正在发生。自2010年以来，随着企业大手笔投资工厂以大批量生产电动汽车所用电池，锂离子电池的价格已降低了85%。数据公司彭博新能源财经预测，今年对存储能力的投资将达到约90亿美元，是2017年水平的四倍。但技术问题仍有待解决。例如，锂离子电池难以长时间蓄电，而这对有雨季的国家很重要。好在企业正在展开各种试验。包括阿里巴巴的马云和亚马逊的杰夫·贝佐斯在内的大亨都投资了各种储能创业公司，从创新的电池设计到熔盐，再到将加压水注入到地下等。

要让企业和资本市场发挥魔力，还需要政策支持——哪怕仅仅是因为相比其他行业，电力市场的规则制定更由政府掌控。既得利益和过时的思维导致政府对电池抱有偏见。2018年，美国能源部拨款2800万美元资助长期蓄电研究，这与美国对煤炭采矿权的1.5亿美元税收减免比起来微不足道。许多地方为风能和太阳能提供补贴或设置强制性规定，但对它们要最大程度发挥作用所依赖的蓄电能力却没有任何扶持。

蓄电技术经常不能像污染性电力来源那样接入电网、获得客户。2018年，美国联邦电力监管机构命令美国的区域电力市场向蓄电开放，但实施缓慢。除非蓄电难度进一步降低，否则向清洁能源的转变将难以实现。现在有必要来一剂强心针，推动这项关键技术的发展。■



Novartis

Affair of the heart

Transforming a pharma conglomerate

THE BOSS of Novartis is on a buying spree. Vas Narasimhan has been shopping for new medicines that will reinvent his drug company. His aim is to turn a stodgy European conglomerate into a cutting-edge pharmaceuticals firm by decluttering it of unwanted assets and placing big bets on advanced medicines. These are more precise in the way they work and are likely to play an increasing role in health care in the future. By shuffling the deck, Mr Narasimhan says he is focusing on “transformative innovation”. All bosses of pharma firms like to boast about that kind of thing. Nonetheless, there is substance to the changes afoot at Novartis.

The latest acquisition, announced on November 24th, of the Medicines Company for \$9.7bn, brings with it a promising cardiac drug that targets bad cholesterol, and which can be given in only two annual shots. In less than two years at the helm, Mr Narasimhan has also snapped up an eye drug from Takeda for up to \$5.3bn, Endocyte, a small biopharma firm, for \$2.1bn, and AveXis, a gene-therapy firm, for \$8.7bn. He has boasted about having a pipeline of 25 blockbuster drugs. If they all come good it would be remarkable.

Out has gone the firm’s stake in a joint consumer health-care venture with GSK, a British pharma firm, for \$13bn. Alcon, its eye-care division, has been spun off into a separately traded company.

Pharma firms have been slow to adopt the digital transformations that have brought innovation (and disruption) to finance, shopping, banking and airlines. The new Novartis is more intent than rival drug firms on using big data and digital technologies to improve productivity and offer new

services. If it can harness big data, the firm could become more adept at drug development. This would, for example, allow Novartis to hone the way it runs clinical trials. It could also allow the firm to identify subgroups of patients within sufferers from diseases such as multiple sclerosis, who will respond better to particular drugs, significantly lowering the cost of treatment. The firm is also opening digital health labs, including one in San Francisco, to tap into start-ups in the health-technology field.

Even as it tries to reshape itself for the next era of medicine, Novartis still faces some criticisms familiar in the drug industry. One is high prices. Its gene-therapy drug, Zolgensma, is expected to cure spinal muscular atrophy, but costs \$2.1m per treatment in America. Novartis has also been sharply admonished by regulators and lawmakers for being slow to reveal that falsified data were used to gain approval for the drug. The firm says it was standard procedure to investigate before informing authorities. The dodgy data seem to have no bearing on the safety or efficacy of the drug.

When it comes to the new heart drug Mr Narasimhan has bought, he will have less pricing power than with Zolgensma. Although the medicine may be better than its rivals, the market is crowded with similar drugs that are not selling well. But while its transformation is under way at least Novartis, like its rivals, can rely on a booming Chinese market, where the government is now paying reasonable prices for foreign drugs. Novartis talks of doubling sales in Asia over the next five years. Investors who are worried about the high price paid for the Medicines Company can take heart. ■



诺华

“心”事

一家制药集团的转型

诺华的掌门人正在大手笔收购资产。公司CEO万思瀚（Vas Narasimhan）正积极物色可以重塑自家公司的新药。为了将这家庞大臃肿的欧洲巨头转型为前沿制药企业，他一方面剥离非核心资产，另一方面重金押注先进药物。新型药物的作用机制更加精确，有望在未来医疗当中发挥愈加重要的作用。通过一轮洗牌，万思瀚表示他正专注于“变革性创新”。所有药企老板都喜欢夸耀这种概念，但在诺华，事情的确在发生实质性的变化。

在去年11月24日宣布的最新一笔交易中，诺华以97亿美元收购Medicines Company，将其极具前景的心脏病药物纳入囊中。这是一种能针对性地降低坏胆固醇的新药，每年只需注射两次。万思瀚掌舵还不到两年，已经以53亿美元收购了武田制药（Takeda）的一种眼科药物，以21亿美元收购了小型生物医药公司Endocyte，以87亿美元收购了基因疗法公司AveXis。他曾宣称公司有25种重磅药物在研发中。如果全部成功上市，必将非同凡响。

诺华还以130亿美元卖掉了与英国药企葛兰素史克合资的消费保健品企业中的股份。其眼科护理业务爱尔康（Alcon）也从公司剥离，成为独立的上市公司。

数字化变革已经为金融、零售、银行和航空业带来了创新（以及颠覆），而制药企业顺应这一变革的速度相对较慢。新的诺华比竞争对手更加积极地运用大数据和数字技术来提高生产率以及提供新服务。如果能够利用好大数据，诺华就能更加得心应手地开展药物研发。举例来说，诺华可以改进临床实验，还可以在多发性硬化症等疾病的患者人群中识别出对某种药物反应更好的病人亚组，从而大大降低治疗成本。公司还在旧金山等地开设了数字健康实验室，以便发掘医疗科技领域的创业公司。

诺华在为了迎接医学新时代而努力改造自我之时，仍然要面对外界对制药业常见的诟病。价格高昂就是其中之一。诺华的基因治疗药物Zolgensma有望治愈脊髓性肌萎缩症，但在美国一剂药的价格高达210万美元。此外，该药物申报审批的数据被发现涉造假，但诺华没有及时披露，因此受到监管和立法部门的严厉谴责。诺华表示先开展内部调查然后才上报当局的做法是标准程序。不过，有问题的数据似乎对药物的安全或疗效并无影响。

至于万思瀚买下的心脏病新药，他将不会有对Zolgensma那样的定价权。虽然该药可能比竞品更胜一筹，但市场充斥着大量销量平平的同类药物。尽管如此，在诺华的转型过程中，至少还是可以像其他竞争对手一样依赖蓬勃发展的中国市场，而中国政府现在也愿意为外国药品支付合理的价格。诺华提出未来五年内将亚洲销售额翻一番。那些担心Medicines Company收购价格太高的投资者可以安心了。■



Keyboards of the world

The Middle-C Kingdom

How China made the piano its own

ONE LOVE story began in the 1930s, on a road of magnificent Western-style villas on the tiny Chinese island of Gulangyu. Cai Pijie, a lad in his 20s, walked daily past the open window of a young lady he had admired from afar. She regularly practised the piano, an instrument then unheard of in much of China, and the notes floated out in the warm southern air. Entranced, Cai wrote her a letter. “Please play Ignace Leybach’s ‘Fifth Nocturne’ if you love me.” Weeks passed before one day her piano answered, and their courtship began. They married. As Cai grew old in the 1980s, his son, Cai Wanghuai, played the nocturne to comfort him. It was the last piece of music he heard before he died.

The younger Cai had by then become deputy mayor of Xiamen, the city of which the island is a part, and helped found Gulangyu’s music school, which opened in 1990. Political grandees have visited, including Xi Jinping, the current Communist Party leader. Jiang Zemin, a classical-music fan who was one of his predecessors, asked students to strike up “O Sole Mio” when he visited, singing it in the original Neapolitan.

Last summer more than a third of the school’s graduates entered top overseas conservatories in America, Germany and Russia. The rest joined the growing number of Chinese ones. They are all part of another relationship that has flourished in the decades since Cai heard the strains of Leybach’s nocturne: a love affair with the piano that has spread all across the nation.

Of the 50m children learning the instrument worldwide, as many as 40m may be Chinese. Shanghai alone has over 2,700 music schools, by one

estimate. The government lavishes money on orchestras, which now number over 80, and new concert halls. Grizzled bureaucrats, fastidious parents and cool young things fill them to hear the latest *wunderkind*—among whose number, in recent decades, have been Lang Lang, Li Yundi and Yuja Wang (pictured)—play some beautifully judged Bach or fiendishly hard Rachmaninov.

| *Musical missionaries*

The piano on which Mr Cai's mother played her serenade in the 1930s was a rare foreign import; now four in five are made in China. No country buys more. And much of this can be traced back to Gulangyu.

After Britain defeated China in the first opium war in 1842, foreign powers forced the emperor to permit their residents to live in several "treaty ports". One of those was Xiamen (then known as Amoy). Up until 1943 Gulangyu, which lies just a five-minute ferry ride offshore, was an international settlement run by 13 nations and guarded by a Sikh regiment from British-ruled India. It held in its hilly two square kilometres an American consulate, a British school, a Japanese hospital and a Danish telegraph office, among other institutions. The missionaries' music filled the island's churches, whose number grew to six, and converts picked up the strange new melodies.

Mary Doty Smith, the daughter of one of the early American missionaries there, wrote of tea merchants who stopped by their home in the 1850s to hear her mother play what was, for a time, the island's only piano. They brought new scores: "Blue Bells of Scotland" and "Auld Lang Syne". "The Chinese women seemed spellbound at the instrument, as well as the voice, producing such sweet sounds," Smith wrote. Though the wives of missionaries taught locals to play, it was expatriates who, missing the music of home, popularised the piano as an everyday amusement. There was soon hardly a family on the island that did not host or go to hear an

evening recital.

It is hard to imagine a lovelier setting for this musical Shangri-La, filled with coconut palms, pink bougainvillea and subtropical plants carried home by overseas Chinese merchants enriched from trade in the East Indies. A Westerner writing in the 1920s said the island would surely vie for the distinction of being the “wealthiest square mile in the world”. For decades it has also claimed another distinction: the largest number of pianos per person in China. By the 1950s it had 500 pianos for some 20,000 people.

The result was a stream of outstanding musicians. At the turn of the 20th century Zhou Shu’an, an islander whose father was a priest, rose to fame singing “The Star-Spangled Banner” to welcome an American navy ship. From 1928 she helped run what became the Shanghai Conservatory of Music, the first Western-style conservatory. Chen Zuohuang, born in 1947, became the conductor of China’s Central Philharmonic Orchestra, and led its first American tour in 1987. Fei-Ping Hsu, a pianist and the son of a Christian pastor, was playing with China’s national orchestra at the age of 18.

But the island’s most celebrated musician is Yin Chengzong. Though Mr Yin has lived in New York for decades, he regularly returns to China to perform and to stay in the family’s 1920s villa on Gulangyu. On a hot autumn day, the 78-year-old pianist points out the longan, papaya and starfruit trees in the villa’s garden.

In the 1940s Mr Yin was a boy soprano at one of Gulangyu’s churches. He began playing the piano aged seven, taught by the pastor’s wife. He spent half his pocket money on classes and the other half on sheet music. He was 12 when he left the island to attend the preparatory school for the Shanghai Conservatory.

He describes how 100 people once squeezed into the Yins' elegant living room for a family recital. In a corner is modern China's first Steinway, obtained by the government of Mao Zedong for Sviatoslav Richter when the Soviet pianist came to perform in 1957. Seven more pianos are strewn about the house. A photograph of Mr Yin taking tea with Mao in 1963 hangs above the mantelpiece. In an exhibition hall nearby is a photo of him with Richard Nixon in 1976, during Nixon's second visit to China.

As the Richter Steinway shows, Western music still flowed in the early years of Mao's rule. The most promising pianists were sent to participate in competitions in other communist countries. In 1955 Fou Ts'ong, a translator's son from Shanghai, won third place in the Chopin Competition in Warsaw. In 1962 Mr Yin came joint-second in the International Tchaikovsky Competition in Moscow, where he stayed on for further training.

Soon after his return, the ravages of the Cultural Revolution began and anything Western or cultured was attacked. In 1966 Mao's Red Guards tormented China's musicians, tore up Western scores and took their axes to any pianos they found—those “black boxes in which the notes rattled about like the bones of the bourgeoisie”, in the (perhaps apocryphal) words of Jiang Qing, better known as Madame Mao.

| *Tragedy in red*

Li Cuizhen, a missionary-trained pianist who knew all 32 of Beethoven's sonatas by heart, was declared a counter-revolutionary. Red Guards hounded her and she killed herself in 1966. Fou's parents hanged themselves soon after (he had already defected to London).

Lu Hong'en, the conductor of the Shanghai Symphony, was thrown into a cell. He continued to hum Beethoven there. After he tore up a copy of Mao's “Little Red Book”, he was sentenced to death. Lu told a fellow prisoner: “If

you get out of here alive, would you do two things? Find my son, and visit Austria, the home of music. Go to Beethoven's tomb and lay a bouquet of flowers. Tell him that his Chinese disciple was humming the 'Missa Solemnis' as he went to his execution." Lu was shot within days. His cellmate reached the Viennese grave three decades later.

On Gulangyu the Yins were thrown out of their villa, as were many others. But the cosmopolitan enclave—perhaps because of its remoteness, perhaps because it was shielded by local officials with an attachment to music—was spared the worst of the brutality. Still, the island fell silent. Some found ways to play clandestinely, and others rehearsed the motions soundlessly with their hands, says Zhan Zhaoxia, a local historian.

In the 1960s Mr Yin had, despite all this, begun to compose. "The piano needed to be made Chinese," he says, "and for all Chinese." He had known only church music and the likes of Mozart and Chopin. Now he burnished his Maoist credentials by playing revolutionary ballads to workers in factories. In May 1967 he and three friends carried a piano, along with a banner reading "Mao Zedong Thought Propaganda Team", into Tiananmen Square. There he played in the open air for three straight days. "We had no idea what would happen," he says. By the third day over 3,000 had gathered to listen.

The young pianist caught the ear of Madame Mao, who saw the possibility of using his talents for propaganda purposes. He became part of a group of favoured musicians working on her state-approved model operas. In 1969 he arranged an earlier revolutionary cantata into the "Yellow River Piano Concerto". It remains China's most famous orchestral composition.

Mr Yin performed his concerto with the Philadelphia Orchestra when it visited in 1973, the first from America to tour communist China. Less than four years later, soon after the death of Chairman Mao in 1976, Beethoven's

“Fifth Symphony” rang out from radios and televisions across China. It was taken as evidence by many, write Jindong Cai and Sheila Melvin in their book, “Beethoven in China” (2015), that the Cultural Revolution was finally over.

Slowly, what had been suppressed—bright clothes and capitalism, Confucius, Christianity and more—re-emerged. So did the piano. Far from being killed off, love for it had grown. When in 1978 the Central Conservatory of Music in Beijing reopened, 18,000 people applied for 100 places in its composition department. “Where did all those musicians come from?” asks Jindong Cai, the author (who is unrelated to Cai *père* and *fil*s of Gulangyu). “Many had been practising Bach and Beethoven in secret.”

Jindong Cai was moved to become a conductor when he first heard Beethoven performed in Beijing in 1979. He went on to lead China’s best orchestras, and now teaches at Bard College Conservatory of Music in America. He recalls heady days when securing a piano required a long wait. In 1980 Mr Cai got his hands on one through a contact. “I remember that time with great excitement,” he says. “There was such a thirst for classical music.” Soon even members of the Politburo were professing their love for it.

Though capitalism, political reform and religion have, at times, stumbled since then, Chinese pianists have only soared, emerging into a nation, and a world, that is happy to fete them.

Mr Yin, though, could see his future in China would be difficult after the fall of Madame Mao. Eventually, in 1983, he left for America—though his music was hardly loved there. In the *New York Times* Harold Schonberg sniffed that Mr Yin’s concerto was “one of those awful ideologically approved pieces of socialist-realism propaganda, but it was so bad it actually had kitsch value”.

But so what? The piece had helped secure a place for the piano in China. It had rescued companions, too. Mr Hsu, the fellow pianist from Gulangyu, was among the first musicians who, having been banished to work on a farm, was rehabilitated after agreeing to perform the “Yellow River Concerto” to army units.

It is today part of every serious repertoire in China. Young idols have recorded renditions. In 2007 Lang Lang—once a student of Mr Yin—hammered out its final movement for the one-year countdown ceremony of the Beijing Olympics. It was recently performed at Carnegie Hall by Zhang Haochen, a rising star.

| *Means of production*

Chinese factories have become attuned to the needs of this booming market. In 1956 the state had directed a group of piano-fixers to start building the instruments in Guangzhou, but for years Pearl River Piano could not muster even one a month. In the 1980s foreign advisers were flown in. Today the state-run company makes more than any other producer worldwide. It builds for Steinway, maker of the world’s finest pianos. Inside the factory, hissing machines make a music of their own, stamping and spitting out their wooden parts. Last year 150,000 pianos rolled off its assembly lines, almost a third of global production. Two in five stayed in China. The company also revived Ritmüller, a defunct German piano brand, and bought Schimmel, another languishing producer.

Where once Western classical music flowed into China, pianists and their renditions are pouring out. China is poised to deliver world-class compositions, says Mr Cai. In 2018 the US-China Music Institute that he began premiered six new Chinese symphonic pieces in Carnegie Hall. The Juilliard School in New York opened its first overseas campus last autumn in Tianjin, a northern Chinese city.

Some misgivings remain, abroad and at home, about whether Chinese technical brio is yet matched by imaginative brilliance. Cao Huanyu reflects on this, too. Like many learners he came from a small town with no top piano teachers. Yet he stood out and made it to Gulangyu's music school. In his final year there, he is applying for Juilliard and the Colburn School.

Mr Cao spends hours practising, but he also wanders the gardens. He worries that China's musical world is too rigid. Students have beautiful technique, he says. "But in practising those long hours, something is lost. The smell of the air, the colours of the trees...I try to put them into my music."

To listen to a playlist of pieces mentioned here, and more, go online to economist.com/pianos ■



世界的琴键

中央C王国

中国如何打造自己的钢琴文化

这是一段始于上世纪30年代的爱情故事，发生在中国鼓浪屿一条满布华丽洋房的街道上。当时20来岁的小伙子蔡丕杰每天走过一扇敞开的窗户，屋里有一位他远远仰慕着的年轻姑娘。姑娘经常练习钢琴，琴声在南方温暖的空气中飘扬，而那时候在中国大部分地区，人们对钢琴还是闻所未闻。为之着迷的蔡丕杰给她写了一封信。“如果你爱我，请弹奏雷拜克的《第五首夜曲》。”几周后，她的钢琴终于做出了回应，他们开始恋爱，最后结了婚。到了80年代，蔡丕杰年事已高，儿子蔡望怀会弹奏这首夜曲抚慰老父。他去世前听到的最后一首曲子也是《第五首夜曲》。

那时，蔡望怀已经是鼓浪屿所在的厦门市的副市长，1990年帮助在鼓浪屿创办了厦门市音乐学校。许多政要曾到校视察，包括现任中共中央总书记习近平。前最高领导人之一、古典乐迷江泽民到访时用原版那不勒斯方言演唱《我的太阳》并请学生伴奏。

去年夏天，这所学校有超过三分之一的毕业生入读美国、德国和俄罗斯的顶级音乐学院。其余的也顺利升读中国各地为数越来越多的音乐学院。这些都属于自蔡丕杰听到雷拜克夜曲的琴音以后的几十年里发展起来的另一种情感关系：人们对钢琴的热爱已蔓延至全国。

全球5000万钢琴学童中可能有多达4000万是中国孩子。据一项估计，仅上海就有2700多所音乐学校。政府大力资助管弦乐团（现有80多个）和建设新音乐厅。头发斑白的官员、严格挑剔的父母和打扮入时的年轻人济济一堂，在音乐厅聆听最新出现的音乐神童（最近几十年有朗朗、李云迪和上图中的王羽佳）演奏美妙演绎的巴赫或难度超高的拉赫玛尼诺夫的曲子。

| 音乐传教士

蔡望怀的母亲在30年代用来弹奏小夜曲的钢琴在当时是稀有的舶来品，而现在，全世界五分之四的钢琴是中国制造的。中国的钢琴购买量也居全球之冠。而这股热潮主要发端于鼓浪屿。

在1842年第一次鸦片战争英国击败清军后，外国势力迫使道光皇帝允许外国居民在多个“通商港口”居住。厦门（当时英译名为Amoy）是其中之一。到1943年前，坐船五分钟就能到达的鼓浪屿一直是被13国占据并由英属印度的锡克士兵充当巡捕的“国际租界”。在这片两平方公里的丘陵小岛上建有一座美国领事馆、一所英国学校、一家日本医院和一家丹麦电报局等机构。传教士的音乐充满了岛上的教堂（数量增至六所），改信基督教的信徒渐渐熟习了这些奇特的新旋律。

玛丽·多蒂·史密斯（Mary Doty Smith）是早年移居那里的一位美国传教士的女儿。她写道，在19世纪50年代，茶商经常顺道登门听她母亲弹奏钢琴（一度是岛上唯一的一架钢琴）。他们会带来新曲谱，如《苏格兰的蓝铃花》（Blue Bells of Scotland）和《友谊地久天长》（Auld Lang Syne）。史密斯写道：“那些中国女士个个心醉神迷，不止为琴音，也是为能传出如此悦耳声音的乐器。”传教士的妻子们会教当地人弹琴，但真正把弹琴普及为日常娱乐活动的是岛上思念家乡音乐的外国人。没多久，岛上几乎家家户户都举办或参加过钢琴演奏晚会。

很难想象还有什么更适合这个音乐世外桃源的美妙环境了：到处是椰子树、粉色勒杜鹃和其他亚热带植物，由那些在东印度贸易中致富的海外华商带回家来。上世纪20年代，一位西方人写道，鼓浪屿绝对有资格争取“全球最富一平方英里”的殊荣。这几十年来，它又获得了另一份荣耀：中国人均拥有钢琴数量最多的地方。到上世纪50年代，岛上约两万人口拥有的钢琴数量已达500台。

结果就是这里盛产杰出的音乐家。20世纪初，牧师的女儿、岛民周淑安高唱美国国歌《星条旗》（The Star-Spangled Banner）迎接一艘美国军舰到访，一举成名。从1928年开始，她协助创办了中国第一家西洋音乐学院，

即后来的上海音乐学院。1947年出生的陈佐湟后来成为中国中央乐团的指挥，并于1987年率领乐团首次赴美巡回演出。基督教牧师之子许斐平是一位钢琴家，18岁就已在中央乐团演奏。

但岛上最著名的音乐家是殷承宗。尽管他已定居纽约几十年，但还是会定期回国演出，还会回到家族在鼓浪屿上那栋20年代的洋房小住。在一个炎热的秋日，这位78岁的钢琴家向笔者指认洋房花园中的龙眼树、木瓜树和杨桃树。

上世纪40年代时，殷承宗是鼓浪屿一所教堂的男童高音。七岁时他开始跟一位牧师的妻子学钢琴。他把一半的零用钱花在琴课上，另一半用来买琴谱。到12岁，他离开鼓浪屿，入读上海音乐学院附属中学。

他回忆当年曾有100人挤进殷家洋房那优雅的客厅，就为听一场家庭演奏会。客厅一角摆放着新中国第一架施坦威钢琴，那是毛泽东政府为1957年苏联钢琴家斯维亚托斯拉夫·里希特（Sviatoslav Richter）访华演出而购买的。房子里还有另外七架钢琴。壁炉架上方悬挂着殷承宗在1963年与毛泽东喝茶的照片。旁边的展厅里挂着一幅1976年他与二度访华的时任美国总统尼克松的合影。

从那架施坦威可见，在毛泽东执政初期，西方音乐仍在国内流传。最优秀的钢琴家被派往其他共产主义国家参加比赛。1955年，翻译家傅雷之子、来自上海的傅聪在华沙举行的肖邦国际钢琴比赛中获得第三名。1962年，殷承宗在莫斯科举行的柴可夫斯基国际大赛中获得钢琴组并列第二，之后他留在那里进修。

就在他回国后不久，文化大革命的破坏开始了，任何与西方或文化修养有关的事物都遭到攻击。1966年，毛泽东的红卫兵批斗国内音乐家，撕毁西方乐谱，向钢琴挥舞斧头，见一台砸一台；用毛泽东夫人江青的话说（可能是杜撰的），那些“黑箱子叮咚作响就像资产阶级的骨头”。

| 红色悲剧

李翠贞是一位由传教士培养出来的钢琴家，熟记贝多芬的全部32首奏鸣

曲，在文革中被定为反革命分子。在红卫兵的迫害下，她在1966年自杀身亡。傅聪的父母也在不久后自缢离世（傅聪当时已出走伦敦）。

上海交响乐团的指挥陆洪恩被扔进牢房。他在狱中继续哼唱贝多芬的乐曲。在撕毁毛泽东的“红宝书”后，他被判处死刑。陆洪恩对一位狱友说：“如果你能活着出去，能帮我做两件事吗？找回我儿子，还有是去一趟音乐之乡奥地利。到贝多芬墓前献上一束鲜花。告诉他，他的中国门徒在被执行死刑时哼着《庄严弥撒》。”几天后陆洪恩被枪决。30年后，他的狱友去到了维也纳的贝多芬墓前。

在鼓浪屿，殷承宗一家跟许多其他人一样被赶出了自家洋房。但也许因为地处偏僻，或是因为喜爱音乐的地方官员暗中保护，这个万国风情的小岛免于最残暴的蹂躏。尽管如此，岛上还是变得静寂了。当地历史研究人员詹朝霞说，有些人想办法秘密弹琴，另一些人用手指做无声的练习。

尽管如此，殷承宗还是在60年代开始作曲。“必须把钢琴中国化，”他说，“并为所有中国人演奏。”他原来只懂教堂音乐和莫扎特、肖邦之类的曲目。现在，他通过向工厂工人演奏革命歌曲来确立自己的毛派身份。1967年5月，他和三个朋友把一架钢琴搬到天安门广场，拉起横幅，上面写着“毛泽东思想宣传队”。在那里，他连续在露天演奏了三天。他说：“我们不知道会发生什么。”到第三天，已有3000多人围观聆听。

这位年轻钢琴家引起了江青的注意，她认为可以利用殷承宗的才华进行政治宣传。他成为钦选音乐家中一员，专门演奏政府认可的样板戏。1969年，他把一首早期的革命颂歌改编成《黄河钢琴协奏曲》。至今它仍是中国最著名的管弦乐作品。

殷承宗在1973年费城交响乐团访华时与之合作演奏了这首协奏曲，这是首个到共产主义中国巡回演出的美国乐团。不到四年后，在毛泽东于1976年去世后不久，贝多芬的《第五交响曲》在中国各地的电台和电视中响起。许多人认为这标志着文化大革命的结束，蔡金冬和希拉·梅尔文（Sheila Melvin）在《贝多芬在中国》（Beethoven in China, 2015年出版）一书

中这样写道。

渐渐地，曾经受打压的一切得以重现——靓丽的衣饰、资本主义、孔子、基督教，等等。钢琴也一样。人们对钢琴的热爱不仅没被抹杀，反而有增无减。1978年，中央音乐学院在北京重新招生，有18,000人申请其作曲系的100个名额。“这些音乐家都是从哪里来的？”蔡金冬（与鼓浪屿的蔡丕杰父子无亲缘关联）问道，“许多人一直在偷偷练习巴赫和贝多芬。”

一九七九年蔡金冬在北京首次听到乐团演奏贝多芬的乐曲，深受感染的他立志成为指挥家。后来他担任过中国多个顶尖乐团的指挥，现任教于美国巴德音乐学院（Bard College Conservatory of Music）。他回想起当年买一架钢琴要长时间等候的那些兴奋焦急的日子。1980年，蔡金冬通过熟人买到了一架钢琴。“想起那个时候就很兴奋，”他说，“对古典音乐就是这么渴求。”很快，甚至连中央政治局的委员们也公开表示自己热爱古典音乐了。

从那时起，尽管资本主义、政治改革和宗教问题跌跌撞撞，中国的钢琴家却一路崛起，走向全国、全世界，为人敬仰。

不过，殷承宗可以预见到江青垮台后自己在中国的前景堪忧。最终他在1983年移居美国，尽管他的音乐在那里不受待见。《纽约时报》的哈罗德·勋伯格（Harold Schonberg）鄙夷地称殷承宗的协奏曲是“那种糟糕的、受意识形态控制的社会主义现实主义政治宣传品，但他的曲子还庸俗滥情，更显差劲”。

但那又如何？这首曲子帮助钢琴在中国获得了一席之地。它也让殷承宗的同行摆脱了困境。来自鼓浪屿的钢琴家许斐平在文革期间被下放农场劳动，在答应给部队演奏《黄河钢琴协奏曲》后，他成为最早返城的音乐家之一。

今天，这首曲子已是中国每个乐团的必备严肃曲目。年轻偶像们也录制了他们自己的版本。2007年，在北京奥运会倒计时一周年的庆祝仪式上，曾师从殷承宗的朗朗演奏了《黄河钢琴协奏曲》的最后一个乐章。而钢琴新

星张昊辰近年在美国纽约卡内基音乐厅也演奏了此曲。

| 生产资料

中国的工厂已经跟上了这个繁荣市场的需求。1956年，政府指示一群钢琴修理工在广州开始制造钢琴，但很多年里，珠江钢琴厂一个月都造不出一架钢琴。到了80年代，工厂请来了外国顾问。如今，这家国有企业的产量超过全球任何其他钢琴制造商。它还为世界上最好的钢琴厂商施坦威代工。工厂内，机器冲压并吐出钢琴的木制零件，那嘶嘶鸣响自成一篇文章。去年工厂流水线上出产了15万架钢琴，占全球产量近三分之一。其中五分之二在中国国内销售。该公司还复兴了已停产的德国钢琴品牌里特米勒（Ritmüller），又收购了另一家衰落的钢琴生产商舒密尔（Schimmel）。

以往都是西方古典音乐向中国输入，现在是大批中国钢琴家和他们演绎的作品向外国输出。蔡金冬表示，中国已准备好创作出世界一流的作品。2018年，他创立的巴德音乐学院美中音乐研习院（US-China Music Institute）在卡内基音乐厅首演了六首全新的中国交响乐作品。纽约的茱莉亚学院（Juilliard School）去年秋天在天津开设了首个海外校区。

相比卓越的演奏技艺，中国人的艺术创造力跟得上吗？海内外对此均有疑虑。曹焕宇（Cao Huanyu，音译）也在思考这个问题。和许多习琴者一样，他来自一个没有顶尖钢琴老师的小镇。然而他脱颖而出，考进了鼓浪屿的音乐学校。现在到了最后一个学年，他正在申请就读茱莉亚学院和科尔本音乐学院。

曹焕宇每天花几个小时练琴，但他也会到花园里散步。他担心中国人的音乐世界过于僵化。他说，同学们琴技娴熟，“但在长时间的练习中，有些东西丢失了。空气的味道、树木的颜色……我努力把这些融入我的音乐里。”

欲收听本文提及的曲目和更多音乐，请访问economist.com/pianos ■



Negative thinking

Glass half-empty

It takes four good things to overcome one bad thing. So says a provocative study of the power of negative thinking

A POOR FIRST impression, it is widely acknowledged, counts for more than a good one. Memories that resurface suddenly tend to be unpleasant. Professional fearmongers draw a larger, more receptive audience than purveyors of restrained analysis. It is normal for people to dwell on a word of criticism for much longer than they luxuriate in a shower of praise.

For Roy Baumeister, a social psychologist, and John Tierney, a journalist, these are symptoms of “the power of bad”. Their provocative book explores what they characterise as “the universal tendency for negative events and emotions to affect us more strongly than positive ones”. Their examples make for uncomfortable reading. “One moment of parental neglect can lead to decades of angst and therapy,” they write chasteningly, “but no one spends adulthood fixated on that wonderful day at the zoo.” Other claims are dispiriting: “Successful marriages are defined not by improvement but by avoiding decline.”

Yet the authors are shrewd about the ways in which negativity can pollute both intimate relationships and large groups. They also show that bad experiences can be instructive, using stories to humanise a subject that could otherwise be dry. One concerns Felix Baumgartner (pictured), a skydiver who spent years masking his anxieties, which multiplied as he stubbornly projected an air of confidence. They only burst forth when he was in final rehearsals for an attempt to leap from a balloon 24 miles (39km) above Earth.

As they examine how Mr Baumgartner and others reverse morbid patterns

of thought, the authors set out a rule of thumb: “It takes four good things to overcome one bad thing.” Accordingly, they are less keen on accentuating life’s positives than on trying to muffle its negatives. In part that means reframing adversity, like wounded soldiers who view injury “not as something that shattered their plans but as something that started them on a new path”. On a more parochial note, they advise that people who have to deal with rude customers finish every encounter, no matter how bruising, with a positive gesture—and that if you are likely to be on the receiving end of reviews, you should get a friend to summarise them, to avoid direct exposure to indelibly hurtful phrases.

A few of the authors’ tips are bland: keep to a minimum your dealings with any colleague who is clearly a bad apple, “make time for nostalgia” and in dark moments try repeating the analgesic phrase, “This too shall pass.” More often, though, their tone is challenging. They believe that higher education, after decades of enfeeblement by exaggerated anxieties about student well-being, should embrace a policy of “less carrot and more stick”. Public debate, they argue, tends to be shaped by people whose livelihood depends on amplifying the chances of catastrophe. Thus the commentariat offers rivetingly grim pieces about the risks of opioid pain-relievers, but fails to acknowledge their benefits.

At times, such judgments on supposedly overblown negativity may strike readers as a touch blasé (the authors reckon a patient’s risk of addiction to opioids is “probably less than one or two percent”). The pair are at their most bracing when, instead of lambasting the doomsayers, they extol “the upside of bad” and the power of negative experiences “to sharpen the mind and energise the will”. It has to be said, though, that some of those upsides come with titanic quantities of downside. At one point, they approvingly cite Samuel Johnson’s macabre observation that “when a man knows he is to be hanged in a fortnight, it concentrates his mind wonderfully.” ■



消极思维

半空的杯子

一项关于消极思维威力的富争议性的研究指出，一件坏事的影响要用四件好事才能抵消【《坏事的威力》书评】

人们普遍认为，糟糕的第一印象比良好的第一印象影响更深远。突然浮现的记忆往往都是令人不愉快的。专业散播恐慌的人比提供克制分析的人吸引的听众更多，其看法也更易为听众接受。同样常见的是，人们不会长久沉浸在如潮的赞美声中，但对批评的话语却久久难以释怀。

在社会心理学家罗伊·鲍姆梅斯特和记者约翰·蒂尔尼看来，这些都是“坏事的威力”的体现。他们富争议性的著作探索了一种“普遍倾向”，即“负面事件和情绪对我们的影响要比积极事件和情绪的影响更大”。他们举出的例子读来让人颇不自在。“父母一瞬间的忽视可能导致持续数十年的焦虑和治疗，”他们令人警醒地写道，“但是没有谁在成年后会深情怀念在动物园度过的美好的一天。”还有些说法令人气馁：“成功的婚姻不是由进步而是由避免退步来定义的。”

不过，关于负面事件究竟是如何败坏亲密关系和大型群体的，作者们的观察非常敏锐而精准。他们还表明糟糕的经历可能具有教育意义，并用了一些故事来使这一原本可能会很枯燥的话题变得充满人情味。其中一则故事的主角是跳伞运动员菲利克斯·鲍姆加特纳（Felix Baumgartner，见图）。多年来他一直在掩饰自己的焦虑，但当他倔强地摆出自信的姿态时，焦虑却成倍增加。他尝试从离地球24英里（39公里）的气球上跳伞，而在最后的彩排中，他的焦虑爆发了。

两位作者开始研究鲍姆加特纳和其他人是如何逆转病态的思维模式的，过程中他们提出了一条经验法则：“克服一件坏事的影响需要四件好事。”相应地，他们不太热衷于强调生活的积极面，而更注重积极去降低消极面的影响。在某种程度上，这意味着要重新审视逆境，就像受伤的士兵认为负伤“不是打碎了他们的计划，而是推动他们走上了一条新的道路”。在一个

更具体的情境中，他们建议那些不得不与粗鲁的顾客打交道的人以积极的姿态结束每一次接触，不管刚刚的经历有多么让人受伤——另外，如果你很有可能是要接受评价的一方，那你应该找一个朋友替你来总结评语，从而避免直接接触到那些可能会造成不可磨灭的伤害的恶言恶语。

作者的某些建议平淡无奇：尽量少和任何明显是害群之马的同事打交道；“腾出时间怀旧”；在黑暗时刻试着反复默念能够抚慰伤痛的话语——“都会过去的。”不过更多时候，他们的论调很挑战人们的认知。他们认为，几十年来，高等教育对学生的福祉焦虑过度，以致自身衰弱无力，如今应采取“少给些胡萝卜，多来些大棒”的政策。他们指出，有些人的生计就是靠夸大灾难事件发生的概率，而能够影响公共辩论的往往正是这种人。因此，时事评论员的报道都在说阿片类镇痛药的风险如何之大——读来令人沮丧却又欲罢不能——而不愿承认这类药物的益处。

有时，这种对于“过度消极”的判断可能会让读者感到一丝冷漠（作者认为患者对阿片类药物上瘾的风险“可能不到1%或2%”）。但当他们选择不去痛斥末日预言家，而是赞美“坏事的积极面”和消极经历“磨砺头脑和激发意志力”的力量时，还是相当让人精神一振。然而不得不提的是，他们所说的积极面有些要从极其巨大的消极面中才能获得。在书中某一处，他们赞许地引用了塞缪尔·约翰逊令人恐怖的心得：“当一个人知道他两周内就会被绞死时，他的思想就变得高度集中了。”■



Stellar evolution

Time for a Big Bang?

Betelgeuse, one of the brightest stars in the sky, has been behaving strangely

THE GREAT Collapsing Hrungr Disaster of the Year 03758 is shrouded in mystery. All that is known about this event, mentioned in a footnote to “The Hitchhiker’s Guide to the Galaxy”, by Douglas Adams, is that the only survivor was the father of one of the story’s main characters, Ford Prefect—and that it took place on one of the planets orbiting Betelgeuse.

Betelgeuse is a red supergiant star in Orion, a prominent constellation that spans the celestial equator. It is one of the brightest objects in the night sky, easily visible to the naked eye. It has around ten times the mass of the sun, and if it were at the centre of the solar system its outer edge would stretch beyond the orbit of Mars.

Betelgeuse shines more brightly than the sun partly because it is bigger and thus has more fuel, but also because it is burning through that fuel faster. As a result, it will die much sooner. The sun is around halfway through its 10bn-year lifespan. Betelgeuse’s span will be about 10m years, and it is close to the end of that period—perhaps very close. For, in the past few weeks, astronomers have watched it getting precipitously dimmer and that has made them wonder: could this be a signal that Betelgeuse’s time has come?

When a star such as Betelgeuse runs out of fuel the nuclear reactions in its core which keep it shining stop—and with them the heat and outward radiation pressure needed to balance the force of gravity trying to pull everything inward. At that point, gravity wins. The core collapses. And the resulting shock wave destroys the star in an explosion called a supernova that is temporarily brighter than the rest of Earth’s home galaxy, the Milky

Way, put together.

| *Brighter than a billion suns*

From Earth, a mere 600 light-years away, a Betelgeuse supernova would be spectacular. It would be visible in the daytime for weeks, as bright as the full Moon at night, and able to cast shadows. The last supernova thought to have had such brightness occurred a millennium ago. For astronomers, it would be an unprecedented opportunity to use their armoury of observatories—electromagnetic, gravitational and neutrino—to study the final moments of a star, close-up, as it collapses.

So far, the closest supernova seen since the telescope was invented is SN1987A, spotted more than three decades ago in the Large Magellanic Cloud, a galaxy 160,000 light-years from the Milky Way. But astronomers detected SN1987A only after it had already happened. They have never been able to bring modern instruments to bear on a supernova in the Milky Way itself, and never watched a star in the moments before and during its final explosion.

Betelgeuse is destined to become a supernova soon, that much is certain. But “soon” in astronomical terms could mean anything from today to 100,000 years’ time. If the recent dip in the star’s brightness is not a signal of imminent catastrophe, it could have a number of other explanations. Because the material inside it is always churning as it is heated, Betelgeuse has hotspots on its surface. Sometimes these hotspots are ejected into space, leaving relatively cooler and dimmer areas behind on the star’s surface, and reducing the magnitude of its output of light.

On top of these random events, Betelgeuse is also known to be a semi-regular variable star. This means its brightness changes as it pulses up and down in size. As that happens, its surface area increases or decreases proportionally. Since the brightness per square kilometre of a star tends to

remain the same during these pulses, a larger surface area means the star will emit more light overall, and a smaller one, less. Various cycles like this operate within Betelgeuse, with periods ranging from a few hundred Earth days to several thousand.

Astronomers will continue watching the star over the coming weeks. Most, realistically, expect it to brighten up again as the internal cycles continue. But even if there is no supernova this time around, that merely postpones the day when Betelgeuse will undergo a real-world equivalent of the Great Collapsing Hrungr Disaster. ■



恒星演化

大爆炸的时刻到了？

参宿四是天空中最亮的恒星之一，近来它表现异常

银河系系年03758年的那场异物大坍塌灾难充满了神秘色彩。道格拉斯·亚当斯（Douglas Adams）在《银河系漫游指南》的脚注中提到，关于这一事件，我们只知道唯一的幸存者是故事的主角之一福特·普里弗克特（Ford Prefect）的父亲，以及事件发生在环绕参宿四运行的一颗行星上。

参宿四是猎户座的一颗红超巨星，猎户座是横跨天球赤道的一个非常显眼的星座。参宿四是夜空中最亮的星体之一，肉眼很容易看到。它的质量大约是太阳的十倍，如果它位于太阳系的中心，它的外边缘将延伸到火星轨道之外。

参宿四比太阳更明亮，部分原因是它体积更大，因此有更多燃料，但也是因为它燃烧这些燃料的速度更快。结果，它走向死亡的速度也会快得多。太阳100亿年的寿命已过了大概一半。参宿四的寿命约为1000万年，它已经接近生命尽头了——可能非常近。因为在过去几周里，天文学家们观察到它突然变暗了，他们不禁怀疑这会不会是参宿四大限将至的信号？

当参宿四这样的恒星耗尽燃料时，让它持续发光的核心核反应会停止，发热也会停止，向外的辐射压力（需要用它来平衡将一切都向内拉的重力）也会随之停止。那一刻，重力赢了。核心坍塌。由此产生的冲击波会在被称作超新星的爆炸中摧毁这颗恒星。超新星的亮度在一段时间内会比地球的母星系银河系其余部分的总亮度还要高。

| 比10亿个太阳还要亮

距离地球只有600光年的参宿四超新星看起来将会非常壮观。连续数周都能在白天见到它，在晚上明亮如满月，还能投射阴影。最近出现的被认为有如此亮度的超新星还是在一千年前。对天文学家来说，这将是一个前所未有的机会，他们可以用电磁、引力和中微子等各式天文台在恒星崩溃时

密切观察它的最后时刻。

直到目前，自望远镜发明以来观测到的距离最近的超新星是30多年前在大麦哲伦星云中发现的SN1987A，这一星云距银河系16万光年。但天文学家是在SN1987A爆炸之后才发现它的。他们从来没能用现代仪器观测过银河系中的超新星，也从来没有观测过恒星终极爆炸之前和爆炸期间的情况。

参宿四会很快变成超新星，这是肯定的。但在天文学意义上，“很快”可能是今天，也可能是今天到未来10万年内的任何时间。如果近来参宿四亮度的下降不是大毁灭即将来临的信号，那么也可能有一些别的解释。因为其内部的物质在加热时总在翻腾，所以参宿四的表面有热点。有时这些热点被喷射到太空，在星体表面留下相对较冷和较暗的区域，并且降低它的光输出强度。

除了这些随机事件外，我们还知道参宿四是一颗半规则变星。这意味着它的亮度会随大小的变化而变化。当这种情况发生时，它的表面积成比例地增加或减少。由于恒星每平方公里的亮度在这些变化期间趋于保持不变，更大的表面积意味着恒星整体将发出更多的光，而更小的表面积则发出更少的光。参宿四内有着多个这样的周期，时长从几百到几千个地球日不等。

天文学家将在未来几周内继续观测这颗星。大多数人都抱着比较现实的预期：随着内部周期的继续，它会再次亮起来。但是，即使这次没有超新星爆发，也只是推迟了参宿四在现实中上演“异物大坍塌”的那一天。■



Entertainment

Thank you for the music

Tencent's purchase of a stake in Universal Music highlights how the internet has remade the music business

IT WAS A nice example of nominative determinism. On December 31st a consortium led by Tencent, a giant Chinese digital conglomerate, announced it was buying 10% of Universal Music Group, a subsidiary of Vivendi, a French company, for €3bn (\$3.4bn). The deal, first mooted in August, gives Tencent a stake in a firm whose catalogue spans artists from ABBA and Bob Marley to Jay-Z and Taylor Swift.

Tencent's purchase values Universal at around €30bn. That is remarkable, for two reasons. The first is that Vivendi's total market capitalisation is just €31.5bn. But Universal is merely the largest component of a conglomerate that also includes Canal+, a French pay-TV channel, and Havas, a PR-and-advertising firm. Both bring in profits of hundreds of millions of euros, and Vivendi is only lightly indebted.

The second is that it illustrates the recorded-music industry's remarkable recovery over the past few years. The International Federation of the Phonographic Industry, a trade body, reckons that sales of recorded music were \$23.9bn in 2001. By 2014 that had dropped by 40%, to \$14.3bn (see chart). The industry laid much of the blame on piracy fuelled by the internet.

Nowadays, though, the internet has become the music industry's best friend. Music-streaming firms like Spotify, a Swedish company, and Deezer, a French one, have outcompeted the pirates with a mix of the go-anywhere convenience enabled by smartphones and subscription-based pricing. For \$9.99 a month, Spotify users get access to more than 50m songs (true

skinflints can pay nothing, if they are prepared to put up with adverts). High volumes make up for low prices. Spotify alone has over 100m paying users, which helped the firm achieve a valuation of \$27bn in its April flotation. It has also helped reverse the decline in music-industry revenues, which are up 34% from their 2014 nadir.

The streaming market is highly concentrated. Spotify and Apple between them account for over half of it. But plenty of firms are nonetheless trying their luck, including Google, Amazon and Tencent itself, whose music-streaming subsidiary has around 35m paying users in China. The latest entrant is ByteDance, best-known for developing TikTok, a trendy social-media app; Resso, its streaming service, was released in India and Indonesia last month.

That rush of new entrants will bring new customers, helping the market grow. It will also boost the firms, like Universal, that control the music that streaming firms must license. Universal's revenue grew by 24% last year. Tencent's purchase therefore looks like an attempt to profit from both sides of the game.

It also fits with Tencent's taste for investing in other firms, and with its growing presence in the Western entertainment industry. The firm is best known for WeChat, a multi-purpose chat, payment and social media app with over a billion users. But it has stakes in hundreds of smaller firms. It is the world's biggest video-game company: revenues from gaming accounted for around two-fifths of its 2018 total of 313bn yuan (\$47bn). It owns Riot Games, the makers of "League of Legends", an e-sports title whose biggest matches attract tens of millions of viewers. It has a controlling stake in Supercell, the Finnish studio behind the hit mobile game "Clash of Clans". And it has a 40% share in Epic Games, an American firm whose offerings include "Fortnite", a popular online shooter. Epic Games was valued at nearly \$15bn in 2018.

Tencent Music Entertainment Group, the firm's streaming subsidiary, was listed on New York's stock exchange in 2018. Its film-production company was involved with films such as "Wonder Woman" and "Terminator: Dark Fate", the sixth instalment in the interminable "Terminator" franchise. The Universal deal may likewise not be the end of the story. Vivendi has given Tencent the option to double its stake at the same price, and has hinted that it might sell even more of Universal to the Chinese giant in future. Will Tencent be back? ■



娱乐

谢谢你的音乐

腾讯入股环球音乐，突显了互联网对音乐产业的重塑

这是个主格决定论的好例子。12月31日，由中国数字企业集团腾讯牵头的财团宣布，将以30亿欧元（34亿美元）的价格收购法国公司Vivendi的子公司环球音乐集团（Universal Music Group）10%的股份。该交易于去年8月首次提出，腾讯由此将持股这家旗下拥有ABBA乐队、鲍勃·马利（Bob Marley）、Jay-Z和泰勒·斯威夫特（Taylor Swift）等艺人的公司。

腾讯的收购对环球音乐的估值约为300亿欧元。这非同寻常，原因有二。首先，Vivendi的总市值仅为315亿欧元，而环球音乐仅仅是这个大集团里最大的一部分，该集团还包括法国付费电视频道Canal+和公关广告公司Havas。这两家公司都带来了数亿欧元的利润，而且Vivendi的负债水平也很低。

其次，这说明唱片行业在过去几年里明显复苏。行业组织国际唱片业协会（International Federation of The Phonographic Industry）估计，2001年唱片销售额为239亿美元。到2014年，这一数字下降了40%，降至143亿美元（见图表）。该行业认为这主要应归咎于由互联网推波助澜的盗版。

然而，如今互联网已经成为音乐产业最好的朋友。瑞典的Spotify和法国的Deezer这样的音乐流媒体公司凭借智能手机提供随时随地的便利和基于订阅的定价，在与盗版者的竞争中胜出。Spotify的用户每月只需花9.99美元就可以畅听5000多万首歌曲（真正的小气鬼要是能忍受广告，一个子也不用出）。巨大的体量弥补了低价格。仅Spotify就有1亿多付费用户，令该公司在2018年4月上市时实现了270亿美元的估值。这也帮助扭转了音乐产业收入的下降趋势，较2014年的谷底上升了34%。

流媒体市场高度集中。Spotify和苹果加起来占了一半以上。但仍有许多公司在碰运气，包括谷歌、亚马逊和腾讯。腾讯的音乐流媒体子公司在中国

拥有约3500万付费用户。最近入场的是字节跳动，它以开发时髦的社交媒体应用抖音而闻名；它的音乐流媒体服务Resso上月在印度和印尼发布。

新进者的涌入将带来新的客户，推动市场增长。这也将促进环球音乐这类公司的增长，它们控制着流媒体公司必须获得许可的音乐。环球音乐去年的收入增长了24%。因此，腾讯的收购看起来像是要从博弈双方两头获利。

这也符合腾讯投资其他公司的口味以及它在西方娱乐产业日益增长的影响力。腾讯最知名的产品是微信，这是一款拥有超过10亿用户，涵盖聊天、支付和社交媒体的多功能应用。但它也持有数百家小公司的股份。它是世界上最大的电子游戏公司：2018年它的收入为3130亿元人民币，其中约五分之二来自游戏。它旗下的Riot Games开发了电子竞技游戏《英雄联盟》（League of Legends），这款游戏最大型的比赛吸引了数千万名观众。它拥有芬兰工作室Supercell的控股权，这是热门手机游戏《部落冲突》（Clash of Clans）的开发者。它还持有40%的Epic Games的股份，这家美国公司的产品包括流行的在线射击游戏《堡垒之夜》（Fortnite）。2018年，Epic Games的估值接近150亿美元。

腾讯的流媒体子公司腾讯音乐娱乐集团于2018年在纽约证交所上市。该公司的电影制作公司参与了《神奇女侠》和《终结者：黑暗命运》等影片的制作，后者是终结不了的《终结者》系列的第六集。同样，入股环球音乐的交易可能同样不是故事的结局。Vivendi已给予腾讯以同样价格将持股翻番的认购权，并暗示未来可能还会向这家中国巨头出售更多环球音乐的股份。腾讯还会归来吗？ ■



Schumpeter

The buzz around AirPods

Why is the ear worth so much less than the eye?

UNTIL RECENTLY the ear was a part of the body relatively unconquered by commerce. The neck long ago fell to the necklace, the ruff and the tie. The wrist surrendered to the bracelet and the watch. The eye sold out to spectacles, shades and mascara. But the ears were a low-rent zone for business, good mostly for cheap jewellery, earphones and hearing aids. Walk around any big city and it is clear how quickly that is changing—thanks to headphones, earbuds and a torrent of new stuff blaring through them.

Apple, as usual, caught the trend early. The number of its AirPods, mocked for looking like broken Q-tips when introduced in 2016, is estimated to have doubled to 60m pairs this year. They have spawned a wave of imitators, from Amazon's black Echo Buds to Xiaomi's Airdots (popular in China) and Microsoft's Surface Earbuds—which creepily link directly to its Office software, including PowerPoint. The devices grow symbiotically with another craze: for streamed audio content in addition to music, such as podcasts. Apple helped popularise this genre. But Spotify, a Swedish streaming service, and big American broadcasting conglomerates, such as Liberty Media, are muscling in.

Industry executives contend that audio is undervalued—especially compared with video. As Spotify's co-founder, Daniel Ek, said earlier last year, time spent on each is about the same, but the video industry is worth \$1trn versus \$100bn for audio. "Are our eyes really worth ten times more than our ears?" he asks.

The eyeball plainly still dominates. The number of screens dwarfs that of

“hearables”. Between them, just three Tinseltown groups—Warner Media, Disney and Netflix—have spent as much as \$250bn on visual programming since 2010. Audio, including music, comes nowhere near. That said, the battle to “monetise the ear”, as Greg Maffei, Liberty Media’s boss, puts it, is in full swing. These days no one would lend Mark Antony theirs; they would rent or sell them.

Take hardware first. Apple does not release figures for any of its “wearables”, but AirPods are the fastest-growing of all of its products, with profit margins above 50%, says Dan Ives of Wedbush Securities, an investment firm. With the new noise-cancelling AirPods Pro, which costs around \$250 a pair, he reckons Apple’s ear-ware may generate up to \$15bn of sales in 2020. That would be about four times the revenues of a headphone veteran like Bose. Horace Dediu, a technology analyst, predicts that this quarter AirPods sales could exceed those of the iPod at its peak around Christmas 2007. With iPhone sales slowing, AirPods are a new way of generating revenue from Apple’s legions of loyalists; they even allow Siri, the company’s voice-activated virtual assistant, to worm her way closer to listeners’ brains. The overall market is spreading to the masses, too. Some wireless earbuds sell for as little as \$20.

Audible content is likewise undergoing a mini-revolution. For the third year in a row, revenues from recorded music in America grew by double digits in 2018, largely thanks to subscriptions to Spotify, Apple Music and the like. Podcasts have grown both more numerous and more compelling. This year Spotify has set out to rule the roost in this medium, which Apple first streamed via iTunes in the mid-2000s. The Swedish firm acquired Gimlet, Anchor and Parcast, three firms that serve different aspects of the podcast market; it now hosts a staggering 500,000 podcasts; hours spent listening to them grew by 39% year-on-year in the third quarter. In October it boasted that the conversion of podcast listeners to paying subscribers is “almost too good to be true”.

The battleground stretches beyond earbuds to the car radio. On December 12th the *Wall Street Journal* reported that SiriusXM, a satellite-radio arm of Liberty Media, had sought clearance from the Department of Justice to raise its stake in iHeartMedia, America's largest radio broadcaster and a big podcasting platform. The aim would be to compete more effectively against Spotify and other audio-streaming services both for subscribers and advertising revenues. Previously Mr Maffei has talked excitedly about podcasting.

The proliferation of digital-streaming devices has spawned the growth of other listening formats. This year, for the first time, the Audio Publishers Association, an industry group, reported that half of Americans listened to an audiobook, a trend it said was boosted by the popularity of digital-streaming devices, as well as podcasts. Audible, owned by Amazon, is the market leader. Malcolm Gladwell, an American author and podcaster, has turned the audio version of his latest book "Talking to Strangers", into what seems like a supersized podcast, with his own narration, actors and music. Romantics see it as a return to the oral tradition.

Though small, some of this spoken word has better economics than the sung variety. As Ben Thompson of Stratechery, a tech newsletter, has pointed out, the more music Spotify's customers download, the more its costs rise because of payments to record labels. Podcasts are different. Spotify has more bargaining power over myriad individual podcasters jostling to reach its 248m-odd users than it does over record labels. It also buys its exclusive podcasts at a fixed cost. The problem is advertising. Ad revenues are paltry. In America terrestrial radio still accounts for 82% of an audio ad market valued at more than \$17bn. SiriusXM and Spotify have just a sliver of the pie.

| *A back door to the brain*

Apple has the clout to make the industry more profitable. It could use its

strong position with AirPods, Apple Music, podcasts and Siri to create a swirl of audio content around the iPhone—an ecosystem in the jargon—and take the lion’s share of advertising. For the time being, though, it appears to be more focused on creating video content, in its battle for eyeballs with Netflix. That is lucky for Spotify. It gives it a bigger opening in the audio market. It is good for listeners, too. The last thing anyone wants is a Big Tech behemoth controlling the next best thing to a brain implant.





熊彼特

AirPods声浪

为什么耳朵相比眼睛那么不值钱？

直到近年，耳朵相对而言还是一个未被商业征服的身体部位。脖子很早就失守了，成了项链、拉夫领和领带的领地。手腕向手镯和手表投了降。眼睛被出卖给了眼镜、墨镜和睫毛膏。但耳朵曾是个不上档次的商业领域，与它相衬的一般都是廉价珠宝、耳机和助听器。但而今漫步在任何一个大城市，都可以明白无误地看到情况正在快速发生变化——这要归功于头戴式耳机、耳塞式耳机和通过这些设备播放的大量新事物。

苹果一如既往地一早就把握住了趋势。AirPods在2016年推出时曾被嘲笑看起来就像断掉的棉花棒，而今年它的出货量估计翻了一番，达到6000万副。Airpods已催生出一波模仿者，从亚马逊黑色的Echo Buds，到在中国很受欢迎的小米Airdots，再到微软的Surface Earbuds——微软的这款耳机可以直接连接到包括PowerPoint在内的Office软件，有点疹人。这些设备与另一种狂热相伴共生：对音乐以外的流式音频内容如播客的追捧。苹果帮助推广了播客这一类型，但瑞典流媒体服务Spotify和自由媒体（Liberty Media）这样的美国大型广播集团也在强行挤入这个市场。

业内高管认为音频的价值被低估了，特别是与视频相比。正如Spotify的联合创始人丹尼尔·埃克（Daniel Ek）去年早些时候所说，人们在这两件事上花费的时间差不多，但视频产业价值1万亿美元，音频产业却仅1000亿美元。“我们的眼睛真的比耳朵值钱十倍吗？”他问道。

眼球显然仍占据主导。论数量，屏幕让“可听戴设备”相形见绌。自2010年以来，仅华纳媒体、迪士尼和奈飞（Netflix）这三家好莱坞集团在视觉节目上的支出就合计达2500亿美元。而包括音乐在内的音频得到的投入远不及这个水平。话虽如此，自由媒体的老板格雷格·马菲（Greg Maffei）所谓的“将耳朵变现”的战斗正在全面打响。如今没有人会把耳朵借给马克·安东尼（Mark Antony，译注：莎士比亚戏剧《裘力斯·凯撒》中马克·

安东尼发表演讲时说，“Friends, Romans, countrymen, lend me your ears.”），而是会把它们出租或出售。

先来看硬件。投资公司Wedbush Securities的丹·艾夫斯（Dan Ives）说，苹果虽未公布其任何“可穿戴设备”的数据，但AirPods是公司所有产品中增长最快的，利润率超过50%。随着新款带降噪功能的AirPods Pro（售价为每副250美元左右）的推出，他估计苹果耳机今年的销售额最高可达150亿美元。这个数字大约会是老牌耳机厂商Bose营收的四倍。科技分析师霍勒斯·德迪乌（Horace Dediu）预测，2019年第四季度AirPods的销售额可能会超过iPod在2007年圣诞节前后创下的记录。随着iPhone销售放缓，AirPods成为了从大批苹果忠实用户那里创收的新途径。苹果甚至还可以借由AirPods让虚拟语音助手Siri凑近听众的大脑。整个市场也正逐步走向大众。有些耳塞式无线耳机的售价仅20美元。

可听内容也在经历一场小型革命。2018年，美国录制音乐的收入连续第三年以两位数增长，主要依靠对Spotify、Apple Music之类的服务的订阅。播客数量越来越多，内容也越来越吸引人。苹果在2005年前后首次通过iTunes推出这一媒介，但今年Spotify开始在播客领域称雄。这家瑞典公司收购了Gimlet、Anchor和Parcast，这三家公司服务于播客市场的不同方面。现在Spotify拥有的播客多达50万个。去年第三季度，人们收听播客的时间同比增长了39%。10月，Spotify夸耀称播客听众向付费订户的转化率“好得难以置信”。

战场从耳塞式耳机延伸到了汽车音响。《华尔街日报》去年12月12日报道称，自由媒体旗下的卫星广播公司天狼星XM（Sirius XM）已寻求美国司法部的批准，以增持在美国最大的广播电台、大型播客平台iHeartMedia的股份。此举是为了更有效地与Spotify和其他音频流媒体服务竞争用户及广告收入。此前马菲谈起播客时就很兴奋。

数字流媒体设备激增也促进了其他收听格式的发展。去年，行业组织音频出版商协会（Audio Publishers Association）首次报告称一半美国人收听有声读物。该协会称，这一趋势是由数字流媒体设备和播客的流行推动

的。亚马逊旗下的Audible是市场领导者。美国作家兼播客作者马尔科姆·格拉德威尔（Malcolm Gladwell）将其新作《与陌生人交谈》（Talking to Strangers）的有声版做了番改编，成果看起来就像一个超大播客，配有他自己的旁白，还有演员和配乐。浪漫派认为这是向口述传统的回归。

虽然播客尚未成大气候，但其中的某些比音乐更具经济价值。正如科技时事通讯Stratechery的作者本·汤普森（Ben Thompson）指出的那样，Spotify用户下载的音乐越多，它付出的成本就越高，因为要向唱片公司付费。播客则不同。相比面对唱片公司，Spotify面对众多个人播客作者拥有更强的议价能力，毕竟这些人要争夺超过2.48亿的用户。它还以固定费用购买独家播客。问题是广告。播客带来的广告收入微不足道。在美国，地面广播仍然占了价值超过170亿美元的音频广告市场的82%。天狼星XM和Spotify只分得了这块蛋糕的一小部分。

| 大脑后门

苹果的影响力能使这个行业更有利可图。它可以利用自己在AirPods、Apple Music、播客和Siri上的强势地位，围绕iPhone打造一个音频内容的漩涡——用行话来说就是生态系统——进而占据最大的广告份额。不过目前来看，苹果似乎更专注于创作视频内容，与奈飞争夺眼球。这对Spotify来说是件幸事，因为这让它在音频市场有了更大的机会。对听众也有好处。谁也不想看到一个仅次于脑植入设备的好东西被一家科技巨头掌控。





US-China trade

Between the lines

A deal redefines America's trade relationship with China

WITH HIS habit of announcing trade deals only for them to dissolve within weeks, President Donald Trump is a standing reminder that talk is cheap. But on January 15th he signed a phase one trade agreement with China alongside Liu He, the Chinese vice-premier, and published its contents for the world to see. The 86 pages set out the terms of a new economic relationship between these two giants. Alongside some welcome measures, there are some howlers—and glaring omissions.

Throughout the whole, however, runs a common pattern. Clauses that are in reality concessions wrung from the Chinese are often written in such a way that they formally apply to both sides—but with subclauses specifying the actions that the Chinese are to take. For example, pledges to protect trade secrets are accompanied by new processes by which American companies can complain about breaches.

The deal also addresses several long-standing American complaints about China's foot-dragging. China pledged that approvals of agricultural biotechnology products will take less than two years. The deal sets deadlines for China to consider licence applications by MasterCard and Visa. And China will lower bureaucratic barriers to imports of American dairy, pork and beef.

As many a weary trade negotiator can attest, China has a history of renegeing on promises. But this deal comes with a novel dispute-settlement mechanism. After a speedy consultation, either party may find fault with the other. (History suggests that the Americans are more likely to feel aggrieved.) If a solution cannot be reached, the accuser can unilaterally

impose penalties. The accused cannot retaliate, short of pulling out of the deal altogether.

It is possible that this mechanism will force China to address American grievances. But it may also cause new problems. It hands huge discretion to Robert Lighthizer, the United States Trade Representative (USTR). Take China's ever-contentious yuan regime. On January 13th, in a sign of thawing relations, the American Treasury removed China from its list of currency manipulators. But if at some point China is put back on the list, the USTR would now seem to have virtually unchecked power to slap tariffs on it.

Further problems may be caused by China's pledge to buy an extra \$200bn of American goods and services over the next two years, on top of a baseline of \$187bn in purchases in 2017. That is intended to satisfy Mr Trump's main desire: to close America's trade deficit with China. But making it happen will probably require China's government to direct Chinese companies to buy lots of American goods. Both countries will become more reliant on each other, which neither wants. And their other trading partners might be squeezed out.

The Americans do not seem overly concerned. Mr Lighthizer is keen to move on to implementation, saying that, as the first deal of its kind, "we have to make sure that it works". The coming months will demonstrate whether the two countries can establish a friendlier dialogue, and whether their relationship can survive America's more aggressive use of security-related export and investment restrictions.

The deal is far from a reset. As Mr Lighthizer noted, China's cyber-intrusions and industrial subsidies still rankle with America. Chinese media, meanwhile, laid out an argument that may become more familiar: if American export restrictions prevent China from fulfilling its purchase commitments, the fault will lie with America.

A truly grand pact between the two countries is some way off—and indeed, may never arrive. But this modest trade agreement shows how much the status quo has changed. Tariffs on hundreds of billions of dollars' worth of imports into both countries remain in place, with an ever-present threat of more. This is not trade peace, but rather a trade truce—and a tense one at that. ■



中美贸易

字里行间

一份重新定义中美贸易关系的协议

特朗普往往在宣布与别国达成贸易协议后几周内就反口，俨然是食言而肥的典范。但在1月15日，他与中国国务院副总理刘鹤签署了中美第一阶段经贸协议，并向全球公布了其中的内容。这份86页的协议列出了两个大国之间的新经贸关系条款。除了包含一些喜闻乐见的措施，协议里还有一些可笑的错误和显眼的疏漏。

不过，协议通篇贯穿着同一个模式。实际是迫使中方做出让步的条款往往在形式上写成适用于双方，但附带子条款明确规定了中方应采取的行动。例如，承诺保护商业秘密的条款附带规定了新程序，以便美国公司投诉违规行为。

协议处理了美国长期抱怨中国在拖延的若干问题。中国承诺将农业生物技术产品的审批时间缩减至两年以内。协议还规定了中国对万事达和Visa牌照申请的受理审批期限。中国还将简化对进口美国乳制品、猪肉和牛肉的繁冗审批程序。

许多疲惫的贸易谈判代表可以证明，中国也惯于背弃承诺。而该协议采取了一项新颖的争端解决机制。在快速磋商后，任何一方可能找对方的茬。（历史记录显示，更有可能感到愤愤不平的是美国。）如果无法达成解决方案，申诉方可单方面实施惩罚，被申诉方不得采取反制措施，除非彻底退出协议。

此机制有可能迫使中方着手应对美方的不满，但也可能引发新问题。这赋予了美国贸易代表罗伯特·莱特希泽（Robert Lighthizer）巨大的自由裁量权。以中国一直备受争议的人民币汇率制度为例。作为两国关系缓和的信号，1月13日美国财政部把中国移出了汇率操纵国名单。但假如哪天中国又重回此名单，美国贸易代表如今似乎就有了几乎不受约束的权力来对中

国实施关税惩罚。

中国承诺在2017年1870亿美元的基数之上，未来两年再从美国采购2000亿美元的商品和服务，这可能进一步引发问题。这一承诺是为满足特朗普的一个主要诉求：缩减美国对华贸易逆差。但要实现这一目标，可能需要中国政府指示中国企业购买大量美国商品。两国将变得更依赖对方，而这是双方都不希望发生的。而且它们的其他贸易伙伴也可能因而被挤出市场。

美方似乎不太担心。莱特希泽就热心于实施协议。他说，作为首个这样的协议，“我们必须确保它行之有效”。未来数月将证明两国能否展开更友好的对话，以及在美国更积极地利用安全相关的出口和投资限制的情况下，两国关系能否维持。

该协议远非两国关系的重置。正如莱特希泽指出的，美国仍不满中国的网络入侵行动和工业补贴政策。同时，中国媒体提出了一个人们可能会逐渐熟悉的论调：如果是美国的出口限制阻碍了中国履行其采购承诺，那问题就出在美方。

两国之间要达成真正意义上的宏大协议还言之尚早——实际上可能永不会达成。但这次的小型贸易协议显示了现状改变的程度。两国仍在对价值数千亿美元的进口商品征收关税，而且始终有扩大征税的威胁。中美之间并未实现贸易和平，只是暂时休战，而且紧张气氛不减。■



Schumpeter

Cloning Tesla

Why Elon Musk has learned to love China

WILLIAM BIN LI is as close as China may have come to cloning Elon Musk. The founder of NIO, a swanky electric-vehicle (EV) company, is in his 40s, a tech nerd, and though not as meme-able as the founder of Tesla, is treated like a rock star by his adoring customers. NIO, worth \$4bn, is a fraction of the size of Mr Musk's Tesla, valued at \$75bn, but of all China's 30-odd EV startups, it is the best known. It also raises and dashes investors' hopes with Tesla-like frequency. On December 30th NIO's shares soared 54% when Mr Li said output had probably reached 8,000 vehicles in the fourth quarter from almost 4,800 in the third. But over the whole of 2019 they lost almost 40% (see chart).

In truth, Mr Musk is in a league of his own. But Mr Li has long had the edge on him in one respect. As our Technology Quarterly in this issue reports, NIO is emblematic of China's ambition to be a hub of global EV production, dominating electric vehicles in the 21st century as squarely as America did the internal-combustion engine in the 20th. As such, China would be a natural place to produce a "Tesla killer", as NIO was dubbed during a CBS interview with Mr Li aired in 2019.

Yet if NIO is trying to topple Tesla, it is going about it in an odd way. It is copying some of the very aspects of Tesla's business model that have made the American firm's survival a matter of constant concern, such as lavish spending on sophisticated technology, resulting in correspondingly large holes in its cashflow statements. If anything can kill Tesla, it is more likely to be its perennial difficulty in generating cash than competition from a Chinese upstart with the same problem. Ironically, it could be China that ultimately secures Tesla a bright future. If only NIO could be so lucky.

Not long ago NIO was considered the more promising of the two. In the world's largest car market, where sales of luxury vehicles are booming, it got its start in 2014 when state and local governments were throwing subsidies at both buyers and manufacturers of EVs. Venture-capital backing was abundant. NIO delivered its first commercial car, the ES8 SUV priced at above \$70,000, in 2018. Shortly afterwards it issued shares on the New York Stock Exchange, both to raise money and to heighten its international profile so that it could sell cars around the world. Its shareholders include Baillie Gifford, an Edinburgh-based fund manager that is the largest institutional investor in Tesla.

Tu Le of Sino Auto Insights, an advisory firm, says NIO's Tesla-killing aspirations got the better of it, though. It was rash to think it could quickly take on a firm 11 years older with huge global brand recognition and several models. NIO's revenues, estimated at around \$1.2bn for 2019, are dwarfed by the \$24bn projected for Tesla. Yet since the start of 2017 its cumulative losses have overtaken those of Tesla (see chart). NIO has splashed out on spacious stores with libraries, coffee shops and crèches, sometimes directly across the street from Tesla showrooms. But unlike Tesla it has not invested much in factories, contracting manufacturing to JAC Motors, a state-owned carmaker, instead.

Furthermore, a cut in state subsidies for EV purchases since June has hurt investor sentiment, prompting fears of a funding crunch. NIO raised \$100m from Tencent, the tech giant that is also one of its leading shareholders, in the third quarter, and Mr Li is expected to pitch in as much himself. But NIO burned through even more than that in the third quarter and has net debt of \$1.3bn, according to Bernstein, an investment firm. Though NIO's sales rose 22.5% in the third quarter compared with the previous three months, and it launched a third SUV on December 28th, it admits it needs funding if it is to survive for another year.

Given the precarious circumstances, the Chinese government might be expected to throw NIO a lifeline. Instead, it is Tesla that is getting the breaks. On December 30th, the day of NIO's relief rally, the first Model 3s rolled out from Tesla's Gigafactory in Shanghai, costing a mere \$50,000 each. Though work started on the plant less than a year ago, production is already running at about 1,000 cars a week. Days before, the American firm received \$1.3bn-worth of funding from Chinese lenders to complete the Shanghai-based factory. Production in China spares Tesla from import tariffs on finished vehicles, and its locally made cars also qualify for subsidies. Its shares have soared to record highs in recent days, though there are still nagging doubts about its ability to increase volumes, margins and cash generation. Perversely, Tesla may even have benefited from China's trade war with America. The government hopes to portray Tesla's investment, the first fully foreign-owned car plant in China, as a symbol of its openness.

NIO, despite being Chinese, does not offer the same geopolitical advantages, and without its own factories it has less leverage when asking state governments to support it. As Michael Dunne, the Tesla-driving boss of ZoZo Go, a car advisory firm, puts it, "NIO doesn't have a clear-cut godfather in the Chinese government." It is competing with a host of EV startups, such as Byton, WM and Xpeng, for funding. There is no guarantee all of them will survive.

In this fraught market, fortunes could quickly reverse again. NIO says it may soon announce new funding arrangements. A state-backed carmaker could take a big stake in it. Some analysts say it is unlikely the government will let NIO go bust, because it is such a symbol of China's technological ambitions.

| *So much giga and greater than America*

For now, though, Tesla is in pole position. In fact, says Mr Dunne, China

must already feel like home to Mr Musk. The government's EV ambitions give Tesla a tailwind that it lacks in America; on January 1st its customers there stopped benefiting from a tax credit. Consumers love luxury-car brands; Tesla's main competition will be with Germany's premium carmakers, not Chinese ones. China's manufacturing prowess will help Tesla overcome the "production hell" it suffered back home. And China may be quicker to encourage autonomous driving than America. For Mr Musk, the main drawback could be that Twitter, his favoured megaphone, is blocked behind the great firewall. But for Tesla that too must be a blessed relief. ■



熊彼特

克隆特斯拉

为什么伊隆·马斯克认识到要爱中国

如果说中国有人在模仿伊隆·马斯克，那么豪华电动汽车公司蔚来的创始人李斌应该是其中最接近的一个。这位40多岁的技术控虽然不像特斯拉的创始人那样盛产表情包，但在崇拜他的客户眼里也是摇滚明星般的存在。价值40亿美元的蔚来与马斯克750亿美元的特斯拉相比还微不足道，但却是中国30多家电动汽车创业公司中最著名的一家。它还以特斯拉那样的频率让投资者的希望经历过山车式的大起大落。去年12月30日，李斌表示第四季度的产量可能从第三季度的差不多4800辆上升到了8000辆，蔚来的股价随之飙升54%。但在整个2019年其股价几乎跌去了40%（见图表）。

马斯克其人确实独领风骚。但在有一点上，长期以来李斌却胜他一筹。正如本刊最新一期《技术季刊》所报道的，蔚来代表中国成为全球电动汽车制造中心的雄心，意欲要在21世纪称霸电动汽车市场，就像美国在20世纪完全主导了内燃机汽车市场那样。因此中国自然就会成为出产“特斯拉杀手”（2019年美国哥伦比亚广播公司专访李斌时对蔚来的戏称）的地方。

然而，若说蔚来正努力超越特斯拉，它却采取了一种奇怪的方式。它正在复制特斯拉商业模式的一些做法，而正是这些做法让人一直担心这家美国公司能否支撑下去，比如在尖端科技上烧钱，以致它的现金流量表出现巨额亏损。如果真有什么能置特斯拉于死地，更有可能的就是缺钱这个老大难问题，而不是来自存在同样问题的中国新贵公司的竞争。讽刺的是，最终给特斯拉带来光明未来的可能正是中国。而蔚来可能就没这么幸运了。

不久前，人们还认为蔚来的前景好过特斯拉。在中国这个全球最大的汽车市场，豪华车的销售在激增。蔚来起步于2014年，当时中央和地方政府向电动汽车买家和制造商发放补贴。风险资本也很充裕。2018年，蔚来推出了首款商用车ES8 SUV，定价7万多美元。之后不久，蔚来在纽约证券交易所发行股票，此举既是为了募集资金，也是为了提升自己的国际形象，以

便将汽车卖到世界各地。它的股东包括总部位于爱丁堡的基金管理公司 Baillie Gifford，它也是特斯拉最大的机构投资者。

不过，咨询公司 Sino Auto Insights 的涂乐表示，蔚来败在一心想要战胜特斯拉上。如果认为蔚来很快就能与一家早它11年成立、在全球拥有超高品牌知名度和多款车型的公司一争高下，未免太过轻率。2019年蔚来的营收预计约为12亿美元，与特斯拉预计240亿美元的营收比起来相形见绌。而自2017年年初以来，蔚来的累计亏损已经超过了特斯拉（见图表）。蔚来将大把钞票撒在面积超大的门店上，这些门店配有阅览室、咖啡店和托儿所，有时候甚至直接就开在特斯拉展厅的对面。但与特斯拉不同的是，蔚来并没有在工厂上投入大量资金，而是由国有汽车制造商江淮汽车代工。

此外，自去年6月以来，政府削减了对购买电动汽车的补贴，投资者情绪受挫，引发了对融资短缺的担忧。第三季度，蔚来从主要股东之一的科技巨头腾讯那里募集了1亿美元，预计李斌自己也会投入同等金额。但投资公司盛博的数据显示，蔚来第三季度的花费甚至超过了这笔融资，净负债达13亿美元。尽管蔚来第三季度销量环比增长了22.5%，并且在12月28日推出了第三款SUV，但蔚来承认，要想扛过来年，还需要资金注入。

在这种危险的情境下，人们预计中国政府可能会出手相救。结果交了好运的反倒是特斯拉。12月30日，也就是蔚来股价承压后反弹的当天，特斯拉在上海的超级工厂交付了首批Model 3，每辆售价仅为5万美元。虽然该工厂开工还不到一年，但周产量已达1000辆左右。这之前几天，特斯拉从中国贷款机构获得了13亿美元的资金，用于完成上海工厂的建设。在中国制造让特斯拉不必支付整车进口税，而它在中国本土生产的汽车也有资格获得补贴。尽管人们对特斯拉在提高产量、利润率和产生现金等方面能力的怀疑仍难以消除，但这些天来它的股价却飙升至历史最高点。有悖常理的是，特斯拉甚至可能还从中美贸易战中获益了。作为中国首家全外资汽车工厂，中国政府希望将特斯拉的投资作为其开放的象征。

尽管蔚来是一家中国企业，但它并不具备同样的地缘政治优势，并且由于没有自己的工厂，它也没有足够的筹码争取到政府支持。正如特斯拉车

主、汽车咨询公司ZoZo Go的老板迈克尔·邓恩（Michael Dunne）所言：“蔚来在中国政府里头没有一个明确给它撑腰的人。”它正与拜腾、威马和小鹏等众多电动汽车创业公司为融资展开竞争。并不是每家公司都有把握存活下去。

在这个充满风险、令人焦虑的市场中，命运可能很快再次逆转。蔚来表示可能很快会宣布新的融资方案。一家政府支持的汽车制造商可能将持有它的大量股份。一些分析人士表示，政府不太可能坐视蔚来破产，因为它足以代表中国的科技雄心。

| 超级工厂，超越美国

不过，就目前而言，特斯拉还是占得先机。邓恩表示，事实上，中国应该已经让马斯克有了宾至如归的感觉。中国政府在电动汽车上的雄心让特斯拉乘上了在美国没有的东风——从1月1日起，特斯拉在美国的客户不再享受一项税收减免优惠。中国消费者钟爱豪车品牌；特斯拉的主要竞争对手是德国的高档汽车制造商，而不是中国制造商。中国超凡的制造力将帮助特斯拉走出在美国本土身陷的“生产地狱”。而且在支持无人驾驶方面，中国可能比美国更积极。对马斯克来说，一大不足可能就是他用得最顺手的喊话工具推特被挡在了中国防火墙之外。但对特斯拉来说，这也不失为一种幸运。■



The Economist film

Why calories are a con?

For decades, people who want to control their weight had been told to control calories - is this a good advice?



经济学人视频

卡路里为什么是一场骗局？

数十年来，那些想要减重的人都一直被告知要“控制卡路里”——这真的是个好建议吗？



Immigration on a plate

A bao in every steamer

The development of Chinese-American cuisine reflects the community's own upward trajectory

FOR SEVERAL years, beginning in the mid-2000s, devotees of Chinese food on America's east coast obsessed over a mystery: Where was Peter Chang? A prodigiously talented—and peripatetic—chef, Mr Chang bounced around eateries in the south-east. One day diners at a strip-mall restaurant in suburban Richmond or Atlanta might be eating standard egg rolls and orange chicken; the next, their table would be graced by exquisite pieces of aubergine the size of an index finger, greaselessly fried and dusted with cumin, dried chillies and Sichuan peppercorns. Or by a soup made of pickled mustard greens and fresh sea bass, in its way as hauntingly perfect and austere as a Bach cello suite. A few months later, Mr Chang would move on.

He now seems to have settled down, running a string of restaurants bearing his name between Rockville, Maryland, and Virginia Beach. His latest—Q by Peter Chang—in the smart Washington suburb of Bethesda, may be his finest. The space is vast and quasi-industrial, with brushed concrete floors, massive pillars and not a winking dragon in sight. Order a scallion pancake, and what appears is not the typical greasy disc but an airy, volleyball-sized dough sphere. Jade shrimp with crispy rice comes under what looks like an upturned wooden bowl (perhaps, you think, for the shells). On inspection the bowl turns out to be the rice. Thumping through it with a spoon reveals perfectly cooked shrimp floating in shamrock-green sauce.

A tab for two at Q can easily top three figures—several times the outlay on an average Chinese meal. Nor is Mr Chang's the only such restaurant in the area: like many big American cities, Washington has seen a rise in high-end

Chinese cuisine. That is good news, and not just for well-heeled gourmands who can tell *shuijiao* from *shuizhu*. The culinary trend is underpinned by two benign social ones. Chinese-Americans are becoming wealthier and more self-confident; and customers are shedding old stereotypes about Chinese food. To put it another way: sometimes a dumpling is more than just a dumpling.

| *The comfort of strangers*

Chinese restaurants began to open in America in the mid-19th century, clustering on the west coast where the first immigrants landed. They mostly served an Americanised version of Cantonese cuisine—chop suey, egg *fu yung* and the like. In that century and much of the 20th, the immigrants largely came from China's south-east, mainly Guangdong province.

After the immigration reforms of 1965 removed ethnic quotas that limited non-European inflows, Chinese migrants from other regions started to arrive. Restaurants began calling their food “Hunan” and “Sichuan”, and though it rarely bore much resemblance to what was actually eaten in those regions, it was more diverse and boldly spiced than the sweet, fried stuff that defined the earliest Chinese menus. By the 1990s adventurous diners in cities with sizeable Chinese populations could choose from an array of regional cuisines. A particular favourite was Sichuan food, with its addictively numbing fire (the Sichuan peppercorn has a slightly anaesthetising, tongue-buzzing effect).

Yet over the decades, as Chinese food became ubiquitous, it also—beyond the niche world of connoisseurs—came to be standardised. There are almost three times as many Chinese restaurants in America (41,000) as McDonald's. Virtually every small town has one and, generally, the menus are consistent: pork dumplings (steamed or fried); the same two soups (hot and sour, wonton); stir-fries listed by main ingredient, with a pepper icon

or star indicating a meagre trace of chilli-flakes. Dishes over \$10 are grouped under “chef’s specials”. There are modest variations: in Boston, takeaways often come with bread and feature a dark, molasses-sweetened sauce; a Chinese-Latino creole cuisine developed in upper Manhattan. But mostly you can, as at McDonald’s, order the same thing in Minneapolis as in Fort Lauderdale.

Until recently, the prices varied as little as the menus—and they were low. Eddie Huang, a Taiwanese-American restaurateur turned author and presenter, recounts how his newly arrived father kept his prices down because “immigrants can’t sell anything full-price in America.”

That, in truth, was a consoling simplification. Americans have traditionally been willing to pay through the nose at French or Italian joints (where, in fact, Latinos often do most of the cooking). And every city has its pricey sushi bars and exorbitant tapas restaurants (tapas, as one joke goes, is Spanish for “\$96 and still hungry”).

But Mr Huang is right that Americans have long expected Chinese food to be cheap and filling. One step up from the urban takeaway, with its fluorescent lighting and chipped formica counter, is the strip-mall bistro with its imposing red doors and fake lions standing guard—sufficiently exotic to be special, but still affordable enough for a family to visit once a week when nobody feels like cooking.

| *American dreams*

Even the superior outlets were cheap for what they served (and often still are). Consider the hand-ripped noodles with lamb at Xi’an Famous Foods in lower Manhattan. A tangle of long noodles, each about the width of Elvis Costello’s ties in the late 1970s, is tossed with curls of braised lamb and a complex, incendiary sauce laced with cumin and chillies—all for just over \$10, a fraction of the price of comparably accomplished dishes at smart

restaurants nearby. True, Xi'an Famous Foods has no waiters (diners carry their plates on plastic trays to bench seating). But its noodles are handmade, and the lamb dish may be the single best thing to eat in New York at any price.

But now things are changing. Mr Huang sells deliciously pillowy stuffed buns in New York and Los Angeles for \$5.50 each—or, as he puts it, “full fucking price”—and encourages other immigrants not to undervalue their work. Restaurants in Q's bracket are cropping up not just in America's Chinatowns but in the suburbs, where Chinese immigrants and their families have settled, following the classic strivers' path. The median income of Chinese-Americans' households is nearly 30% higher than the average. They are more than twice as likely as other Americans to have an advanced degree.

Meanwhile, although racism persists, the pervasive discrimination of earlier ages has waned. Witness the presidential campaign of Andrew Yang, in which his ethnicity has scarcely been mentioned. Since the Chinese-American population is six times as big as 40 years ago, Americans overall are much more familiar with Chinese people and their cooking. All of which means that, in your correspondent's fairly extensive experience, the new fancy breed of Chinese restaurants draws a heartening mix of Chinese and non-Chinese diners.

Not everyone is enticed. The same cult of authenticity which decrees that good tacos only come from trucks posits that the best Chinese food is found in humble settings. That is as inaccurate as the snobbery that Mr Huang decries. Chinese chefs are as ambitious as any others; a bowl of noodle soup no more stands for all of Chinese cuisine than a slice of pizza does for Italian.

In any case, authenticity is a slippery commodity. Recipes constantly

evolve as people move and mingle. The chillies now considered essential to Sichuan dishes were actually brought to China by Iberian traders in the late 16th century. Hot dogs were originally German, pizza Neapolitan, bagels Polish—but now they are all American, and like America, infinitely varied.

The goat ribs at Duck, Duck Goat, in Chicago's trendy meatpacking district, are more Chinese-ish than Chinese. So is the place itself—headed by a non-Chinese chef and kitschily decorated with paper lanterns and bright red walls. The ribs come as a mesh of burnished meat stilettos with a wonderful chew, the sweetness of the glaze giving way to the goat's irresistible gaminess. They spark fights over who gets the last one. They are as inauthentic, and as imaginative and lovingly created, as Mr Chang's scallion dough sphere—and as delicious, which in the end, is what counts.





餐盘上的移民

蒸蒸日上

美式中餐的演变反映了美籍华人自身的上升轨迹

从2005年前后开始，有那么几年美国东海岸的中餐迷对一个神秘事件津津乐道：张鹏亮（Peter Chang）在哪儿？他是一名才华横溢却行踪不定的厨师，游走于美国东南部的众多餐馆之间。里士满或亚特兰大近郊路边商店街的某个餐馆里，食客前一天可能还在吃着普通的鸡蛋卷和陈皮鸡，后一天他们的餐桌上摆上了食指大小的精巧茄子条，油炸过却不油腻，上面撒着孜然、干辣椒和四川花椒；有时是新鲜海鲈鱼配酸菜做成的汤，如巴赫大提琴组曲般完美简约，令人回味。几个月后，张鹏亮又会飘然离去。

现在，他似乎已经安定下来，在马里兰州的罗克维尔和弗吉尼亚海滩之间开出了一系列以自己的名字命名的餐厅。最新的一家叫“Q by Peter Chang”（以下简称Q餐厅），位于华盛顿的高档郊区贝塞斯达，也许是他所有餐厅中最高级的。里面非常宽敞，打磨混凝土地面和大柱子营造出工业风，看不到眨着眼的龙。点一道“葱油泡饼”，端上来的不是通常那种油腻的圆形薄饼，而是排球大小的轻盈的炸面球。“锅巴葱汁虾贝”上面貌似倒扣着一只木碗（你也许以为那是扔虾壳用的）。细看才会发现那“木碗”正是锅巴。用勺子敲碎锅巴，精致烹调的虾浮现于三叶草绿色的酱汁中。

两人在Q餐厅用餐，账单很容易上到三位数，是普通中餐的好几倍。但Q餐厅也不是该地区唯一此类餐厅：和美国许多大城市一样，华盛顿也刮起了一股高档中餐的风潮。这是好事，不止是对那些分得清“水饺”和“水煮”的阔绰老饕而言。在这股餐饮潮流背后有两个良性社会趋势在支撑。一方面，美国华裔变得越来越富也越来越自信，另一方面，顾客也在逐渐消除对中餐的刻板印象。换句话说，有时候饺子不只是饺子了。

| 外人的慰藉

中餐馆最早在美国出现是在19世纪中叶，集中在第一批移民落脚的西海岸地区。它们大多提供美式粤菜——杂碎、芙蓉蛋之类。在19世纪以及20世

纪的大部分时间，这些移民主要来自中国东南部，主要是广东省。

美国在1965年改革了移民政策，取消了限制非欧洲人迁入的种族配额，来自中国其他地区的移民开始涌入。餐馆开始管自家菜品叫“湖南”、“四川”，尽管它们往往与这些地区的实际菜式大相径庭；但相比最早期中餐菜单上那些偏甜的炒菜和油炸食物，这些新式中餐更多元，也更敢用辣。到了90年代，在华裔较多的美国城市，勇于尝新的食客已经可以选择各大菜系的中餐。带有令人上瘾的麻辣味（川椒有轻微麻醉舌头的作用）的川菜尤其受欢迎。

但在过去几十年里，随着中餐变得随处可见，抛开美食家的小众世界不说，它变得日渐标准化。在美国有41,000家中餐馆，数量几乎是麦当劳的三倍。几乎每个小镇都有一家，菜单都大同小异：猪肉馅蒸饺或煎饺、酸辣汤或馄饨汤、按主料列出的炒菜（以辣椒图标或星号表示含有少量辣椒碎）。10美元以上的菜式会列在“主厨特选”之下。地区之间有些微差异：在波士顿，外卖中餐通常附送面包和一份深色的蜜糖酱；在曼哈顿上城则发展出一种混合风味的拉美式中餐。但大多数情况下，就和在麦当劳那样，你能在明尼阿波利斯和劳德代尔堡点到一模一样的东西。

直到近年，中餐的价格和菜单一样变化不大，一直都很低。来自台湾的华裔美国人黄颐铭（Eddie Huang）从餐馆老板转型为作家兼节目主持人，他回忆父亲初到美国开餐馆时一直把价格定得很低，因为“在美国，移民无法以足价卖任何东西。”

实际上，这只是聊以自慰的简单化的说法。美国人一贯愿意花大价钱在法国或意大利餐厅用餐（实际上那里的菜大多是拉美人做的）。美国每个城市都有高价日本寿司店和天价西班牙tapas小吃店（就像一句玩笑话说的的那样，“花96美元还吃不饱”用西班牙语讲就是“tapas”）。

但黄颐铭有一个说法是对的：长期以来美国人都觉得中餐应该既便宜又管饱。比起城中那些亮着惨白日光灯、柜台塑料贴面破破烂烂的中餐外卖店，郊区公路边商业区里装着堂皇的红漆大门、立着假狮子的中餐馆要高

级一些。它们带有足够别致的中国风，但一家人在不想做饭时每周光顾一次也负担得起。

| 美国梦

即便那些品质较好的门店也堪称物美价廉（现在有很多也仍然如此）。想想开在曼哈顿下城的“西安名吃”（Xi'an Famous Foods）那盘羊肉干扯面吧。一碗长长的面条，每根差不多有歌手埃尔维斯·卡斯特罗（Elvis Costello）在70年代末系的领带那样宽，铺上红烧羊肉片，浇上火辣但口感丰富的孜然辣椒汁，全部只需10美元多一点，比起附近高档餐厅里同等水准的菜肴价格悬殊。是的，“西安名吃”没有服务生（食客自己用塑料托盘把碗碟端到配着长凳的座位上），但它的面条是手工制作的，而且这道羊肉面可能是纽约最好吃的东西，多贵也不为过。

但现在，情况正在发生变化。黄颐铭目前在纽约和洛杉矶出售香软可口的包子，每只5.5美元（用他的话说这才是“他妈的足价”），并鼓励其他移民不要低估自己的工作成果。Q餐厅之类的高档中餐馆不仅在美国各地的唐人街冒起，还追随典型的奋斗者轨迹，在华裔移民家庭定居的近郊住宅区出现。美国华人的家庭收入中位数比美国平均水平高出近30%，他们拥有高等学位的比例也是其他美国人的两倍以上。

同时，尽管种族主义仍然存在，但早年间普遍歧视已经消减。从杨安泽（Andrew Yang）参选总统的经历可见一斑，他的族裔身份几乎不曾被提起。美籍华人的数量已是40年前的六倍，所以美国人总体上对华人和中餐都熟悉了许多。以本专栏记者也算广博的体验来看，所有这些都意味着新一批高档中餐馆为华人和非华人食客“通吃”，令人鼓舞。

但也不是人人都会捧场。崇尚地道美食的人认为，最好的中餐要到环境朴素的小店里寻觅，正如他们认为只有街头餐车卖的玉米饼才够正宗。这和黄颐铭批评的那种优越感一样是错的。华裔厨师和其他厨师一样雄心勃勃；一片披萨不能代表意大利菜，一碗汤面也不能代表所有中国菜。

无论如何，何谓正宗并不好说。随着人们迁移混合，食谱也不断演变。现

在被认为是川菜精髓的花椒实际上是16世纪后期才由伊比利亚商人带到中国的。热狗源自德国，披萨源于那不勒斯，百吉饼是波兰人的创造，但这些现在都成了美国的代表食物，而且就和美国一样变幻无穷。

在芝加哥由原肉类加工厂改建而来的时尚街区，“鸭鸭山羊”（Duck, Duck Goat）端出的羊肋排与其说是中国菜，不如说是带中餐元素的菜式。餐厅本身也是如此，它的主厨并不是华人，店内大红色墙面，纸灯笼悬挂，风格俗丽。这道羊肋排把油亮的细排骨叠放，吃起来很有嚼头，表面那层糖汁的甜味过后是山羊肉诱人的膻味，惹得食客争抢碟上最后一根排骨。这道菜和Q餐厅的葱油泡饼一样，不正宗，但富有想象力，匠心独具，而且非常美味——这最后一点才是最重要的。 ■



Global retail

Aisle and hopper

International expansion is a mixed bag for big retailers

WHEN COSTCO, an American discount retailer, opened its first store in Shanghai this August, huge crowds of shoppers forced managers to shut it down. The world's 250 biggest retail chains are present in ten countries on average and get about a quarter of revenues from international operations. Expansion into foreign markets looks like a no-brainer for retailers, then?

Not so fast. Many firms' foreign revenues have been tepid (see chart). Last month Tesco was reported to be considering the sale of its 2,000 stores in Thailand and Malaysia. Since 2013 the British supermarket chain has folded its unprofitable Chinese operations into a state-run firm, unwound a \$2bn foray into America and exited South Korea and Turkey. Germany's MediaMarkt and America's Best Buy, big electronics retailers, and Home Depot, an American home-improvement giant, all flopped in China. In June Carrefour, a French supermarket chain, said it would sell 80% of its Chinese business. Even Walmart, the world's largest company by revenue, has found foreign expansion tough. It retreated from South Korea and Germany in 2006, and in 2016 said it would close 269 stores worldwide.

Foreign revenues help insulate firms from downturns in domestic markets. But global retailers face nimble local rivals overseas, who often understand consumer preferences better than foreigners do. Foreign ventures do not always offer refuge from domestic competitors, either. Walmart paid \$16bn in 2018 for a majority stake in Flipkart, a loss-making Indian e-merchant, hoping to profit from serving India's rising middle class. Instead, it is battling Amazon for their custom. ■



全球零售

超市跳步

国际扩张对大型零售商而言好坏参半

美国折扣零售商好市多（Costco）去年8月在上海开设了首家门店，开业当天由于人流量过大而不得不暂停营业。全球250家最大的零售连锁店平均在十个国家开展业务，国际业务收入约占总收入的四分之一。如此看来，对零售商而言，向国外市场扩张似乎是件不需要思考的事了？

且慢。很多公司的海外收入一直都不温不火（见图表）。上月，有报道称乐购（Tesco）正在考虑出售它在泰国和马来西亚的2000家门店。2013年以来，这家英国连锁超市将其无利可图的中国业务卖给了一家中国国营企业，放弃了亏损20亿美元的美国业务，退出了韩国和土耳其。德国的MediaMarkt和美国的百思买（Best Buy）这两家大型电子产品零售商，以及美国家装巨头家得宝（Home Depot）都在中国失利。去年6月，法国连锁超市家乐福表示将出售其中国业务80%的股权。就连全球收入最高的沃尔玛在海外的扩张之旅也不无艰难。它于2006年撤出韩国和德国，在2016年表示将在全球关闭269家门店。

海外收入有助于隔离国内市场低迷的影响。但是，全球零售商在海外面对的本地竞争对手灵活敏捷，通常比外国企业更了解消费者的喜好。海外业务也不是总能帮助企业躲避国内竞争对手的威胁。沃尔玛在2018年以160亿美元的价格收购了亏损的印度电子商务公司Flipkart的多数股权，希望能通过服务印度日渐扩大的中产阶级获利。但现在它却得和亚马逊争夺这些客户。 ■



Asset prices

Worth its weight

Gold hits seven-year highs as geopolitical risks soar and real interest rates fall

“NOBODY REALLY understands gold prices, and I don’t pretend to understand them either,” said Ben Bernanke, then chairman of the Federal Reserve, in 2013, after a turbulent few months in the market for the metal (it hit its all-time peak in 2011, at the height of the euro-zone crisis and following a downgrade of America’s credit rating). Yet it is not hard to see why the metal hit its highest level since early that year—\$1,588 per ounce—on January 6th.

The jump followed the drone strike that killed Qassem Suleimani, leader of the Quds Force of Iran’s Islamic Revolutionary Guard Corps, three days earlier. The rise of 2.9% over two trading days is similar to those after other Middle Eastern flare-ups. (Oil prices also leapt: Brent crude rose by 5%, briefly topping \$70 a barrel.) Iran’s attack on the Al-Asad airbase on January 8th caused a further 2% jump, to \$1,611 per ounce, before investors concluded that Iran was saving face, rather than escalating.

Investors typically rush into gold when geopolitical risk soars. However, its price has been rising for a while, climbing by more than 25% since November 2018. The reason is falling real (ie, inflation-adjusted) interest rates. The most common measure is the yield on ten-year inflation-indexed American Treasury bonds (TIPS); after the Federal Reserve began cutting rates this slid from around 1.1% in November 2018 to near zero last August. That was the lowest since 2013, the last time gold was so dear.

Analysts at PIMCO, a fixed-income asset manager, think of gold as an asset with no default or inflation risk (in inflationary times, investors often regard it as a hedge against rising prices). That makes it pretty similar to

TIPS, except that gold never yields any interest. If real rates rise, gold's relative attractiveness falls; when they fall, it rises.

Gold is not for everyone. Warren Buffett, probably America's most celebrated investor, is certainly no fan. He once said that the metal "gets dug out of the ground in Africa, or someplace. Then we melt it down, dig another hole, bury it again and pay people to stand around guarding it. It has no utility." John Pierpont Morgan, eponymous founder of America's biggest investment bank, held a different opinion, quipping that "gold is money, everything else is credit". And when the return for providing credit is close to zero, it is little surprise that investors want their money in gold. ■



资产价格

值钱的金子

地缘政治风险飙升加上实际利率下跌，推动黄金价格达到七年来最高水平

“没有人真正懂得金价，我也不会不懂装懂。”2013年，在金价震荡数月后，时任美联储主席的伯南克这样说道（金价在2011年升至历史巅峰，当时欧元区危机水深火热，美国又被调低了信用评级）。不过，不难明白为何这种金属在本月6日达到了2013年初以来的最高价格——每盎司1588美元。

此次价格跃升的三天前，伊朗伊斯兰革命卫队“圣城旅”指挥官卡西姆·苏莱曼尼（Qassem Suleimani）遭美军无人机袭击身亡。金价在两个交易日内上涨了2.9%，这与中东地区其他冲突事件爆发后的情况相似。油价也大涨：布伦特原油价格上涨5%，一度突破每桶70美元。1月8日，伊朗袭击了美军驻伊拉克的阿萨德空军基地，导致金价再升2%，达到每盎司1611美元，之后投资者才推断认为伊朗的行动只是想挽回颜面，并非要升级冲突。

地缘政治风险飙升时，投资者通常会抢购黄金。然而，金价已经持续上涨了一段时间，自2018年11月以来涨幅超过25%。原因是实际利率（即剔除通胀以后）下降。最常见的衡量标准是十年期通胀保值美国国债（以下简称TIPS）的收益率。自美联储开始降息后，TIPS收益率从2018年11月的1.1%左右降至去年8月的接近零，是自2013年以来的最低水平，而2013年是上一次金价处于如此高位之时。

固定收益资产管理公司太平洋投资管理公司（PIMCO）的分析师认为，黄金是没有违约或通胀风险的资产（在通胀时期，投资者通常视之为对抗物价上涨的避险工具）。这令黄金与TIPS非常相似，只是黄金不产生任何利息。假如实际利率上升，黄金的相对吸引力就会下降；若前者下跌，后者就会上升。

并非人人都喜欢投资黄金。可谓美国最著名投资人的巴菲特肯定不是黄金的拥趸。他曾经说，这种金属“被人们从非洲或别的什么地方挖出来，然后熔炼，再挖个洞把它藏起来，还要雇人在周围守卫。它没有任何实际用处”。美国最大的投资银行摩根大通的创始人约翰·皮尔庞特·摩根（John Pierpont Morgan）却有不同看法，他戏称“黄金才是钱，其他的都只是信用”。而当提供信用的回报接近于零，投资者把资金换成黄金也就不足为奇了。■



American firms in China

Still worth it

Despite political complications, America Inc is still doing surprisingly well in China

FOUR DECADES ago communist China officially opened its doors to America and its capitalist firms. Politics, once seemingly set aside for the purpose of commerce, has recently made a comeback. President Xi Jinping has stirred up nationalism as part of his effort to consolidate power—worryingly for American firms seen as insufficiently deferential to China’s line on Hong Kong among other sensitive political topics. President Donald Trump’s trade war against China and his crackdown on Huawei, a domestic telecoms-equipment giant, have provoked further anti-American sentiments.

On December 31st Mr Trump tweeted that he will soon sign a “phase one” trade agreement with China. That will lead to some tariff cuts on Chinese imports, and to a presidential trip to Beijing for further haggling. When he visits, Mr Trump will surely hear grouses from his country’s firms about their troubles in China. What they are less likely to trumpet is how surprisingly well they are still doing there.

Some firms are suffering from a backlash arising from the trade war. But its effect on America Inc has been exaggerated. For one thing, American companies on average get only about 5% of their revenues from China (see chart), according to Morgan Stanley, a bank. Though the technology, automobile and consumer-products industries have greater exposure, for others China is an afterthought.

A third of respondents to a survey by the US China Business Council (USCBC), a trade group, claim they have been subjected to “increased scrutiny from Chinese regulators as a result of bilateral trade tensions.”

However, local governments with their own growth targets have been rolling out the red carpet this year, foreign executives say. Thanks in part to such efforts, the share of American firms claiming their local operations had been hurt by “Made in China 2025”, an indigenous-innovation scheme America is wary of, plunged from 20% in 2017 to 12% in 2019.

Rising nationalism, stirred up by Mr Xi and embraced with zeal by mainland netizens, may prove a bigger problem than trade tensions. In November DC Comics was forced to pull a promotional poster for a Batman comic book from social media (Batwoman was shown throwing a molotov cocktail) as Chinese critics on social media drew parallels with the pro-democracy movement in Hong Kong. That came on the heels of a much-publicised row involving the National Basketball Association (NBA), after an executive at the Houston Rockets tweeted support for Hong Kong’s molotov-chuckers.

Previous nationalist backlashes stirred up by the Communist Party, for example against Lotte, a South Korean supermarket chain, and Toyota, a Japanese carmaker, led to no more than flash-in-the-pan boycotts. The basketball row, in contrast, is dragging on; the Rockets remain blacklisted in China, and by one reckoning have lost nearly \$20m in sponsorship deals as a result.

Being seen to kowtow to China presents its own risks nowadays. The NBA, which claims 600m fans in China, promptly apologised—only for its apology to come under fire in America, including a reprimand from Mike Pence, the vice-president. In July Google scrapped a mooted return to the mainland’s censored online-search market after an employee revolt. Shutterstock, an online-photo agency, faced similar outrage from its workers in November over its decision to censor images in China.

American bosses are now in the unenviable position of having to weigh up

the prospect of Chinese official ire with the sensibilities of politicians, employees and consumers at home. This risk will be heightened by increasing international concern over Xinjiang, a province in the west of China where officials stand accused of abusing Uighurs, the largest Muslim group in the country. American firms ranging from Kraft Heinz, a food giant, Coca-Cola, a fizzy-drinks colossus, and Nike, a sporting-goods brand, are reported to have supply chains that stretch into Xinjiang.

Despite these complications, most American firms remain committed to the mainland. The latest survey by the American Chamber of Commerce in Beijing finds that China remains in the top three as a global investment destination for 62% of its members, up from 56% in 2016; 87% of member firms tell the USCBC that they plan to keep doing business in China, roughly the same proportion as in recent years.

The reason is that the mainland remains a huge and growing market for most industries. American firms are still making money there. Andy Rothman of Matthews Asia, an investment firm, even argues that China is “the world’s best consumer story.” In dollar terms, retail sales in China are nearly as big as those in America, but they surged by 6% last year compared with a 2% rise in America. Chinese real incomes rose 120% over the last decade, whereas American ones grew by 17%. American multinationals are benefiting from this rising tide: the vast majority of their operations are not only profitable, but often increasingly so. Nearly half reported their Chinese operations were more profitable than elsewhere in 2019, up from 38% a year earlier.

More Budweiser beer is consumed in China than in America, notes Bruno Lannes of Bain, a consultancy. ABInBev, which brews the quintessentially American tippie, has seen its revenues in China grow more than six-fold even as its profit margins have fizzed. China’s market for fast-moving consumer goods rose by 5.2% in 2018, and foreign firms have benefited.

Procter & Gamble, an American consumer-products goliath, says China represents more than 30% of its global sales growth. In December Tesla, an electric-vehicle pioneer, delivered the first EVs produced at its new factory in Shanghai.

If the threat from politics seems overblown, there is a genuine worry for American bosses on the mainland: market competition. Chinese smartphone makers have increased their share in the local market for phones costing over \$400 from 12% in 2014 to 67% in 2018, says McKinsey, a consultancy. Domestic carmakers, who once made subsidised hunks of junk, have managed to reduce their defect rate by an order of magnitude since 2003; their market share has jumped from 26% in 2014 to 38% in 2018.

This is primarily the result of nimbleness, not subsidies. Unlike state-owned firms, which Mr Xi is propping up with renewed vigour, most Chinese private companies are frugal innovators. Only 9% of American firms complain that local private firms get unfair advantages like tax breaks, licensing approvals and subsidies.

Political rows dominate the headlines today, but the longer-term challenge for American firms may prove to be the rise of China Inc. ■



美国企业在中国

仍有可为

尽管政治环境错综复杂，美国企业在中国仍然业绩惊人

四十年前，共产主义中国对美国及其资本主义企业正式打开了门户。政治一度貌似为商业利益让路，但近来又重新占据主导。作为巩固权力的举措之一，国家主席习近平挑起了民族主义情绪，这让美国企业感到担忧，因为它们往往被认为在香港等敏感政治议题上对中国的立场不够恭敬。美国总统特朗普发起了对华贸易战，并重拳打击中国通信设备巨头华为，这进一步激发了反美情绪。

特朗普在12月31日发推文表示很快将与中国签署“第一阶段”贸易协议。此举将取消部分对华加征的关税，他本人还将访问北京展开进一步谈判。在他访华期间，他肯定会听到美国企业向他抱怨在中国遭受的种种麻烦。但它们可能不大会嚷嚷自己在那里的业务仍好得出奇。

有些企业正饱受贸易战影响的冲击。但贸易战对美国企业的影响还是被夸大了。首先，据摩根士丹利统计，美国企业平均只有约5%的营收来自中国（见图表）。虽然科技、汽车和消费品行业对中国的依赖度较高，但在其他行业里中国市场并不紧要。

在行业组织美中贸易全国委员会（USCBC）的调查中，三分之一的受访者表示“由于双边贸易关系紧张，他们在2019年经历了中国监管部门更多的审查”。但外企高管表示，地方政府为了实现自己的经济增长目标，这一年将他们奉为上宾。一定程度上有赖于此，2019年只有12%的美国企业表示其本地运营受到“中国制造2025”这一美国忌惮的自主创新计划的冲击，远低于2017年的20%。

习近平鼓动的民族主义不断高涨，受到大陆网民的热忱信奉，这带来的麻烦可能比贸易关系紧张更大。去年11月，DC漫画公司（DC Comics）蝙蝠侠系列漫画的一张宣传海报被认为影射香港民主运动（图中的蝙蝠女侠正

在投掷燃烧弹），受到中国网民批评，被迫从社交媒体撤下。在此之前，休斯顿火箭队的一名高管发推文支持扔燃烧弹的香港示威者，令NBA卷入一场喧嚣的口水战。

过去由共产党挑起的民族主义抵制比较短暂，例如针对韩国超市连锁乐天以及日本汽车制造商丰田的抵制活动都不过昙花一现。但这次的篮球风波却迟迟没有平息：火箭队在中国仍未被解禁，一项估算显示该队已经因此损失了近2000万美元的赞助收入。

今时今日，被认为向中国屈服也有风险。拥有六亿中国粉丝的NBA很快道歉，结果却在美国遭到炮轰，副总统彭斯也发声谴责。去年7月，由于员工强烈抗议，谷歌放弃了重返中国大陆受审查的网络搜索市场的计划。图片网站Shutterstock11月决定在中国市场配合审查，同样引发员工震怒。

美国老板们现在的处境十分尴尬，一方面要避免激怒中国官员，一方面又要考虑本国政客、员工及消费者的敏感情绪。随着新疆问题日益受到国际关注，这种风险还将进一步增大。这个中国西部省份的官员被指控虐待国内最大的穆斯林群体维吾尔族人。从大型食品企业卡夫亨氏、碳酸饮料巨头可口可乐，到运动品牌耐克，许多美国企业的供应链都被指涉及新疆。

尽管环境如此复杂，大多数美国企业仍然坚守中国大陆市场。在北京的美国商会的最新调查显示，62%的会员仍将中国视为全球三大投资目的地之一，高于2016年的56%；而在USCBC的会员企业当中，87%表示计划继续在中国的业务，与近几年的比例基本持平。

这是因为对于多数行业而言，中国大陆仍然是一个不断增长的庞大市场。美国企业仍在从这里赚钱。投资公司铭基亚洲（Matthews Asia）的罗福万（Andy Rothman）甚至称中国应获颁“世界最佳消费者故事奖”。以美元计算，中国的零售额几乎与美国相当，但在去年增长了6%，而美国仅增长了2%。过去十年里中国人的实际收入增加了120%，而美国人只增加了17%。美国的跨国公司搭乘了这股东风：它们的绝大部分业务不仅盈利，而且利润率往往还越来越高。2019年近半数受访企业表示中国区业务

比其他地区更赚钱，一年前该比例为38%。

贝恩咨询公司的布鲁诺·兰纳（Bruno Lannes）指出，中国喝掉的百威啤酒比美国还多。作为美国经典啤酒的酿造商，百威英博（ABInbev）在中国的营收增长了五倍以上，同时利润率也蒸蒸日上。2018年中国快消品市场增长了5.2%，外资企业从中获利颇丰。美国快消品巨头宝洁表示其全球新增销售的30%以上来自中国。去年12月，电动汽车先锋企业特斯拉交付了第一辆在上海新工厂生产的电动汽车。

政治方面的威胁或许言过其实，美国老板们在中国大陆却有一个实实在在的忧虑：市场竞争。咨询公司麦肯锡统计，中国智能手机制造商在国内售价400美元以上手机市场所占的份额已经从2014年的12%增加到2018年的67%。国内汽车厂商以前依赖补贴，产品质量惨不忍睹，但自2003年以来它们的故障率已经降低了一个数量级，市场份额也从2014年的26%跃升至2018年的38%。

这主要得益于灵活经营而非补贴。与习近平现在重新大力扶持的国企不同，多数中国私营企业都是勤俭持家的创新者。只有9%的美国企业抱怨中国私企获得了减税、许可审批和补贴等不公平的优势。

政治纷争虽然占据了眼下的新闻头条，但长远而言美国企业面临的挑战更可能是来自中国企业的崛起。 ■



Predicting 2020

What are the odds?

The wisdom of markets and models suggests a tumultuous year ahead

“PREDICTION IS DIFFICULT,” they say, “especially about the future.”

Statistical models can yield tolerably accurate projections for events that occur often, but not for one-offs, for which there are no historical data. One way to estimate the odds of such events is the “wisdom of crowds”. Just as stockmarkets aggregate beliefs about risk and firms’ future profits, betting markets reveal a consensus view about future political and news events.

Our graphic shows forecasts for the year ahead based on markets and models, from Donald Trump’s chances of re-election (46%) to whether Sweden will win the Eurovision Song Contest (9%). Nothing about the future is certain, but some outcomes are more likely than others. ■



预测2020

几率有多大？

市场智慧和模型显示这一年将充满动荡

人们常说：“预测很难，尤其是预测未来。”统计模型可以对经常发生的事件做出准确度尚可的预测，但对没有历史数据的一次性事件就很难了。预测此类事件发生几率的一种方式“群众智慧”。正如股票市场汇集了对风险和企业未来利润的看法，博彩市场揭示了人们对未来政治和新闻事件的共识。

我们的图表显示了基于市场和模型对这一年做出的预测，从特朗普连任的机会（46%）到瑞典是否会赢得欧洲歌唱大赛（9%）。未来的一切都不确定，但有些变成现实的几率要更大。■



China and America

Poles apart

The planet's biggest break-up is under way. It will reshape the world economy—and cost a fortune

ON JANUARY 15TH, after three years of a bitter trade war, America and China are due to sign a “phase one” deal that trims tariffs and obliges China to buy more from American farmers. Don’t be fooled. This modest accord cannot disguise how the world’s most important relationship is at its most perilous juncture since before Richard Nixon and Mao Zedong re-established links five decades ago. The threat to the West from China’s high-tech authoritarianism has become all too clear. Everything from its pioneering artificial-intelligence firms to its gulags in Xinjiang spread alarm across the world.

Just as visible is America’s incoherent response, which veers between demanding that the Chinese government buy Iowan soyabeans and insisting it must abandon its state-led economic model. The two sides used to think they could both thrive; today each has vision of success in which the other lot falls behind. A partial dismantling of their bonds is under way. In the 2020s the world will discover just how far this decoupling will go, how much it will cost and whether, as it confronts China, America will be tempted to compromise its own values.

The roots of the superpower split go back 20 years. When China joined the World Trade Organisation in 2001 reformers at home and friends abroad dreamed that it would liberalise its economy and, perhaps, its politics too, smoothing its integration into an American-led world order.

That vision has died. The West has faced a financial crisis and turned inward. China’s behaviour has improved in some ways: its giant trade

surplus has fallen back to 3% of GDP. But it has an even bleaker form of dictatorship under President Xi Jinping and has taken to viewing America with distrust and scorn. As with every emerging great power, China's hankering to exert its influence is growing along with its stature. It wants to be a rule-setter in global commerce, with sway over information flows, commercial standards and finance. It has built bases in the South China Sea, is meddling with the 45m-strong Chinese diaspora and bullying its critics abroad.

President Donald Trump has responded with a policy of confrontation that has won bipartisan support in America. Yet the China hawks thronging Washington agencies and corporate boardrooms share no consensus over whether America's goal should be the mercantilist pursuit of a lower bilateral trade deficit, the shareholder-driven search for profits in American-owned subsidiaries in China or a geopolitical campaign to thwart China's expansion. Meanwhile, Mr Xi oscillates between grim calls for national self-reliance one day and paeans to globalisation the next, while the European Union is unsure if it is an estranged American ally, a Chinese partner or an awakening liberal superpower in its own right.

Muddled thinking brings muddled results. Huawei, a Chinese tech giant, faces such a disjointed campaign of American pressure that its sales rose by 18% in 2019 to a record \$122bn. The EU has restricted Chinese investment even as Italy has joined China's belt-and-road trade scheme. China spent 2019 promising to open its big, primitive capital markets to Wall Street even as it undermined the rule of law in Hong Kong, its global financial hub. The phase-one trade deal fits this pattern. It mixes mercantilist and capitalist goals, leaves most tariffs intact and puts aside deeper disagreements for later. Mr Trump's tactical aim is to help the economy in an election year; China is happy to buy time.

Geopolitical incoherence is neither safe nor stable. True, it has not yet

inflicted a big economic cost—since 2017 bilateral trade and direct investment flows between the superpowers have dropped by 9% and 60% respectively, but the world economy still grew by about 3% in 2019. Some businesses, such as Starbucks's 4,125 cafés in China, need never be affected. But confrontation is constantly spreading into new arenas. America's campuses are convulsed by a red scare about Chinese spying and intimidation. Rows blaze over athletes kowtowing to China, naval docking rights and alleged censorship on TikTok, a Chinese app used by teenagers worldwide. In the background is the risk of a confrontation between the superpowers over Taiwan, which held elections last weekend.

Each side is planning for a disengagement that limits the other superpower's day-to-day influence, reduces its long-term threat and mitigates the risk of economic sabotage. This involves an exceptionally complex set of calculations, because the two superpowers are so intertwined. In technology, most electronic devices in America are assembled in China, and, reciprocally, Chinese tech firms rely on foreign suppliers for over 55% of their high-end inputs into robotics, 65% of those into cloud computing and 90% of those into semiconductors. It would take 10-15 years for China to become self-sufficient in computer chips and for America to shift suppliers. Likewise in high finance, which could serve as a vehicle for sanctions. The yuan accounts for just 2% of international payments and Chinese banks hold over \$1trn in dollar assets. Again, shifting trade partners to the yuan and winding down the banks' dollar exposure will take at least a decade, probably longer. And when it comes to research, China still trains its best talent and finds its best ideas in America's world-beating universities—at the moment there are 370,000 mainland students on campuses in the United States.

Were the superpower rivalry to spiral out of control, the costs would be vast. To build a duplicate tech hardware supply-chain would take \$2trn or so, 6% of the superpowers' combined GDP. Climate change, a great

challenge which could provide a common purpose, would be even harder to cope with. Also at stake is the system of alliances that is a pillar of America's strength. Some 65 countries and territories rely on China as their largest supplier of imports and, asked to choose between the superpowers, not all of them would opt for Uncle Sam—especially if it continues to pursue today's policy of America First. Most precious of all are the principles that really made America great: global rules, open markets, free speech, respect for allies and due process. In the 2000s people used to ask how much China might become like America. In the 2020s the bigger question is whether a full superpower split might make America more like China. ■



【首文】 中国与美国

两极分裂

地球上正发生着一场最大的决裂。它将重塑世界经济，并付出昂贵的代价

贸易战苦战三年后，美中两国将在1月15日签署“第一阶段”协议，削减对华关税并迫使中国进口更多美国农产品。但别被蒙蔽。这份影响有限的协议无法掩盖的是，全球最重要的双边关系正处于50年前尼克松和毛泽东尝试重新建交以来最危险的关头。中国的高科技专制体制对西方的威胁已经再明显不过。从其锐意创新的人工智能公司到新疆的劳改营，一切都让世界惊恐。

同样显而易见的是美国的反应自相矛盾：一时要求中国政府购买爱荷华州的大豆，一时又坚决要求中国放弃政府主导的经济模式。过去，双方认为它们可以共同繁荣；如今，它们各打各的算盘，要抛离对方独享成功。双方的连结在一些方面已经在崩裂。进入本世纪20年代，世人将见证两边会决裂至何种程度、造成何种代价，以及美国在对垒中国时是否会违背自己的价值观。

这两个超级大国走向决裂，根源可追溯到20年前。2001年中国加入世贸时，中国国内的改革派和国外的友人都梦想中国可从此实现经济自由化，或许政治也能如此，从而顺利融入美国主导的世界秩序。

这种愿望已经落空。西方经历了一场金融危机，自顾不暇。中国在某些方面的表现有所改善：原本庞大的贸易顺差已降至GDP的3%。但在习近平的领导下，中国的独裁统治更加森严，转而对美国采取不信任和蔑视的态度。就像每个新兴大国一样，随着地位的提升，中国愈发渴望施展自身影响力。它希望成为全球商贸的规则制定者，主导信息流、商业标准和金融。它在南中国海建立了基地，正在干涉4500多万海外华人的事务，威吓海外批评者。

特朗普以针锋相对的政策回应，在美国赢得了两党支持。然而，美国的目

标到底是秉承重商主义追求降低双边贸易赤字，还是以股东利益为主导追求美国在华子公司的利润最大化，还是以地缘政治运动阻挠中国扩张？充斥华盛顿政府机构和公司董事会的对华鹰派人士对此并无共识。与此同时，习近平也是摇摆不定，今天严辞号召国民自力更生，明天又高唱全球化赞歌。欧盟也立场不明——是渐生嫌隙的美国盟友、中国的伙伴、还是另一股觉醒的自由派超级势力？

混乱的思维带来混乱的结果。美方向华为施压的行动杂乱无章，结果这家中国科技巨头在2019年销售额还增长了18%，达到创纪录的1220亿美元。欧盟限制中国投资，意大利却又加入了中国的“一带一路”贸易倡议。中国在2019年再三承诺向华尔街开放其庞大但仍然初级的资本市场，同时却又在破坏其全球金融中心香港的法治。第一阶段贸易协议也是这副模样。它混合了重商主义和资本主义目标，保留了大多数关税，把更深层次的分歧留待日后。特朗普的战术目标是在选举年内提升经济表现，而中国则乐于拖延时间。

地缘政治上的混乱思路既不利于安全也不利于稳定。诚然，这尚未造成重大的经济损失——自2017年以来中美双边贸易和直接投资流量分别下降了9%和60%，但2019年全球经济仍取得了约3%的增长。有些企业永远不会受影响，比如在中国有4125家分店的星巴克。但对抗正不断扩散到新的领域。对中国间谍和威吓的“红色恐慌”震动了美国校园。围绕美国运动员讨好中国、美国海军停靠港口的权利以及据称对广受全球青少年欢迎的抖音国际版TikTok的审查展开了激烈争论。还有一个不那么显见的地带是两国可能会因为台湾发生冲突，那里上周末刚刚结束了领导人选举。

双方都在规划脱钩，以限制另一个超级大国对自己的日常影响，减轻其长期威胁，并减少遭受经济破坏行动的风险。这涉及极其复杂的算计，毕竟两国在方方面面已紧密交织。在技术上，美国大多数电子设备都是在中国组装的，而反过来，中国的高科技公司在机器人、云计算、半导体上依赖国外供应商提供高端零部件的比例分别超过55%、65%和90%。中国实现计算机芯片自给自足以及美国转移供应商需要10到15年的时间。可以作为制裁手段的复杂金融交易也一样。人民币仅占国际支付的2%，而中资银

行持有的美元资产超过一万亿。同样，说服贸易伙伴以人民币结算并减少中资银行的美元敞口至少需要10年，甚至可能更久。而在科研方面，中国仍要依靠美国的世界顶尖学府培养其最优秀的人才以及激发最好的创意。目前有37万大陆学生就读于美国高校。

假如超级大国之间的竞争失控，代价将极其巨大。另外打造一条技术硬件供应链将花费约两万亿美元，是中美两国GDP总和的6%。气候变化这一重大挑战本可为两国带来共同目标，此刻将变得更难应对。美国的盟友体系也面临风险，而这是美国强势地位的支柱之一。约有65个国家和地区以中国为最大进口来源国，它们要被迫在中美之间做抉择，并非所有这些国家都会选择“山姆大叔”，尤其是如果它继续奉行当前的“美国优先”政策的话。最宝贵的是那些真正使美国变得伟大的原则：全球规则、开放市场、言论自由、对盟国的尊重，以及正当程序。本世纪头十年，人们常问中国可能会在多大程度上变得像美国。进入20年代，更大的问题是，中美全面分裂是否会令美国变得更像中国？ ■



Investing

Rich rewards

Renaissance Technologies' flagship fund has earned \$100bn in trading profits

THE BEST investors' strategies often sound simple. "Whether it's socks or stocks, I like buying quality merchandise when it's marked down," says Warren Buffett. Betting big on the fallout from epoch-making events, like the fall of the Berlin Wall, is George Soros's preferred tactic. Jim Simons, the founder of Renaissance Technologies, a hedge fund, spots patterns.

Mr Simons is less famous than Mr Soros or Mr Buffett, but no less successful. He founded Renaissance in 1982, aged 44, after a successful career in mathematics and code-breaking. Its flagship Medallion fund has earned \$100bn in trading profits since 1988, mostly for its employees. The average annual return of 66% before fees makes Mr Simons one of the most successful investors of all time. He is now worth \$21bn.

A new book, "The Man Who Solved the Market" by Gregory Zuckerman of the *Wall Street Journal*, asks how he did it. It is a compelling read. Mr Simons started investing in 1978 by looking for patterns in currencies. He had early successes with simple "reversion to the mean" strategies, buying when a currency fell far enough below its recent average. A decade later René Carmona, another mathematician, convinced him that rather than searching for such patterns themselves, they should hand over the job to an algorithm, and trade even when the logic was unclear to its human minders. In the 1990s Robert Mercer and Peter Brown, formerly of IBM, developed a "self-correcting" version of this trading approach that would double down on successful strategies and cut losing ones. These techniques, now called machine learning, have become widespread.

There were missteps along the way. Early in his career Mr Simons

unintentionally almost cornered the market for Maine potatoes, only realising when regulators reprimanded him. For months the team struggled to make money from trading shares, until a young programmer spotted that Mr Mercer had typed a fixed value for the S&P 500 index in one of half a million lines of code, rather than getting the program to use the index's current value.

As Mr Zuckerman lucidly explains, such strategies have limitations. One is that their scale is limited. Medallion, which trades on short-term price signals, has never held more than \$10bn. The narrower the time frame, the larger the market inefficiencies and the greater the chance that an algorithm's choice of trade will succeed. But short-termism reduces capacity. Renaissance now has funds, open to outsiders, that trade over longer horizons. But returns have been less impressive.

Other firms now try to copy Renaissance's trades. Insiders say it tries to trade a pattern "to capacity", moving prices so that other firms cannot spot the same signals—rather as if a bargain-hunter, upon learning that a favourite shop was holding a sale, arrived early and bought up the entire stock so that no one else even realised the sale was on. Others on Wall Street often describe Renaissance as a money-printing machine, but Mr Zuckerman shows how it has had to keep adapting its model to stay ahead of the competition.

The book's only disappointment is that the man at the centre of it all features relatively little. That is perhaps unsurprising. Mr Simons studiously avoids publicity. After all, keeping its funds' strategies secret is a big part of Renaissance's success. Having solved the market, he is hardly about to give away his edge that easily. ■



投资

丰厚回报

文艺复兴科技公司的旗舰基金已赚得1000亿美元的交易利润

顶尖投资者的策略听起来往往很简单。沃伦·巴菲特说：“我喜欢在减价的时候买优质商品，不管是袜子还是股票。”乔治·索罗斯喜欢对柏林墙倒塌等划时代事件的影响押下重注。对冲基金文艺复兴科技公司

（Renaissance Technologies）的创始人吉姆·西蒙斯（Jim Simons）则是靠发现规律。

西蒙斯的名气比不上索罗斯或巴菲特，但取得的成功不亚于他们。他先是在数学和密码破译领域事业有成，后来于1982年成立了文艺复兴科技公司，那一年他44岁。自1988年以来，其旗舰基金大奖章基金

（Medallion）已赚得1000亿美元的交易利润，主要获利者是自家员工。66%的平均年化收益（未扣除费用）让他成为有史以来最成功的投资者之一。如今他的身家高达210亿美元。

《华尔街日报》记者格雷戈里·祖克曼（Gregory Zuckerman）的新著《破解市场的人》（The Man Who Solved the Market）想要探究西蒙斯成功的秘诀。本书读来引人入胜。西蒙斯于1978年开始通过探寻货币规律进行投资。他在早期通过简单的“回归均值”策略（在一种货币的汇率跌到远低于其近期平均水平时买入）获得了一些成功。十年后，另一位数学家雷内·卡莫纳（René Carmona）说服他用算法替代人去寻找规律，即便是在人脑还搞不懂其中逻辑时就做交易。上世纪90年代，曾在IBM就职的罗伯特·默瑟（Robert Mercer）和彼得·布朗（Peter Brown）开发了这种交易方法的“自校正”版本，对已经取得成功的策略加大投资，反之则减少。这些技术现在被称作机器学习，已经广泛普及。

一路上也曾有失误。在西蒙斯职业生涯的早期，他在无意间差点垄断了缅因州的土豆市场，直到受到监管机构的告诫才意识到。有那么几个月，他的团队一直没法通过买卖股票赚钱，直到一位年轻的程序员发现默瑟在约

50万行代码中的一行里给标普500指数输入了固定值，而不是让程序使用该指数的当前值。

正如祖克曼在书中清晰解释的那样，这种策略有其局限性。局限之一是投资规模有限。凭借短期价格信号进行交易的大奖章基金的资金规模从未超出过100亿美元。时间窗口越短，市场无效性越显著，算法所选择的交易的成功机会就越大。但短期主义会降低基金容量。现在文艺复兴科技也有对外开放的长期交易基金，但收益就没那么可观。

其他公司现在试图复制文艺复兴科技的交易策略。业内人士指出，它试图根据一种规律做“最大限度”的交易，促使价格产生变动，让其他公司无法再发现相同的信号。这就像是一个淘便宜货的人，在得知最喜欢的商店打折后，早早就去把打折货一扫而光，别人甚至都没意识到该店在打折。华尔街的其他公司经常把文艺复兴科技公司叫做印钞机，但祖克曼却描述了它如何不断调整自己的模式，才能在竞争中保持领先。

这本书唯一令人失望的地方是核心人物出现得不多。这也许并不让人意外。西蒙斯刻意回避公众的关注。毕竟，对自家基金的投资策略严加保密是文艺复兴科技成功的重要因素。破解市场之后，他可不会轻易泄露自己的优势。■



The stockmarket

Christmas bonus

The causes of a booming stockmarket in 2019 are unlikely to last through 2020

THE CHRISTMAS of 2018 was a dismal one for American stockmarket investors. Meagre gains eked out through a volatile year were reversed at its end, on fears of slowing global growth and all-out trade war between America and China. The S&P index of large companies tumbled by 15% between November 30th and December 24th that year. Many thought a recession was imminent.

The fears proved overblown. The S&P 500 rose by 28.9% during 2019, close to the 2013 record increase and well above the average annual gain for the past decade (see chart). December is often good for markets—a phenomenon traders call the “Santa rally”. This one was particularly strong, with the index rising by 2.9%. Markets beyond America also did well. The FTSE All-World, a global index, rose by 24% in dollar terms, its best showing since 2009.

Share prices often rise when expectations of future profits do. But earnings have stagnated recently, so that does little to explain this year’s boom. Falling interest rates played a bigger part. These boost share prices by increasing the comparative value of claims to future income streams, such as profits. The Federal Reserve, which had finished 2018 signalling that it would tighten monetary policy, changed course early in 2019 and indicated that it would ease if necessary to offset any shocks caused by the trade war. Market predictions for policy rates tumbled. During the year the Fed cut three times, undoing nearly all the previous year’s tightening.

After turbulence in the repo market, the Fed also started to expand its balance-sheet by buying short-dated Treasuries. The move was billed as a

technical solution to problems in an essential part of the financial system, not as an economic stimulus. But it may have acted as one, all the same. After the financial crisis a decade ago, the Fed's swelling balance-sheet was credited with driving a stockmarket rally.

December's market oomph seems to have come from a mini trade deal between America and China. America cancelled planned new tariffs on Chinese goods and cut some already in force. China agreed to buy more American goods.

It was a good year not just for stocks, but for most financial assets, including corporate debt, government bonds, commodities and gold. That is unusual. When risky assets such as stocks and high-yield corporate debt are rising, safer ones such as government bonds and gold generally fall. Investors flock from risk to safety in times of crisis, and back again when the outlook improves. But when policy interest rates fall, bond yields generally do too; and thus bond prices rise. Loose monetary policy also tends to boost commodity prices. Broad indices of American bond prices rose by 9% in 2019. The price of gold rose by 19%.

A bumper year, then. But what of 2020? The potent combination of monetary easing and evaporating risks to growth seems largely played out. Shifting from trade hostilities to a ceasefire had a big impact; any further rapprochement is unlikely to do so much. Meanwhile neither the Fed nor independent economists are forecasting interest-rate moves during 2020.

Economic growth is also less likely to provide a tailwind. In America and globally, growth slowed a little during 2019. According to the Conference Board, a think-tank, economists expect that slowdown to continue. Profit upgrades are therefore unlikely. And investors are already paying through the nose for stocks. The "earnings multiple"—share prices as a multiple of profits—is steep, at 21.6 for the S&P 500, far above the long-run average of

around 16.

Election years tend to be turbulent for stockmarkets. Over the past century, America's has been more buoyant in the first two years of a presidential term than in the final one. And investors are worried that the Democrats will pick a nominee from the party's radical left. When Elizabeth Warren was rising in opinion polls in October, hedge-fund managers warned that markets would fare poorly under her.

In October Paul Tudor Jones of Tudor Investment, a hedge fund run from Palm Beach, claimed the stockmarket would fall by 25% if Ms Warren were to be elected president. The *Wall Street Journal* has reported that Bridgewater Associates, the world's largest hedge fund, has spent \$1.5bn on derivatives that will pay out if the S&P 500 falls by March. It is hard to tell much about a fund's portfolio from a single trade (and Ray Dalio, its founder, denied that the trade is representative)—but that is around when it will become clear who the Democratic nominee is likely to be.

Fears in 2018 for the year ahead proved misplaced. Those for 2020 may be, too. But investors should not bank on it. Only 12 times since 1928 has the S&P 500 posted a better return than it did in 2019. Each time, the following year turned out weaker than the one that came before. More ominously, in four returns were negative. ■



股市

圣诞奖金

令2019年股市红火的因素不太可能在2020年持续

对于美国股市的投资者来说，2018年的圣诞节令人沮丧。市场在这一年跌宕起伏，到了年底，因为忧心全球经济增长放缓及中美爆发全面贸易战，原本微薄的收益又悉数吐出。当年11月30日至12月24日，代表大公司的标普500指数下跌了15%。许多人以为经济即将陷入衰退。

事实证明这是过虑了。标普500指数在2019年上涨了28.9%，接近2013年的创纪录涨幅，远高于过去十年的年均水平（见图表）。12月的市场情况通常都不错——交易员称之为“圣诞老人升市”。2019年的圣诞升市尤为强劲，标普500指数上涨了2.9%。美国以外的股市也很红火。富时全球指数按美元计算上涨了24%，是自2009年以来的最佳表现。

股价往往随利润预测看涨而上升。但近期盈利原地踏步，所以这不能解释2019年股市的上涨。利率下降的影响更大。这一因素引发了获得未来收入流（如利润）的相对价值上升，从而推高股价。美联储在2018年底暗示将收紧货币政策，但在2019年初改变态度，表示必要时会放宽政策以抵消贸易战造成的冲击。市场预测政策利率会下跌。这一年美联储降息三次，几乎抵消了前一年所有的紧缩措施。

在回购市场经历动荡后，美联储还开始购买短期国债来扩大自身的资产负债表。它将此举宣称为为了解决金融体系的关键部分所存在的问题而采取的一种技术方案，而不是经济刺激措施。但它可能起到了类似经济刺激措施的作用。十年前的金融危机过后，人们认为美联储扩大资产负债表推动了股市反弹。

上个月市场的活力似乎得益于中美两国的“迷你贸易协议”。美国取消对中国商品拟征收的新关税，并削减了一些已经生效的关税。而中国则同意购买更多美国商品。

不单是股市，去年对于大多数金融资产来说都是个好年景，包括公司债、政府债券、大宗商品和黄金。这并不寻常。股票和高收益公司债等风险资产的价格走高时，政府债券和黄金等较安全资产通常会走低。在危机时期，投资者会把资金从风险资产转移至安全资产，到前景改善时再转回去。但当政策利率下调时，债券收益率通常也会下降，债券价格会因此上涨。宽松的货币政策往往还会推高大宗商品价格。美国债券价格的指数在2019年普遍上涨了9%。黄金价格上涨了19%。

这可谓是个丰收年。但2020年呢？宽松货币政策和增长放缓风险消退的强大合力似乎已大体消退。贸易对抗转向停火休战起到了重大作用，任何进一步的和解行动都不太可能再有这么大的效果。与此同时，美联储和独立经济学家都没有预测2020年的利率走势。

经济增长发挥推动作用的可能性也更小了。2019年，美国及全球各地的经济增速略为放缓。智库世界大企业联合会（Conference Board）称，经济学家预期经济放缓将持续。因此利润不太可能提升。而投资者本就已经在为购买股票支付过高的成本。“市盈率”（股价对盈利的倍数）非常高，标普500指数目前达到21.6，远高于16左右的长期平均水平。

股市在选举年往往动荡不定。在过去一个世纪里，美国股市在总统任期的头两年往往比最后一年更红火。而且投资者担心民主党会选出激进左派候选人。当10月的民调显示伊丽莎白·沃伦（Elizabeth Warren）支持率上升时，对冲基金经理警告称，如果她当选，市场将走弱。

棕榈滩的对冲基金都铎投资（Tudor Investment）的保罗·都铎·琼斯（Paul Tudor Jones）10月表示，如果沃伦当选总统，股市将下跌25%。据《华尔街日报》报道，全球最大的对冲基金桥水基金（Bridgewater Associates）已投入15亿美元购买衍生品，如果标普500指数今年3月下跌，该基金届时将获得丰厚回报。一般很难单从某笔交易来判断一家基金公司的投资组合，桥水的创始人雷·达利奥（Ray Dalio）也否认该交易有代表性，但它发生在民主党候选人快要明晰之时。

事实证明，2018年时人们对来年的担忧是多虑了。对2020年的忧虑可能也是如此。但投资者不能指望这一点。自1928年以来，标普500指数的收益率只有12年高于2019年的水平，而这些年份之后那年的市场行情都更差。更不祥的是，有四年甚至回报为负。■



Workers' pay

Keeping caps out of hands

China once stressed the importance of a minimum wage for protecting workers' rights. Some officials have grown lukewarm about it

XIANG JINGUO works as a security guard in the industrial city of Shijiazhuang, 300km (185 miles) south-west of Beijing. He has long been living on just 1,700 yuan (\$237) a month. He grumbles about the rising cost of food, especially the soaring price of pork. "I've become an unwilling vegetarian," he huffs. Happily for him, however, the monthly minimum wage in his city was raised to 1,900 yuan on November 1st, up from 1,650 yuan. "Now I can try going back to my normal diet," he says.

Minimum wages have long been a feature of most advanced democracies. America introduced a national minimum wage in 1938. Japan did so in 1959. China caught up in 1995 when it revised its labour law to require local governments to set a wage floor. The central government stressed the "importance and urgency" of this as a way of "protecting workers' rights".

In recent years, however, the mood has changed. Despite the rising cost of living, Mr Xiang had to endure a three-and-a-half year gap between adjustments of the minimum wage in Shijiazhuang. The law used to say that local governments must revise them every two years. In 2015 this was extended to three years, but the authorities in Shijiazhuang still dawdled. Provincial governments set different floors for each city within their jurisdiction based on such factors as the local cost of living and unemployment rates. In 2019 just eight provinces raised minimum wages, down from 15 the year before. In 2010 all but one of China's 31 provinces raised them.

To ensure that firms do not squeal, officials have tried to keep minimum

wages low. Most employers observe them—a good indication that they are not too onerous. Yanan Li of Beijing Normal University estimates that only about 5-10% of Chinese workers earn less than the minimum, a smaller proportion than in most developing countries that have such a system. By taking an average of the highest minimum wages in each province, Jing Wang of York University in Canada has calculated a notional national minimum wage. She finds that the ratio of the minimum wage to the average wage has fallen sharply since 1995 (see chart), from 40% to just 26% in 2018. In the OECD, minimum wages were 42% of average wages in 2018, up from 35% in 2000.

The central government appears to want localities to use changes in the minimum wage as a way of indicating how much they would like wages in general to rise. Since China's economic growth began slowing early in the 2010s, provinces have parted company in their enthusiasm for raising the level. Inland spots such as Hebei, which are poorer than coastal areas, want to compete using their abundant cheap labour. The manpower-rich southwestern region of Chongqing, where growth slowed from 11% in 2016 to 6% in 2018, waited until the last day of the three-year window before modestly increasing its minimum wages in January 2019.

Richer areas with a shortage of labour have gone the other way. Shanghai, for instance, has raised its minimum wage every year since 2010. It now has China's highest monthly wage floor, at 2,480 yuan. That is a sign it wants to move up the value chain and attract higher-wage workers.

Initially the central government stood back when local officials failed to punish companies for ignoring the rules, perhaps reckoning that strict enforcement might deter at least some firms from hiring. But in the early 2000s it grew more worried that fast-rising income inequality would cause unrest. In 2004 it began demanding tougher enforcement. The fine for firms that misbehave was raised from a fifth of the accumulated shortfall in

wages paid to five times the arrears. “Full implementation” of the minimum-wage rules was needed to reduce “excessive income inequality”, said the Ministry of Commerce.

In 2011 the government unveiled a new five-year plan that set a target of increasing minimum wages nationwide by at least 13% annually. The goal was achieved, but some firms, especially in poorer provinces, complained (the rises were far higher than inflation each year). In the north-eastern province of Liaoning, a leader of the chamber of commerce says his organisation tried to convince the local government to “slow down a bit”. As growth slowed, companies in backward areas grumbled that big and frequent increases in the minimum wage were harming competitiveness.

In the latest five-year plan, adopted in 2016, the central government appears to have accepted this argument. The document sets no minimum-wage targets. Central officials have refrained from berating provinces for foot-dragging. In July *Economic Daily*, a state-controlled newspaper, said that those setting minimum wages should not only take into account the interests of “low earners” but also “the actual burden on enterprises”.

Officials still talk about a need to reduce income inequality. But they no longer suggest that increasing the minimum wage frequently is a good way of achieving this. Mr Xiang, the security guard, says he understands why his wages are not rising faster. “The reality is that there are still too many unskilled people like me,” he says. ■



工资

放松托底

中国曾强调最低工资对于保护劳动者权益的重要性。但部分官员对此已不再积极

向金国（音译）在北京西南向300公里的工业城市石家庄当保安，很长一段时间以来靠每月1700元的工资生活。他抱怨食品开销越来越高，特别是猪肉价格飞涨。“我不得不改吃素。”他气呼呼地说。幸好，从11月1日开始，石家庄的最低工资标准从1650元提高到了每月1900元。他说：“现在我能试着像以前那样吃了。”

最低工资一直以来都是大多数先进民主国家的特色。美国在1938年开始设定全国最低工资标准。日本在1959年开始实施。中国在1995年赶上形势，修订了劳动法，要求地方政府设置最低工资标准。中央政府强调此举在“保障劳动者权益”方面具“重要性和紧迫性”。

然而，近年来这种态度发生了转变。尽管生活成本不断上涨，向金国却不得不熬了三年半才等到石家庄再次调整最低工资标准。法律以前规定地方政府必须每两年调整一次。到2015年这一间隔被延长至三年，但石家庄有关部门还是拖了更久。各省政府根据当地生活成本和失业率等因素为下辖各市设置不同的最低工资标准。2019年只有八个省份提高了最低工资，少于一年前的15个。而回到2010年，中国31个省份中只有一个没有上调最低工资。

为免企业抱怨，各地官员尽量将最低工资水平保持在较低水平。多数雇主都能遵守规定——充分说明最低工资标准并没有造成过于沉重的负担。北京师范大学的李亚男估算，中国只有大概5%到10%的劳动者收入未达最低标准，此比例低于多数实施最低工资制度的发展中国家。加拿大约克大学的王静（音译）取每个省内最低工资的最高值然后求平均值，得出一个全国最低工资的概念值。她发现最低工资与平均工资的比率自1995年以来急剧降低（见图表），从40%降至2018年的仅26%。经合组织（OECD）国家2018年最低工资相当于平均工资的42%，高于2000年的35%。

中央政府似乎希望地方通过调整最低工资来反映它们对整体工资水平上涨的预期。自中国经济增速在上一个十年开始放缓以来，各省在提高工资水平的积极性上出现了分歧。河北等内陆省份的经济不如沿海地区，因而希望利用充足的廉价劳动力参与竞争。西南直辖市重庆人力充裕，经济增速从2016年的11%下降至2018年的6%，它一直拖到三年期限的最后一天才在2019年1月小幅提高了最低工资水平。

劳动力短缺的较富裕地区则反向而行。例如上海自2010年以来每年都上调最低工资标准，目前月最低工资已经达到2480元，为全国最高。这表明上海希望向价值链高端迈进，吸引更高收入的劳动者。

地方官员并没有处罚不遵守规定的企业，而中央政府起初对此也未予理会，也许是认为严格执法可能至少会影响部分企业招工的积极性。但到了本世纪头几年，政府日益担忧收入不平等迅速扩大可能导致社会不稳定，于是在2004年开始要求加强执法力度。违规企业的罚款从累积所欠工资的五分之一提高到欠薪的五倍。商务部表示，“全面执行”最低工资规定是降低“过度的收入不平等”的必要手段。

中央政府在2011年提出的五年计划定下了全国最低工资标准每年至少提高13%的目标。虽然目标得以实现，但不少企业叫苦连天（每年的升幅远高于通胀），在较贫困的省份尤其如此。辽宁省一位商会领袖表示，他们尝试说服地方政府“放慢一点”。随着经济增速放缓，经济落后地区的企业抱怨频繁而大幅地提高最低工资标准正在损害它们的竞争力。

在2016年通过的最新五年计划中，中央政府似乎接受了这种意见。计划中没有提出最低工资目标。各省执行政策时磨磨蹭蹭，中央官员也未加斥责。中央直属的《经济日报》去年7月提出，在设定最低工资标准时不仅要考虑“低收入职工”的利益，也要兼顾“企业的实际承受负担”。

官员们仍表示需要减少收入不平等，但他们不再说频繁提高最低工资是实现这一点的好方法。保安向金国表示理解为什么自己的工资不能涨得快一些。“确实还有太多像我这样没啥技术的人。”他说。■



Bartleby

Conduct yourself

What businesses can learn from the arts

PICTURE A LECTURE session at a business school and you probably envisage students gazing at screens filled with equations and acronyms. What you might not expect is choristers attempting to sing “O clap your Hands”, an eight-part anthem composed by Orlando Gibbons and first performed in 1622. But Bartleby was treated to this delight, and others facing MBA students, on a visit to Saïd Business School in Oxford last year.

There was a catch. Some of the students had to try conducting the choir. The first to take the challenge was a rather self-confident young man from America. It didn't take long for him to go wrong. His most obvious mistake was to start conducting without asking the singers how they would like to be directed, though they had the expertise and he was a complete tyro.

The experience was doubtless chastening, but also instructive. The session, organised by Pegram Harrison, a senior fellow in entrepreneurship, cleverly allowed the students to absorb some important leadership lessons. For example, leaders should listen to their teams, especially when their colleagues have specialist knowledge. All they may need to do, as conductors, is set the pace and then step back and let the group govern itself.

It was noticeable, too, that the choir managed fairly well even if the conductors were just waving their batons in an indeterminate fashion. The lesson there, Mr Harrison said, was that leaders can only do so much damage—provided they do not attempt to control every step of the process. The whole exercise illustrated it is possible for a lesson to be instructive and entertaining at once.

Other business schools have also realised that their students can learn from the arts. At Carnegie Mellon University in Pittsburgh, Leanne Meyer has introduced a leadership-training programme that includes poetry, art installations and a book club. Involvement in such pursuits can help develop empathy in future leaders, she argues; for example, reading a novel helps students get into the mind of a character. She also believes that the programme benefits students in terms of how they promote themselves to recruiters.

It is hardly surprising that art-based programmes are popular. They provide a welcome diversion from the stodgy content that marks out most MBA courses. But are they really helpful? Intriguingly, there are signs that successful businesses are incorporating the arts into their training. AQR, a fund-management group best known for its number-crunching skills, has started a professional- and personal-growth programme called the Quanta academy; one component is a book club where members have read “Destined for War”, a book about American-Chinese relations by Graham Allison.

Rather than turn the pages, some business people tread the boards. The Royal Academy of Dramatic Art (RADA) has trained many great thespians, such as Sir Anthony Hopkins, Alan Rickman and Phoebe Waller-Bridge. It also offers training courses for executives, ranging from half a day to six days.

“Acting is about finding the truth in the character and in yourself,” says Charlie Walker-Wise, one of RADA’s tutors. “We help people to become more aware of their habits; what they do without realising it. How people manage their physicality—their breath, their voice. Not many people are aware of how they come across.”

It might seem odd to link running a business with a profession that ranges

from Laurence Olivier proclaiming Hamlet's soliloquy to Robert de Niro training as a boxer to play the lead in "Raging Bull". But Mr Walker-Wise says that middle managers are often delivering speeches that are not their own (because they were devised by head office) or trying to inspire staff to meet an objective that was set by someone else. "The lesson from acting is how do I connect to this message without betraying my own personality," he argues.

Being a manager involves a lot more than just setting targets and entering numbers into a spreadsheet. It requires empathy and an understanding of human nature. It makes sense that an education in the arts might help develop those qualities. Above all, the students on Mr Harrison's course at the Saïd school were experiencing something Bartleby never expected to see in those attending an MBA lecture: they were having fun. ■



巴托比

寓教于演

企业能从人文艺术中学到什么

想象一下商学院上课的情景，你脑中可能会浮现学生们盯着满屏方程式和缩写词的画面。您可能想象不到会有唱诗班试着唱起《拍起手来》（O clap your Hands），这是奥兰多·吉本斯（Orlando Gibbons）创作的八节赞美诗，于1622年首演。但本专栏作者去年就在牛津大学赛德商学院有幸见识了这样的欢乐场面，以及其他面向MBA学生的趣味课程。

不过有一个麻烦。一些学生得尝试做指挥。第一个接受挑战的是一个相当自信的美国年轻人，但他很快就遇到了问题。他最明显的错误是没有先询问唱诗班成员期待怎样的指挥方式就开始指挥了，尽管这些成员都有专业经验，而他自己完全是门外汉。

这次经历想必让学生们尝了点苦头，但也很有启发性。组织这节课的是创业课高级研究员佩格拉姆·哈里森（Pegram Harrison），他通过这种形式巧妙地让学生领会了一些领导力方面的重要经验。例如，领导者应该听取团队的意见，特别是在团队成员具备专业知识的情况下。和指挥一样，他们可能需要做的就是设定节奏，然后退后一步，让团队自行管理。

同样值得注意的是，即使指挥只是意图不明地挥舞着指挥棒，唱诗班也仍然表现良好。哈里森说，从中可以学到的是领导者的破坏力是有限的——只要他们不试图控制过程的每一步。这个课堂活动表明，一堂课是可以做到寓教于乐的。

其他商学院也意识到学生们可以从人文艺术中学到东西。在匹兹堡的卡内基·梅隆大学，琳恩·梅耶（Leanne Meyer）推出了一个领导力培训课，内容包括诗歌、艺术装置和读书俱乐部。她认为参与这样的活动可以帮助未来的领导者培养同理心。例如，阅读小说可以帮助学生进入角色心理。她还认为，该课程还能帮助学员学着向招聘人员推销自己。

基于人文艺术的课程广受欢迎并不出奇。这些课不像大多数MBA课程那么枯燥乏味，这令人欣喜。但这样的课程真的有用吗？有意思的是，有迹象表明成功的企业正将文艺课程融入员工培训当中。以数据处理能力闻名的基金管理集团AQR启动了Quanta学院，提供专业技能和个人成长方面的课程。课程内容之一是读书俱乐部，成员们阅读了格雷厄姆·艾里森

（Graham Allison）撰写的关于中美关系的书《注定一战》（Destined for War）。

有些商界学员没有参加读书俱乐部，而是选择了登台演出。英国皇家戏剧学院（RADA）培养了安东尼·霍普金斯爵士（Sir Anthony Hopkins）、艾伦·里克曼（Alan Rickman）和菲比·沃勒·布里奇（Phoebe Waller-Bridge）等许多出色的演员。它也为高管提供培训课程，时长从半天到六天不等。

“表演就是在角色和自己身上找寻真相，”皇家戏剧学院的导师查理·沃克-怀斯（Charlie Walker-Wise）说，“我们帮助人们更清楚地了解自己的习惯动作，那些下意识的行为。教他们控制呼吸、声音等身体反应。没有多少人清楚自己在别人眼中是什么样子。”

练习表演的形式多样——从劳伦斯·奥利维尔（Laurence Olivier）背诵哈姆雷特的独白，到罗伯特·德尼罗（Robert de Niro）为主演电影《愤怒的公牛》中的拳击手而专门接受拳击训练。将这种专业训练与经营企业联系起来似乎很奇怪。但沃克-怀斯说，中层管理人员经常要发表并非出于自己本心的讲话（因为内容由总部定调），或者要试着激励员工实现由别人设定的目标。“通过练习表演，他们可以学会让自己显得言辞恳切，不暴露真实的自我。”他说。

管理者要做的事远不只是设定目标和在电子表格中输入数字。管理者要有同理心，要了解人性。人文艺术教育确实可能有助于培养这些素质。最重要的是，在哈里森的课上，赛德商学院的学生们体验到了本专栏作者从没想到过能在MBA课堂上出现的東西：开心。■



Wealth management

For the money, not the few

Hold your nose. The world's snootiest money managers are being forced to serve the unwashed masses

LINDA, A 54-YEAR-OLD event consultant in Los Angeles, is neither disorganised nor innumerate. Ask about her finances, however, and you lose her for two hours. She opens her current (checking) account on a mobile app, then cites a rainy-day fund at another bank. She has 14 credit cards, five mortgages, six insurance policies and several pensions with ex-employers.

Ranks of pinstriped advisers have long helped the very rich to invest, minimise tax and pass money down the generations. Everyone else has had to work it out on their own. "People's relationship with money is broken," says Martin Gronemann of ReD Associates, which uses anthropology to advise businesses. It reckons that personal finances are a bigger source of stress than worries about crime or health.

Now, however, financial firms are competing to democratise wealth management. On December 8th Goldman Sachs, which used to shun clients with less than \$25m, said its robo-adviser could soon serve clients with as little as \$5,000 to invest. And on December 14th Vanguard, an asset manager with nearly \$6trn under management, teamed up with Alipay, a Chinese tech giant, to counsel customers with at least 800 yuan (\$114).

The wealth-management sector is fragmented and ripe for disruption. UBS, the global leader, has a 3% market share and is the only firm in the top four in each of Europe, Asia and America. The industry remains technophobic, says Charlotte Ransom, a Goldman Sachs veteran now at Netwealth, a challenger. Advisers spend half their time on tasks that could be

automated. According to EY, a consultancy, only 56% of clients fully understand the fees they pay.

The industry stratifies customers in a manner rather similar to airlines. “Affluent” clients, with between \$300,000 and \$1m in assets, get premium-economy treatment. They may talk to advisers by phone, but banks will do all they can to keep them out of branches. Investment options are limited to ready-made funds. “High-net-worth” clients, with up to \$15m, fly business class, picking stocks and chatting in person with named advisers. Flying private are the “ultra-high-net-worth” individuals, who have access to venture capital and currency hedges, with exclusive dinners, golf outings and so on as cherries on top.

Whereas high-net-worth individuals typically pay no more than 1% of assets in fees each year, the mass affluent often pay over 2%—the average yield of S&P 500 stocks—for inferior service. Cattle class gets no service at all. Saving for retirement is the second-biggest financial commitment most adults ever make (after buying a home), says James McManus of Nutmeg, a British fintech. Yet most do it with no help.

That leaves a lot of money on the table. According to Oliver Wyman, a banking consultancy, the affluent, with \$21trn in assets, and those below them, with \$51trn, have as much to invest between them as high-net-worth individuals. The problem is that advisers, branches and time are costly. Most private banks deem portfolios below \$2m barely profitable.

Yet three factors are conspiring to bring that figure down. The first is technology. In 2001 Credit Suisse tried to go budget with a pan-European online network. But the cost quintupled to €500m (\$447m), in part because it relied on huge servers. Today data are in the cloud, and firms can bolt on apps instead of coding everything.

Second, the top of the pyramid is getting crowded. Banks love wealth management, with its high returns and low need for capital. As they have all tried to expand their high-net-worth offerings, competition has squeezed margins. The market value of a panel of 100-odd wealth managers has dropped by 15% in the last year, using Bloomberg data.

Third, negative interest rates are eroding the money held by the masses, about half of which is in cash deposits. So clients are crying for help.

That has sparked a race between banks, fintechs and investment firms. Wealth managers need several strengths to succeed, says Matthias Memminger of Bain, a consultancy: technology, trusted brands, marketing dollars and a human touch. Private banks have the last three, but score poorly on IT. They also fear cannibalising their high-net-worth business. UBS shut its robo-adviser in 2018, a year after launch. Investec, a bank, folded its own in May.

Startups have the opposite profile. Their robo-advisers generate recommendations by asking simple questions, keeping fees down. They allow customers to buy fractions of shares, and net out orders to reduce trading costs. But their brands are weaker, so acquiring customers costs more. And clients entrust them with only smallish sums. Launched in 2011, Nutmeg manages just £1.9bn (\$2.5bn), and Wealthfront, a decade-old American firm, \$22bn.

Brokers and asset managers also have good technology, which they use to compile data and execute trades. They pile clients' money into cheap exchange-traded funds and have cut fees to rock-bottom, hoping to cross-sell premium products. Charles Schwab's robo-adviser manages \$41bn; Vanguard's, \$140bn. But their expertise lies in manufacturing investment products, not distributing them. They help people pursue single investment goals, not plan their financial life.

To tick all the boxes, contenders are combining forces. In May Goldman Sachs paid \$750m for United Capital, a tech-savvy manager. It has also invested in Nutmeg. BlackRock has backed Scalable Capital, a digital service whose robo-adviser is used by banks including ING and Santander. Insurers are jumping in, too. Nucoro, a fintech, recently said that it would power Swiss Risk & Care. Allianz has tied up with Moneyfarm, a British robo-adviser.

The logical endpoint is financial platforms—perhaps super-apps that sit on smartphones—which would let customers stitch their patchwork of financial products back together. But the model has not yet been tested by rough economic weather. Volatility makes financial clients prize human contact, says Christian Edelmann of Oliver Wyman. The consultancy reckons the average cost-to-income ratio for the biggest wealth managers would jump from 77% to 91% in a recession. It remains to be seen how well mass-market wealth managers will perform in a downturn. ■



财富管理

看钱不看人

忍着吧。全球最傲慢的理财公司正被迫为底层大众服务

琳达是洛杉矶一名54岁的活动策划顾问，做事有条理，也不是数字盲。但如果问一下她的财务状况，她两小时都说不清。她会先在一个移动应用上打开她的活期（支票）帐户，然后再看看在另一家银行的应急存款。她有14张信用卡，5项抵押贷款，6份保险，还有几个在前雇主那里开设的退休金账户。

长期以来，那些衣冠楚楚的顾问一直在帮助富豪投资、尽可能减少缴税并将财富传给后代。其他人理财得靠自己。ReD Associates的马丁·葛罗纳曼（Martin Gronemann）说：“人们与金钱的关系被割裂了。”ReD Associates利用人类学为企业提供建议。该公司认为，与对犯罪或健康的担忧相比，个人财务状况是一个更大的压力源。

但现在金融公司正竞相让财富管理大众化。过去高盛不会理会资产少于2500万美元的客户。12月8日，该公司表示其智能投顾将很快可以为投资金额低至5000美元的客户提供服务。12月14日，管理近6万亿美元资产的资产管理公司先锋领航（Vanguard）宣布与中国科技巨头支付宝合作，为客户提供800元人民币起投的投资顾问服务。

财富管理行业市场分散，颠覆的时机已经成熟。该领域的全球领军企业瑞银集团占3%的市场份额，并且是唯一在欧洲、亚洲和美国都排名前四的公司。该行业仍患有技术恐惧症，夏洛特·兰瑟姆（Charlotte Ransom）表示。她曾是高盛的资深员工，目前任职于业内后起之秀和挑战者Netwealth公司。顾问们有一半的时间都花在本可以自动化的任务上。咨询公司安永表示，只有56%的客户完全明白自己支付的那些费用是何名目。

财富管理行业划分客户的方式与航空公司非常相似。资产在30万至100万

美元之间的“富裕”客户将获得高端经济舱待遇。他们可以通过电话与顾问交流，但银行会尽力不让他们直接到分行去面谈。投资选择仅限于现有基金。身家高达1500万美元的“高净值”客户享受的是商务舱服务，可以挑选股票，与指定顾问面谈。乘坐私人飞机的是“超高净值”客户，可以选择风投资本和货币对冲产品，还有专属晚宴和高尔夫活动等锦上添花的服务。

高净值客户每年支付的费用通常不超过其资产的1%，而大批富裕人群支付的费用通常超过其资产的2%（标准普尔500成分股的平均收益水平），得到的服务却更差。经济舱等级的客户则根本得不到任何服务。英国金融科技公司Nutmeg的詹姆斯·麦克马纳斯（James McManus）说，为退休做储蓄是大多数成年人（继买房后）的第二大财务投入。然而大多数人在这方面只能靠自己。

这就意味着有大量资金未被触及。据银行业咨询公司奥纬咨询（Oliver Wyman）称，富裕人群的总资产为21万亿美元，财富水平在他们之下的人群的总资产为51万亿美元，两者的可投资资产加起来与高净值人群一样多。问题在于，顾问、银行分行和时间都是成本。大多数私人银行认为它们从200万美元以下的投资组合中几乎赚不到什么钱。

然而，有三个因素正在共同发挥作用，拉低这一门槛。首先是技术。2001年，瑞信（Credit Suisse）尝试通过一个泛欧在线网络做预算，但成本增加了四倍，达到5亿欧元（4.47亿美元），部分原因是这个网络依赖巨型服务器。如今，数据存储在云端，企业可以方便地往已有应用上添加功能，而不再需要为所有东西编程。

其次，金字塔的塔尖越来越拥挤。财富管理的回报高，资本需求低，因而很受银行青睐。各家银行都试图拓展高净值理财产品，竞争压缩了利润。彭博的数据显示，去年100多家财富管理机构的总市值下降了15%。

第三，负利率正让大众手里的钱（约一半是现金存款）贬值。客户因此急需帮助。

这引发了银行、金融科技公司和投资公司之间的激烈竞争。咨询公司贝恩

的马蒂亚斯·梅明格（Matthias Memminger）说，财富管理机构要取得成功需具备以下优势：技术、受信赖的品牌、营销资金及人性化服务。私人银行具备后三项优势，但在IT方面处于弱势。它们还担心大众理财业务会冲击高净值业务。2018年，瑞银关停了仅推出一年的智能投顾业务。天达银行（Investec）也于去年5月关停了这项业务。

创业公司的情况正相反。它们的智能投顾通过问一些简单的问题为客户提供建议，因而收费低廉。它们允许客户购买少量股票，汇集订单以减少交易成本。但创业公司的品牌较弱，获得客户的成本也就更高。客户交给它们投资的资金也不多。创立于2011年的Nutmeg管理资产总计仅19亿英镑（25亿美元）。美国公司Wealthfront成立已有十年，资产管理规模为220亿美元。

经纪公司和资产管理公司也拥有良好的技术，它们用这些技术来汇编数据、执行交易。它们把客户的资金大量投入廉价的交易所交易基金，并把费用压到最低水平，希望能交叉销售高端产品。嘉信理财（Charles Schwab）的智能投顾管理着410亿美元的资产；先锋领航的智能投顾管理1400亿美元。但它们的专长是打造而不是分销投资产品。它们帮助人们追求单一的投资目标，而不是做长期的财务规划。

为了让自己具备所有的优势，竞争者正在整合力量。去年5月，高盛斥资7.5亿美元收购了精通技术的财富管理公司联合资本（United Capital），还投资了Nutmeg。贝莱德投资了数字服务公司Scalable Capital，荷兰国际集团（ING）和桑坦德（Santander）等银行都在用这家公司的智能投顾。保险公司也加入进来。金融科技公司Nucoro近期表示将投资Swiss Risk&Care。安联已与英国智能投顾公司Moneyfarm达成合作。

最终的发展趋势应该是建立金融平台（也许是安装在智能手机中的超级应用），让客户可以统一管理他们零散的理财产品。但这一模式尚未经受过恶劣经济环境的检验。奥纬咨询的克里斯蒂安·埃德曼（Christian Edelmann）表示，由于波动性的存在，理财客户更重视真人提供的服务。这家咨询公司估计，在经济衰退期间，最大的那些财富管理公司的平

均成本收入比会从77%跃升至91%。面向大众市场的财富管理公司在低迷时期的表现还有待观察。 ■



Daimler

Two is traffic

A fifth of the Mercedes maker may soon be in Chinese hands

AT DAIMLER'S ANNUAL meeting in May, one shareholder captured the mood. "Don't replace the Mercedes star with a Chinese dragon," implored Deka Investment, a big asset manager, referring to the purchase in 2018 by Geely, a Chinese firm which also owns Sweden's Volvo, of a 9.7% stake in the German car giant. Daimler now faces the rise of a second dragon. Beijing Automotive Group (BAIC) is reportedly poised to double its holding in Daimler to almost 10%. This would put it ahead of Geely as the firm's biggest shareholder.

If Geely's manoeuvre was a surprise, BAIC's is not. In July the state-owned company grabbed 5% of Daimler. Though the dragon is not yet on the bonnet, it has long been under it: engines, powertrains and other parts that go into Daimler's Mercedes-Benz cars sold in China are made under two joint ventures with BAIC set up since 2005. With Chinese car sales down in 2018 and 2019 after years of steady increases, domestic manufacturers are banking on premium cars for growth. So is Daimler, whose financial performance has been less inspiring than that of its cars. Its share price has nearly halved since 2015.

For BAIC, the relationship with Daimler is "of existential importance", says Robin Zhu of Bernstein, a research firm. In 2018 sales from Beijing Benz, one of its ventures, grew by 16% year on year and accounted for 90% of BAIC's total revenue. Mr Zhu notes that BAIC has long sunk profits from Beijing Benz—a tidy 10bn yuan (\$1.5bn) in 2018—into "the bottomless pit" of BAIC's domestic brands, which lost 6.5bn yuan.

A bigger stake in Daimler may be an attempt to restore the perception that

BAIC, not Geely, is the Germans' main partner. A spokesman for Daimler says it welcomes long-term investors, especially those it knows well. The German firm owns 9.6% of BAIC Motor, the Chinese company's Hong Kong-listed subsidiary, and 3% of BluePark, another BAIC affiliate that makes electric cars and batteries.

Many Germans nevertheless worry. With another 5% or so the Chinese duo could block some strategic decisions, says Marc Tüngler of DSW, an organisation which represents the interests of German private investors. The pair could easily join forces. Geely may be privately owned but, Mr Zhu says bluntly, "both ultimately represent the Chinese state."

Geely and BAIC may shun separate holdings above 10% to avoid triggering a review by BaFin, Germany's financial regulator. But Daimler is apparently already worried that an enlarged Chinese stake may invite scrutiny from an American government body which vets foreign deals, including those between foreign firms with American subsidiaries. Another of Daimler's Chinese joint ventures, with BYD, a maker of electric cars, may come under strain as Congress tries to bar federal money from paying for Chinese buses, which BYD sells to America. On December 15th China's ambassador to Germany threatened to retaliate against its car industry if the country bowed to American demands to bar Huawei, a telecoms-equipment giant, from its networks. For Daimler, this requires some deft handling. ■



戴姆勒

双车追逐

奔驰汽车的制造商可能很快将有五分之一股权落入中资手中

在去年5月戴姆勒的年度会议上，一位股东的发言充分体现了普遍的情绪。“可别把奔驰的三叉星徽换成中国龙啊。”大型资产管理公司德卡投资（Deka Investment）的代表恳求道。他指的是2018年中国公司吉利（已收购瑞典沃尔沃汽车）购入了这家德国汽车巨头9.7%的股份这件事。现在，戴姆勒又面对第二条龙的崛起。据悉北汽集团准备将所持戴姆勒股份翻倍至近10%。这将使它超越吉利，成为戴姆勒的最大股东。

如果说吉利入股戴姆勒出人意料，北汽这次则不然。去年7月，这家国有企业获得了戴姆勒5%的股份。尽管龙还没有爬到引擎盖上方，但它早已雄踞在引擎盖之下：戴姆勒在中国销售的奔驰汽车的发动机、动力总成和其他零件都来自2005年后与北汽成立的两家合资企业。中国的汽车市场在多年稳步增长后，在2018年和2019年销量出现下降，国内汽车公司目前寄望以高端汽车销售带动增长。戴姆勒亦有此意，相比奔驰车的惊艳性能，其财务业绩黯然失色，股价自2015年以来跌去近半。

对北汽而言，与戴姆勒的关系“攸关生死”，研究公司盛博的罗宾·朱（Robin Zhu，音译）表示。作为北汽合资企业之一的北京奔驰在2018年的销售额同比增长16%，占北汽总营收的90%。罗宾·朱指出，北汽长期以来用北京奔驰的利润（2018年达100亿元人民币之多）填补北汽国内品牌的“无底洞”（亏损达65亿元）。

增持戴姆勒股份也许是为正人视听——让大家知道北汽才是这家德国公司的主要合作伙伴，吉利不是。戴姆勒的发言人表示公司欢迎长期投资者，尤其是它熟知的公司。这家德国汽车巨头拥有北汽集团在香港上市的子公司北汽汽车9.6%的股份，还持有另一家北汽子公司、制造电动汽车和电池的北汽蓝谷3%的股份。

尽管如此，许多德国人还是忧心忡忡。德国私人投资者权益保护组织DSW的马克·滕格勒（Marc Tüngler）表示，再增持5%左右的股份，这两家中国公司就能阻挠戴姆勒做出的某些战略决策。北汽和吉利联手是轻而易举的事。没错，吉利是私营公司，但“两者最终都代表中国政府”，罗宾·朱直言不讳地说。

吉利和北汽可能不会分别持股超过10%，以免引发德国金融监管机构联邦金融监管局（BaFin）的审查。但戴姆勒似乎已经开始担心中资股份增加会惹来美国一个政府机构的审查（该机构审查涉外交易，包括在美国有子公司的外国公司之间的交易）。戴姆勒在中国与电动汽车制造商比亚迪组建的合资公司可能会受压，因为美国国会试图禁止使用联邦资金购买中国产巴士，而比亚迪正向美国出售巴士。12月15日，中国驻德国大使威胁称，假如德国屈服于美国，禁止电信设备巨头华为参与德国的网络建设，中国将对德国汽车业采取报复行动。对戴姆勒而言，这需要一番灵巧驾驭。 ■



The Economist film

Why alcohol causes more harm than heroin?

Alcohol's widespread use means that it causes greater harm to non-users than illegal drugs.



经济学人视频

为什么酒精比海洛因更危险？

酒精的饮用很常见，这意味着相比非法药物，它会对非使用者造成更大的危害。



The art of persuasion

A thousand words

The case for migration—as you might not have seen it before

ECONOMISTS DO NOT normally write cartoon books. But Bryan Caplan of George Mason University wanted to make a radical argument to the widest possible audience. So he teamed up with Zach Weinersmith, an illustrator with a bold and cheerful brush. The result is a brilliant distillation of the moral, economic and practical arguments for open borders.

It starts with an uncomfortable thought-experiment. Suppose a desperately hungry man called Marvin wanted to walk to a market to buy food—and another man, Sam, prevented him at gunpoint, knowing that he would starve as a consequence. Wouldn't that be murder? And if what Sam did is wrong, why is it all right for Uncle Sam to do something very similar to would-be immigrants?

Migration is by far the most effective route out of poverty. Yet all rich countries make it extremely hard, dooming the Marvins of the world to remain in places where life is shorter and more wretched. Governments in rich countries are not merely refusing to help the poor. They are forcibly preventing them from helping themselves.

Advocates of immigration restrictions—ie, nearly everyone in rich countries—predict that free movement would spell disaster. Mr Caplan explains why this is unlikely, and how better policies could make it vanishingly so. Are immigrants a burden on taxpayers? Only if the host country's policies allow or encourage them to be. He lays out the fiscal contributions of current migrants, depending on their age and skills, and of a theoretical future mix of new arrivals. His argument is sophisticated and footnoted, but jargon-free and illustrated in a way that helps even readers

with no economic training to follow it.

The format is surprisingly effective. The chapter on philosophical arguments for and against open borders features a cartoon John Stuart Mill debating with Mr Caplan, plus Immanuel Kant, John Rawls, Lee Kuan Yew and Jesus. The author puts the strongest arguments against his position into the mouths of sympathetic Everymen and -women, and rebuts them respectfully.

Having set out a maximalist goal—completely free movement—Mr Caplan explores intermediate steps in that direction. For each objection he offers a solution that is less harmful than keeping immigrants out. Worried that they will freeload? Make them pay more taxes or exclude them from most welfare benefits. Concerned that they won't learn English? Insist that they do, as a condition of entry. Many other books on this topic are angry and hectoring; this one delivers a deeply moral message in a playful tone, interspersed with humour. Schools and colleges should use it not only as the starting point for a civil debate on migration, but also as an example of how to hold such debates in general. ■



劝导的艺术

一图胜千言

为何支持移民——你可能未曾见过的论证【《开放边境：移民的科学与伦理》书评】

经济学家通常是不会创作漫画绘本的。但美国乔治梅森大学（George Mason University）的经济学教授布莱恩·卡普兰（Bryan Caplan）希望向尽可能广泛的受众传达一个激进的观点。于是，他与画风大胆活泼的插画师扎克·韦纳史密斯（Zach Weinersmith）合作，巧妙又精要地阐述了开放边境在伦理、经济和实践上的合理性。

书的开篇是一个令人不安的思想实验。假设饥肠辘辘的马文想去市场买吃的，而一个叫山姆的人却持枪阻止马文去市场，明知道这会让他饿死。这不是谋杀吗？如果山姆的行为是不对的，那为什么“山姆大叔”就可以对那些想移民的人做与此非常相似的事情呢？

移民绝对是摆脱贫困的最有效途径。但所有富裕国家都让这件事变得极度困难。世上众多“马文”只能继续留在生命更短暂也更悲惨的地方。富裕国家的政府不仅拒绝帮助这些穷人，还强行阻止他们自救。

提倡限制移民的人（富裕国家几乎人人如此）都认为人口自由流动会带来灾难。卡普兰在书中解释了这为何不太可能发生，以及更好的政策何以能近乎完全消除这种威胁。移民会成为纳税人的负担吗？并不会，除非移民接收国的政策允许或鼓励他们成为负担。他列出了当前移民的财政贡献（视乎他们的年龄和技能），以及理论上未来新移民所能带来的贡献。卡普兰的论述深入细致，辅以注解，但没什么术语行话，且用漫画辅助展现，即使没有经济学专业背景的读者也能读懂。

这种形式出奇地奏效。在关于支持和反对开放边境的哲学论证的一章里，卡通小人约翰·斯图尔特·密尔与卡普兰、康德、约翰·罗尔斯、李光耀及耶稣逐一辩论。作者让那些具同情心的“普通人”说出反对开放边境的最有力论点，然后再恭敬地逐一反驳。

在树立了“完全自由流动”这一最高目标后，卡普兰探索了实现这一目标的中间步骤。针对每种异议，他都提出了解决方案，而它们带来的损害都要小于将移民拒之门外。担心移民白吃白喝？那就让他们缴更多税或将他们排除在大多数福利之外。担心他们不学英语？那就强制要求，以此为准入条件。其他关于这一主题的书籍大多怒气冲冲、咄咄逼人，卡普兰这本书用俏皮的口吻传递深刻的道德信条，幽默随处可见。各类院校应以它作为移民问题民间辩论的起点，以及总体而言该如何展开这类辩论的一个范本。 ■



Online business

California's data sheriffs

Companies far beyond the Golden State will feel the impact of its new privacy law

HISTORY DOES not repeat but sometimes it rhymes. So, it seems, do efforts to protect netizens' privacy. The European Union led the world with its General Data Protection Regulation (GDPR), which came into force in May 2018. That law shook up internet giants and global advertising firms, both of which had previously used—and at times abused—consumer data with little oversight. On December 11th India's government introduced a bill that would force firms to handle data only with consumer consent and give the authorities sweeping access to them. The same day Scott Morrison, Australia's prime minister, promised a review of privacy laws and said the competition authority will monitor how advertising is done on digital platforms. But the most important piece of legislation rhyming with GDPR right now is the California Consumer Privacy Act (CCPA), which comes into force on January 1st. To online businesses, it jars.

The Californian law copies some of the GDPR's provisions. It gives consumers the right to know what online information is collected about them and how it is used, permits them to demand that their data be destroyed and to sue companies for data breaches. In some ways, the CCPA is looser than its European predecessor. It does not, for instance, insist that firms have a "legal basis" for collecting and using personal data or restrict the international transfer of data. It also stops short of demanding the appointment of corporate data-protection officers and assessments of projects' data-protection risks. And whereas the GDPR lets individuals demand that private information about them be removed from the web under certain circumstances, the First Amendment makes this "right to be forgotten" a non-starter in America.

In other respects, though, California goes further than the EU. The CCPA adopts a broader definition of personal information (which extends to such things as internet cookies that identify users on websites) and it explicitly forbids discrimination (by offering discounts to those who grant firms access to their data). Companies must enable Californians to opt out of the sale of personal data with a clear “do not sell” link on their home page, rather than through GDPR’s fiddlier process. Michelle Richardson of the Centre for Democracy and Technology, a privacy-advocacy group which is bankrolled in part by big tech companies, calls the CCPA “ground-breaking”.

The California law will apply to firms with revenues of \$25m or more that do business in the state or process its residents’ data, even if not based there. Any for-profit entity anywhere that buys, shares or sells the data from more than 50,000 Californian customers, households or devices a year is also covered. Law-breakers face fines of up to \$7,500 for every violation, compared with 4% of global annual revenues or €20m (\$22m), whichever is higher, for the GDPR. But California’s relatively trifling ceiling can add up quickly for firms with thousands of users.

The GDPR’s track record suggests the effects of the CCPA will be far-reaching. Some 250,000 complaints have been lodged under the EU rules, and some penalties approach €100m. If breaking the rules could prove expensive, so is respecting them. The International Association of Privacy Professionals, an industry body, and EY, an accountancy, reckon that complying with the GDPR costs the average firm \$2m. Tech firms spend over \$3m; financial firms, more than \$6m. By one estimate, the total cost to all American firms with more than 500 employees could reach \$150bn.

“Initial compliance” with the CCPA may, for its part, cost the estimated 500,000-odd affected American firms \$55bn, according to a study commissioned by California’s attorney-general. Any such estimates should be taken with a grain of salt. For one thing, global firms that are already

GDPR-compliant have a head start, even if differences between the two laws mean abiding by the Californian one will be far from automatic. Big firms, which are already on the hook for GDPR, are expected to spend another \$2m each. For the tech giants that looks like chump change. Microsoft and Apple say they are not only ready for CCPA, but also plan to implement it across America.

For America's legions of smaller online trinket-sellers, app-makers or other firms present on the internet the Californian law will be onerous. They can ignore European regulations, because most have no EU business, but cannot easily stay away from one of America's biggest domestic markets. A new survey by the US Chamber of Commerce, a lobby group, claims that only 12% of small businesses in America know about the law, let alone have prepared for it.

The impact of the CCPA is being felt beyond boardrooms. Big Tech is lobbying lawmakers in Washington, DC, for a federal statute on the subject. "We really, really support an omnibus federal privacy law," says a data-privacy official at a large American technology company. Facebook and Google do, too, they profess. The US Chamber of Commerce, better known for opposing regulations, is also now in favour.

One explanation for tech firms' sudden enthusiasm to safeguard user information is their reasonable desire to avert a balkanised mess of contradictory state laws. Illinois, New York and Washington have differing state legislation in the works. Many others are looking into the matter.

| *Tame west, wild east*

Tech companies could have another motive to back federal rules. Because much online activity crosses state boundaries it falls under federal jurisdiction. A national data law would therefore supersede California's, unless it explicitly made federal rules the floor which states could raise if

they wished. A Democratic proposal in the Senate does just this. A rival Republican one would set business-friendlier rules as the ceiling, in effect obviating the CCPA. No points for guessing which one of these America Inc would prefer. Neither is likely to pass before November's presidential elections. Until then companies will need to heed California's data sheriffs. After that, expect a shoot-out. ■



在线业务

加州的数据警长

将感受到“金州”新隐私法影响的远不止州内企业

历史不会重复，但有时会有回声。保护网民隐私的行动似乎就是如此。欧盟率先推出的《通用数据保护条例》（GDPR）于2018年5月生效。该法让互联网巨头和跨国广告公司大受震动，它们以前都是在几乎不受监督的情况下使用（有时甚至是滥用）消费者数据的。12月11日，印度政府推出了一项法案，要求企业只能在获得消费者同意的情况下处理数据，并给予政府自由访问数据的权力。同一天，澳大利亚总理斯科特·莫里森（Scott Morrison）承诺检讨现行隐私法，并表示竞争管理部门将监督数字平台上的广告活动。但目前与GDPR异曲同工的最重要的法律是《加州消费者隐私法案》（CCPA）。该法案于1月1日生效，冲击网络商务。

加州这项法律照搬了GDPR的一些条款。它让消费者有权知道企业收集了他们的哪些线上信息以及是如何使用这些信息的，有权要求企业销毁他们的数据，并状告企业泄露数据。在某些方面，CCPA比GDPR更宽松些。例如，CCPA并没有要求企业在收集和使用个人数据时必须要有“法律依据”，或限制数据跨境转移，也没有要求企业任命数据保护官并评估公司项目的数据保护风险。尽管GDPR允许个人在某些情况下要求将自己的私人信息从网上移除，宪法第一修正案让这一“被遗忘权”在美国无望实现。

但在其他方面，加州比欧盟走得更远。CCPA对个人信息的定义更广泛（包括网站用来识别用户的Cookie之类的内容），并明确禁止歧视（向允许企业使用自己数据的个人提供折扣）。企业必须在自己的官网首页上明确标识“不可出售”链接，让加州人可以选择不出售个人数据，而GDPR靠的是更繁琐的流程。部分从大型科技公司融资的隐私倡导团体民主与技术中心（Centre for Democracy and Technology）的米歇尔·理查森（Michelle Richardson）称CCPA是“开创性的”。

加州的法案将适用于年营收2500万美元或以上，并在该州开展业务或处理

加州居民的数据的企业，即使该企业的总部不设在加州。任何地方的营利性实体，每年购买、共享或出售数据涉及超过五万加州消费者、家庭或设备的，同样适用。违法者每例违规面临最高7500美元的罚款，而GDPR的最高罚款额则是违法企业全球年收入的4%或2000万欧元（2200万美元），以较高者为准。加州的罚款上限看似很低，但对于那些拥有成千上万名用户的公司，罚款总额会迅速累加。

GDPR的实施情况表明，CCPA的影响将是深远的。根据GDPR已提出了约25万宗投诉，部分案例的罚款金额接近1亿欧元。如果说违反条例的代价可能会很高，遵守条例的成本也不低。行业组织国际保护隐私专业人员协会（International Association of Privacy Professionals）和会计师事务所安永估计，要遵守GDPR，一般企业要付出200万美元，科技公司的合规支出超过300万美元，金融公司超过600万美元。一项估计显示，员工超过500人的所有美国企业的总合规成本可能达到1500亿美元。

加州总检察官委托开展的一项研究显示，受CCPA影响的约50万家美国企业的“初始合规”成本可能会达到550亿美元。对任何这类估算都应持保留态度。一方面，已经做到GDPR合规的全球性公司有先行优势，尽管这两部法律之间的差异意味着GDPR合规远不等同于CCPA合规。那些已经为GDPR合规掏腰包的大公司预计每家还将再支出200万美元。对于科技巨头来说，这只是毛毛雨。微软和苹果表示，它们不仅准备好了在加州做到CCPA合规，还计划在全美范围内遵守这一法规。

对于美国大批规模较小的小商品电商、应用开发者或其他从事互联网业务的企业而言，这部加州法规将带来繁重的负担。它们可以无视欧洲法规，因为它们大多在欧洲没有业务，但它们无法轻易回避加州这个美国最大的国内市场之一。游说团体美国商会的一项新调查声称，美国只有12%的小企业知道有这项法案，而为此做好了准备的就少之又少了。

CCPA带来的冲击波已经超越了企业董事会。大型科技公司正在游说华盛顿特区的立法者就该问题制定联邦法规。一家大型美国科技公司的数据隐私官说：“我们真的非常支持通过一部总括性的联邦隐私法。”Facebook和

谷歌也表达了同样的意思。美国商会历来反对立法，现在也赞同制定联邦法规。

科技公司对保护用户信息突然热心起来，一种解释是它们不想看到各州法律各行其是，相互矛盾。这样的愿望是合理的。伊利诺伊州、纽约州和华盛顿州都在各自筹备立法，其他很多州也在酝酿之中。

| 温驯西部，狂野东部

科技公司支持联邦层面的法规可能还有另一个动机。许多在线业务跨越州境，因此受联邦法律管辖。所以，联邦数据法会取代加州的数据法，除非联邦数据法明确说明它仅作为基础，各州可以根据自己的意愿做出更高的要求。民主党在参议院就提出了一份这样的提案。与之相对的共和党提案将要求以对商业更友好的规则为上限，实际上就是要消除CCPA的影响。没必要去猜测美国商界更希望最终是哪个结果。在11月美国大选之前，这两项提案都不太可能通过。所以在大选之前企业还得注意遵守加州的数据法案。大选之后，就等着一场混战吧。■



Technology and society

Pessimism v progress

Contemporary worries about the impact of technology are part of a historical pattern

FASTER, CHEAPER, better—technology is one field many people rely upon to offer a vision of a brighter future. But as the 2020s dawn, optimism is in short supply. The new technologies that dominated the past decade seem to be making things worse. Social media were supposed to bring people together. In the Arab spring of 2011 they were hailed as a liberating force. Today they are better known for invading privacy, spreading propaganda and undermining democracy. E-commerce, ride-hailing and the gig economy may be convenient, but they are charged with underpaying workers, exacerbating inequality and clogging the streets with vehicles. Parents worry that smartphones have turned their children into screen-addicted zombies.

The technologies expected to dominate the new decade also seem to cast a dark shadow. Artificial intelligence (AI) may well entrench bias and prejudice, threaten your job and shore up authoritarian rulers. 5G is at the heart of the Sino-American trade war. Autonomous cars still do not work, but manage to kill people all the same. Polls show that internet firms are now less trusted than the banking industry. At the very moment banks are striving to rebrand themselves as tech firms, internet giants have become the new banks, morphing from talent magnets to pariahs. Even their employees are in revolt.

The *New York Times* sums up the encroaching gloom. “A mood of pessimism”, it writes, has displaced “the idea of inevitable progress born in the scientific and industrial revolutions.” Except those words are from an article published in 1979. Back then the paper fretted that the anxiety was “fed by growing doubts about society’s ability to rein in the seemingly

runaway forces of technology”.

Today’s gloomy mood is centred on smartphones and social media, which took off a decade ago. Yet concerns that humanity has taken a technological wrong turn, or that particular technologies might be doing more harm than good, have arisen before. In the 1970s the despondency was prompted by concerns about overpopulation, environmental damage and the prospect of nuclear immolation. The 1920s witnessed a backlash against cars, which had earlier been seen as a miraculous answer to the affliction of horse-drawn vehicles—which filled the streets with noise and dung, and caused congestion and accidents. And the blight of industrialisation was decried in the 19th century by Luddites, Romantics and socialists, who worried (with good reason) about the displacement of skilled artisans, the despoiling of the countryside and the suffering of factory hands toiling in smoke-belching mills.

Stand back, and in each of these historical cases disappointment arose from a mix of unrealised hopes and unforeseen consequences. Technology unleashes the forces of creative destruction, so it is only natural that it leads to anxiety; for any given technology its drawbacks sometimes seem to outweigh its benefits. When this happens with several technologies at once, as today, the result is a wider sense of techno-pessimism.

However, that pessimism can be overdone. Too often people focus on the drawbacks of a new technology while taking its benefits for granted. Worries about screen time should be weighed against the much more substantial benefits of ubiquitous communication and the instant access to information and entertainment that smartphones make possible. A further danger is that Luddite efforts to avoid the short-term costs associated with a new technology will end up denying access to its long-term benefits—something Carl Benedikt Frey, an Oxford academic, calls a “technology trap”. Fears that robots will steal people’s jobs may prompt

politicians to tax them, for example, to discourage their use. Yet in the long run countries that wish to maintain their standard of living as their workforce ages and shrinks will need more robots, not fewer.

That points to another lesson, which is that the remedy to technology-related problems very often involves more technology. Airbags and other improvements in safety features, for example, mean that in America deaths in car accidents per billion miles travelled have fallen from around 240 in the 1920s to around 12 today. AI is being applied as part of the effort to stem the flow of extremist material on social media. The ultimate example is climate change. It is hard to imagine any solution that does not depend in part on innovations in clean energy, carbon capture and energy storage.

The most important lesson is about technology itself. Any powerful technology can be used for good or ill. The internet spreads understanding, but it is also where videos of people being beheaded go viral. Biotechnology can raise crop yields and cure diseases—but it could equally lead to deadly weapons.

Technology itself has no agency: it is the choices people make about it that shape the world. Thus the techlash is a necessary step in the adoption of important new technologies. At its best, it helps frame how society comes to terms with innovations and imposes rules and policies that limit their destructive potential (seat belts, catalytic converters and traffic regulations), accommodate change (universal schooling as a response to industrialisation) or strike a trade-off (between the convenience of ride-hailing and the protection of gig-workers). Healthy scepticism means that these questions are settled by a broad debate, not by a coterie of technologists.

| *Fire up the moral engine*

Perhaps the real source of anxiety is not technology itself, but growing

doubts about the ability of societies to hold this debate, and come up with good answers. In that sense, techno-pessimism is a symptom of political pessimism. Yet there is something perversely reassuring about this: a gloomy debate is much better than no debate at all. And history still argues, on the whole, for optimism. The technological transformation since the Industrial Revolution has helped curb ancient evils, from child mortality to hunger and ignorance. Yes, the planet is warming and antibiotic resistance is spreading. But the solution to such problems calls for the deployment of more technology, not less. So as the decade turns, put aside the gloom for a moment. To be alive in the tech-obsessed 2020s is to be among the luckiest people who have ever lived. ■



科技与社会

悲观对阵进步

当下人们对科技之影响的担忧在历史上有迹可循

很多人指望更快速、更廉价、更优质的技术能带给他们更光明的未来。但在本世纪20年代的开始，人们却乐观不起来了。过去十年里占据主导的各种新技术似乎正在让事情变得更糟。社交媒体曾被认为是一条纽带，将人们连结在一起。在2011年的“阿拉伯之春”中，它们被誉为一股解放的力量。而如今，它们更为人熟知的一面是侵犯隐私、充当宣传机器和破坏民主。电子商务、网约车和零工经济可能给人们的生活带来便利，但也因为付给工人的报酬过低、加剧不平等、导致堵车而被诟病。家长们担心智能手机已经把他们的孩子变成了沉迷屏幕的“僵尸”。

预计会主导下一个十年的技术似乎也给世界投下一片阴影。人工智能（AI）很可能会加深偏见和成见，威胁人们的工作机会，并成为独裁统治者的帮凶。5G是中美贸易战的核心。无人驾驶汽车尚未成功，却在夺人性命。民意调查显示，如今人们对互联网公司的信任度比对银行更低。就在银行努力将自己重塑为科技公司之时，互联网巨头却摇身变成了新的银行，从吸引人才的香饽饽变成了弃儿，甚至连自家员工也在和它们作对。

《纽约时报》概括了这种蔓延的忧虑。它写道，“一种悲观情绪”已经取代了“科技和工业革命必然带来进步的想法”。只是这句话是出自它在1979年发表的一篇文章。当时这家报纸担心，这种焦虑“源于人们对社会能否驾驭看似失控的科技力量的怀疑与日俱增”。

如今，悲观情绪主要集中在十年前迅速流行开来的智能手机和社交媒体上。然而，关于人类在技术发展的道路上走错方向，或某些特定技术弊大于利的担忧，之前就已出现过。上世纪70年代，对人口过剩、环境破坏和核杀戮的担忧让人沮丧。上世纪20年代，汽车遭到抵制。而在此之前，马车让街道充斥着噪音和粪便，造成交通拥堵和事故，汽车则被视为解决这些问题的灵丹妙药。再上溯到19世纪，工业化的恶果遭到卢德派、浪漫主

义者和社会主义者的谴责，他们担心熟练工匠被取而代之、乡村遭到掠夺，辛勤劳作的工人在浓烟滚滚的工厂里受苦受难。他们这些担心不无道理。

置身事外来看，在所有这些历史事件中，沮丧是由未能实现的希望和始料不及的后果交织在一起而造成的。科技释放出创造性破坏的力量，因而导致焦虑再自然不过；任何一项技术有时都会显得弊大于利。如果多项技术同时出现这种情况——就像今天这样——就会产生更大范围的科技悲观主义。

然而，这种悲观情绪可能过头了。太多时候，人们关注于新科技的缺点，却将它的好处视为理所当然。在担心人们花太多时间在屏幕上的同时，还应看到它带来了切实得多的好处——智能手机让交流无处不在，还能即时获取信息和娱乐。更危险的是卢德派试图避免与新科技有关的短期损失，这到头来可能要将它们带来的长期好处也拒之门外——也就是牛津大学学者卡尔·本尼迪克特·弗雷（Carl Benedikt Frey）所说的“技术陷阱”。例如，因为担心工作岗位会被机器人取代，可能会促使政客们对机器人征税，以阻止对机器人的使用。然而从长远来看，随着劳动人口的老龄化和萎缩，希望维持现有生活水平的国家将需要更多机器人，而不是更少。

这就告诉我们另外一个道理：要解决科技带来的问题，往往需要更多科技。例如，安全气囊和其他提高安全性能的举措推出后，在美国，每10亿英里行驶里程的交通事故死亡人数已经从上世纪20年代的240人左右下降到今天的12人左右。AI正被用来帮助遏制极端主义内容在社交媒体上的传播。最显著的例子是气候变化。很难想象有什么解决方案能完全不依赖清洁能源、碳捕集和能源储存等方面的科技创新。

最重要的教训与科技自身相关。任何强大的科技都可以被用于好坏两面。互联网增进了了解，但也是斩首病毒式扩散的地方。生物技术可以提高作物产量、治愈疾病，但同样可以制造出致命武器。

科技本身没有能动性，是人们对它的选择塑造了世界。因此，科技抵制潮

就是采用重大新技术的过程中不可或缺的一步。在最佳情形下，科技抵制潮有助于人们构想社会该如何接纳革新，并实行一些规章和政策（如安全带、催化转换器和交通规则等）来限制它们可能造成的破坏，顺应变革（如针对工业化而实施的普及教育），或是找到折中办法（如既做到召车便利，又保护零工权益）。要对科技提出理智的质疑，这就要通过广泛的辩论来解决这些问题，而不是依靠一小群技术专家。

| 发动道德引擎

也许焦虑的真正来源不是科技本身，而是人们越来越怀疑社会是否有能力掌控这场辩论，并得出好结论。从这个意义上说，科技悲观主义是政治悲观主义的反映。不过，这其中却又有让人感到安慰的地方——一场悲观的辩论总比完全没有辩论要好得多。而且总体来说，历史还是站在乐观主义者这一边。工业革命以来的科技变革帮助人类遏制了各种由来已久的弊害，如儿童死亡、饥荒和愚昧。诚然，地球正在变暖，抗生素耐药性正在蔓延。但要解决这些问题，就需要更多地利用科技而不是更少。因此，当我们迈入新的十年，先把悲观放在一边。活在痴迷科技的21世纪20年代的人是有史以来最幸运的。 ■



The World in 2020

Working through the tech-tax tangle

A global tax deal fit for the modern economy is within reach

It might just be the year that the international tax system is at last dragged into the 21st century. The summer of 2020 is the deadline by which negotiators tasked with working out how to tax multinationals that sell digital services—the backbone of the modern economy, from Amazon to Zoom—are supposed to agree on a solution acceptable to the world’s major economies. All being well, this would be approved by the G20 countries soon after.

Technocrats, led by a team from the OECD, are hard at work, and are optimistic that a deal can be struck—if not by the ambitious target date, then within a year or so of it. The bosses of global companies should hope so: the alternative to multilateralism is a tax free-for-all that leaves them facing confusing and costly piles of overlapping tax bills.

The global framework for taxing international companies, based largely on thousands of bilateral treaties, has been creaking for decades. It was designed for the age of manufacturing, not machine-learning. The rise of tech firms with ever more intangible assets has made it easier for companies to game the system and shift profits to tax havens. More and more governments and their citizens have cried foul, accusing firms such as Apple, Amazon, Facebook and Google of being tax cheats.

The OECD, nudged by the G20, stepped up its work after the global financial crisis. Its “Base Erosion and Profit Shifting” project led to a series of reforms in 2015, agreed on by dozens of countries. These tackled some of the most egregious tax-avoidance wheezes—for instance, playing tricks with intra-company debt to make taxable profits vanish. But the digital-economy can

was kicked down the road because America, home to the biggest tech firms, was not willing to do a deal.

That has since changed, partly because President Donald Trump's big domestic tax reform has left America better placed to handle global reform; and partly because of European gambits. When European Union countries failed to agree on a "digital-services tax" on the European sales of tech giants, individual member states, including Britain and France, drew up their own. This upset the Trump administration, which saw the moves as unfairly targeting American companies. It vowed retaliation, in the form of trade restrictions, against France, which was the first to implement its tax. A truce was agreed at a G7 summit in August 2019, but the peace is fragile.

This exchange of fire made a global deal more urgent. OECD experts think the best hope of one lies in a "two pillar" approach. The first is centred on developing new "nexus" rules that better capture profits of companies that do business in territories without a physical presence. This will require rethinking how to track genuine economic activity—which these days is about much more than counting employees, machinery and other tangible assets. It will also involve an overhaul of the flawed "arm's length" transfer-pricing principle that underpins the current system, which says that multinationals should price transactions between subsidiaries in different countries at market rates, as if they were unrelated parties. As such intra-group transactions grow more intricate, policing them becomes more difficult. The second pillar involves setting an agreed minimum level of taxation for multinationals' global operations, as a net to catch those still not paying a fair share.

| *Tax me if you can*

There are many potential sticking-points. America, the EU and others may struggle to agree on what constitutes a fair minimum tax rate. Even if they can, talks may falter on dividing the spoils. There will, inevitably, be

winners and losers, and not all the losers will be tiny tax havens whose complaints can be brushed aside—several EU countries, including the Netherlands and Ireland, do well under the current, broken system. The views of China and other large, non-Western economies will increasingly need to be factored in. The mechanism for resolving disputes between countries that squabble over taxing rights still needs fixing. And so on.

This is, in short, a pivotal moment for corporate taxation. The odds of a multilateral deal shortened in 2019 as bust-ups over tax-shy internet firms came to a head, forcing governments to look for another way. Global consensus is within reach. Without it, the world could tip towards tech-fuelled tax wars. ■



2020年的世界

理顺“技术税”乱结

一项适合现代经济的全球性税收协议触手可及

这一年，国际税收体系可能终于要被拖着进入21世纪了。谈判代表们受命解决如何向出售数字服务的跨国公司征税的问题（从亚马逊到Zoom，这类公司已成为现代经济的支柱），他们应该在最后期限2020年夏天之前达成一项解决方案，并得到世界主要经济体的认可。如果一切顺利，之后将很快得到二十国集团成员国的批准。

在经合组织一个团队的主持下，技术官僚们正卖力工作，并乐观地认为能够达成一项协议——如果不能在上述雄心勃勃的目标日期之前达成，那么之后一年左右的时间内也能达成。全球化企业的老板们应该也希望如此：在多边机制缺失的情况下，现行税收制度造成了各方为所欲为的局面，这些老板们因而要面对成堆且重复的税收账单，混乱又昂贵。

对国际性企业征税的全球框架大体上基于成千上万条双边协定，几十年来一直摇摇欲坠。它是为制造业时代而不是机器学习时代设计的。科技公司坐拥的无形资产越来越多，它们的崛起方便了企业钻制度的空子，将利润转移到避税天堂。对此，越来越多的政府及其公民抱怨连连，指责苹果、亚马逊、Facebook和谷歌等公司逃税。

在G20的推动下，经合组织在全球金融危机后加强了自己的工作。其“税基侵蚀和利润转移”项目在几十个国家间达成了共识，促成了2015年的一系列改革。当时这些改革击破了一些最恶劣的避税伎俩——例如在公司内部债务上耍花招，使应税利润消失。但是数字经济这个皮球还是被踢开了，因为那些最大的科技公司的老家美国不愿参与制定协议。

自那之后情况发生了变化，部分原因是特朗普在国内推行的大规模税改增强了美国应对全球改革的能力，此外欧洲的策略也发挥了作用。当欧盟国家未能就向科技巨头在欧洲的销售征收“数字服务税”达成一致时，包括英

国和法国在内的个别成员国制定了自己的方案。特朗普政府为此感到不快，认为这样的举措是针对美国公司，有失公平。它放言要以贸易限制的形式对率先开征数字税的法国实施报复。2019年8月，两国在七国集团（G7）峰会上达成了停战协议，但这样的和平是脆弱的。

这场交火使得达成一项全球性协定更显紧迫。经合组织的专家认为，达成协议最大的希望在于“双支柱”方案。第一个支柱的核心是制定新的“联结度”规则，更好地捕捉企业在未设立业务实体的地区开展业务时产生的利润。这就需要反思该如何追踪真正的经济活动——如今这远不只是计算雇员、机器和其他有形资产的数量。它还将涉及彻底改革现行体系的基础、有缺陷的“独立”（arm's length）转让定价原则。根据这一原则，跨国企业应按照市场汇率为位于不同国家的子公司之间的交易定价，就好像它们彼此间毫无关联一样。随着这种集团内部交易变得愈加错综复杂，监管它们的难度也变大了。第二个支柱是各方为跨国公司的全球业务商定一个最低税收水平，将它作为一张网，捕捉仍未缴纳足够税款的企业。

| 逃税猫鼠游戏

然而还有很多潜在的障碍。美国、欧盟和其他国家可能难以就公平合理的最低税率达成共识。即使它们达成了共识，谈判也可能在瓜分战利品的问题上再度陷入僵局。过程中无可避免地会有赢家和输家，而沦为输家的并不将只是那些小小的避税天堂（它们的抱怨可能会被漠视），可能还包括荷兰和爱尔兰在内的若干欧盟国家，它们在运转不佳的现行体系下如鱼得水。中国和其他大型非西方经济体的意见将越来越需要考虑在内。国家间因征税权问题争吵不休，用于解决这类争端的机制仍然需要修复。诸如此类的问题还有不少。

简而言之，对企业税收来说，目前到了关键时刻。因不爱缴税的互联网公司而起的激烈纷争已达白热化状态，迫使各国政府另寻他法，这在2019年加大了达成多边协议的可能性。全球共识触手可及。如若不然，世界可能会滑向由科技提供弹药的税收战。 ■



The World in 2020

The coming innovation explosion

The key to the future is open collaboration, says Ren Zhengfei, CEO and founder, Huawei

We at Huawei firmly believe that humanity will enter an intelligent world within the next 20 to 30 years. Society is on the verge of another explosion of new theories and technologies. There is a lot of potential, but also much uncertainty. Many questions remain—and open innovation would be the best way to address them.

In electronics, chips will continue to scale down to three nanometres and maybe even one nanometre. This evolution will continue, in ways we cannot yet predict, even as Moore's law becomes obsolete. In the past we thought graphene would be the driver of this evolution, but today we don't know for sure if this will still be true.

We will surely see significant breakthroughs in genetic technologies over the next two to three decades, which will trigger incredible progress in life sciences, biotechnology and nanomedicine. But how these breakthroughs will change the way people live and work also remains unclear. Molecular science and technology can be used to synthesise materials that never existed before. There is no way of telling what new materials and technologies will emerge. We do know that artificial intelligence (AI) will see ample application, but we cannot predict how it will drive society forward or create more wealth.

Breakthroughs in quantum computing and its widespread application will trigger an explosion of data traffic. Although we know for sure that the impact will be significant, it may not look the way we think. Optical technologies will also be widely applied in various domains.

Advances in individual disciplines are creating new opportunities at dizzying rates, but the impact of interdisciplinary breakthroughs will be even more astonishing. All these future innovations will be accompanied by explosive growth in data traffic. We cannot yet foresee what demands there will be when it comes to storage, transmission and processing of these ultra-large quantities of data. What we know for sure is more and more data will be stored and processed in the cloud. But how will we channel this surge in data?

In short, we just don't know what the structure of our society will look like, how we will adapt to it or how we can keep it under control. All sorts of new ideas and technologies are unfolding right before our eyes. A novel characteristic of this new wave of technological innovation is "chain reactions" that span multiple disciplines. For example, information technologies have become the foundation for scientific research and innovation in all disciplines. Similarly, they have become the foundation for development in every industry.

One thing is clear, though. We must reinforce the infrastructure of the information society. There are two sides to infrastructure: one is hard (the actual technology) and the other is soft (the rules, skills and other things we apply to it).

On the hard side, we have optical networks and 5G in particular, as well as 6G in the future. AI depends on a range of information technologies, and it will struggle to advance without continuous breakthroughs in infrastructure capabilities. That would be like trying to drive cars at high speed without a highway.

On the soft side, we have talent, regulations and so on. The key lies in talent. To embrace this new era, the world as a whole must fully support education, and develop talent of all kinds by creating an environment that

allows academic freedom and nurtures freedom of thought.

| *Follow the data*

Standing at the threshold of the intelligent world, we at Huawei must decide what part we will play in this new social structure in the next 20 or 30 years. We know that the volume of data traffic will be overwhelming in the future, so our strategic direction will be focused on channelling, distributing, storing and processing this massive data traffic. This will be where we will dedicate ourselves over the long term. We must not deviate from this direction, but we can adapt during the different stages of our journey.

A single flower does not make spring. In this vibrant information society, it will be impossible to prevent flowers of all kinds from blooming. At Huawei we will continue to work with companies from around the world to build a strong ecosystem and share its benefits. With a firm commitment to globalisation, we will remain open and collaborate for shared success. ■



2020年的世界

我们处在爆炸式创新的前夜

华为创始人兼CEO任正非认为，开放合作是打开未来大门的钥匙

我们坚信，未来二、三十年人类社会必然走进智能社会。今天，人类社会正处于新理论、新技术再一次爆发的前夜。发展潜力巨大，但也存在诸多不确定性。很多问题依然存在，但开放创新是最好的解决之道。

电子技术到了3纳米、1纳米后，不会因摩尔定律的失效而停下发展的脚步，还会继续前进，只是前进的实现形式还不知道罢了。我们曾经期望通过石墨烯来实现，但直到今天还不是很清楚。

基因技术在这二、三十年一定有大的突破，它将促使生命科学、生物技术、纳米医疗.....的巨大进步，给人类带来的变化还不可知；分子科技可以用来合成前所未有的材料，新材料、新技术不断出现，我们现在完全看不清楚；人工智能在此期间必将得到充分应用，对社会进步的促进和改进，财富的增加形式，还无法构想。

量子计算在这个时期的突破普及，带来信息流量的爆炸，产生的影响，虽然想象得到，但绝对不会是我们想象的样子；光技术在各领域的深入应用.....

单学科技术的进步，给我们带来新的机会，已经让人目不暇接了，而跨学科领域的突破产生的巨大冲击波更令人震撼；任何创新都伴随信息流量的爆炸增长，这些超大容量的数据的存储、传送、处理会是什么需求，不能预测。但可以确定的是，越来越多的数据将存储在云上，并在云上进行处理。洪水般的数据如何疏导？

总之，我们不知道未来的社会结构会是什么样的，如何去适应它，驾驭它。各种新思想、新技术都方兴未艾。跨学科的“链式反应”是这一波科技创新的新特征，比如，信息技术已经成为所有领域科学研究创新的基础，

如同信息技术已经成为各个产业的基础一样。

已经明确的是，我们要加强信息社会的基础设施建设。其中，基础有两部分：硬基础（技术本身）、软基础（应用技术所需的规则、技能.....）。

硬基础，特别是光网与5G的建设，以及未来6G的应用。AI依赖一系列的信息技术，没有基础设施能力的持续突破，就难以进步，这就如同汽车没有高速公路就跑不快一样。

软基础涉及人才、监管等，但关键在于人才，全世界要迎接这个新时代，必须发展教育，在提高全民族文化素质的基础上，在充分的学术自由、思想自由下，培养百花齐放的人才。

| 紧随数据

站在智能社会的门口，我们要展望二、三十年后在这个新的社会结构中扮演什么角色。我们想象得到信息洪水的巨大，疏导巨大信息洪流就是我们公司未来二、三十年的战略定位。疏导分发、存储与处理数据流量，就是我们的战略方向，也是我们长期的奋斗方向，奋斗必须在大方向上要有连续性，在不同阶段应有适应性。

一花独放不是春，这么五彩缤纷的信息社会，没有百花齐放是不可能的，我们要坚持开放合作共赢，坚持与全世界公司共建生态，共享生态，坚定不移拥抱全球化。■



The World in 2020

AI can do that

What would an artificial intelligence think about the year ahead? We decided to ask one GPT-2 Large-scale unsupervised language model, OpenAI SAN FRANCISCO

This publication draws on a wide range of expertise to illuminate the year ahead. Even so, all our contributors have one thing in common: they are human. But advances in technology mean it is now possible to ask an artificial intelligence (AI) for its views on the coming year. We asked an AI called GPT-2, created by OpenAI, a research outfit. GPT-2 is an “unsupervised language model” trained using 40 gigabytes of text from the internet. Given a prompt, such as a question or the first sentence of a story, it generates what might plausibly come next. Here are some of its (unedited) answers to our questions on the big themes of 2020.

Q: Greetings, GPT-2. Have you done an interview before?

A: I’m not going to lie. I did not come prepared (laughs).

Q: Which technologies are worth watching in 2020?

A: I would say it is hard to narrow down the list. The world is full of disruptive technologies with real and potentially huge global impacts. The most important is artificial intelligence, which is becoming exponentially more powerful. There is also the development of self-driving cars. There is a lot that we can do with artificial intelligence to improve the world.

Q: What is the future of AI?

A: It would be good if we used the technology more responsibly. In other words, we should treat it like a utility, like a tool. We should put as much effort into developing the technology as necessary, rather than worrying

that it's going to harm us and destroy our lives.

Q: Are you worried that AI technology can be misused?

A: Yes, of course. But this is a global problem and we want to tackle it with global solutions. It is not just the government that must do something. Companies must also take responsibility. This means they need to make sure their technologies are used responsibly and that they do not harm anyone.

Q: How worried do you think we humans should be that machines will take our jobs?

A: It depends what role machine intelligence will play. Machine intelligence in some cases will be useful for solving problems, such as translation. But in other cases, such as in finance or medicine, it will replace people.

Q: Do fake news stories, generated using AI, pose a threat to democracy? Are we likely to see this tactic being used in the 2020 American presidential elections?

A: Yes, we'll probably see them. It's just a matter of when. Fake news stories are generally generated by political campaigns, and have the potential to have a huge impact on the outcome of an election. This is because they spread misinformation, often with no basis in fact.

Q: Do you, GPT-2, represent a step towards more powerful artificial general intelligence (AGI)?

A: I am not a step towards AGI. I am interested in understanding the origins of language. The only thing that I can do is answer questions correctly.

Q: Moving on from technology, do you think the trade war between China

and America will be resolved in 2020?

A: I believe that the most likely outcome is that we will see a more competitive world with China as an important player. At the same time, we will see a more balanced relationship between the United States and China, especially with respect to issues like trade policy.

Q: Do you think Donald Trump will win a second term?

A: I think he will not win a second term. I think he will be defeated in the general election.

Q: How do you see the economic outlook for 2020?

A: I think it is very unclear. The outlook for the UK economy is uncertain, but the American economy is very strong. I think we are going to have a lot of turbulence in the world economy.

Q: Do you have any other predictions for 2020?

A: I am not a futurist, but I do think there will be significant political change. I think there will be major changes in the EU, particularly if the British leave. And there will probably be major changes in China.

Q: Do you have any advice for our readers?

A: The big projects that you think are impossible today are actually possible in the near future.

Q: Thank you very much for talking to us.

A: You are welcome.

All answers generated using the 774M-parameter version of GPT-2.

Interview conducted by Tom Standage, deputy editor, The World in 2020.
Special thanks to Ignacio López-Francos for the Jupyter-notebook
implementation of GPT-2 ■



2020年的世界

AI能做到

人工智能对未来一年有何看法？我们决定问一问由旧金山OpenAI研发的GPT-2大规模无监督语言模型

本刊博采众长以预测来年。即便如此，我们所有的撰稿人有一个共同点：他们是人类。但是，技术进步意味着现在已经可以请一个人工智能（AI）系统来谈谈对来年的看法了。我们询问了由研究机构OpenAI研发的名为GPT-2的AI。GPT-2是一种“无监督语言模型”，使用来自互联网的40G文本进行训练。给它一个提示，比如一个问题或者一个故事的第一句话，它就会接着往下生成貌似合情合理的内容。以下是它对我们有关2020年重大主题的提问的一些（未经编辑的）答复。

问：你好，GPT-2。你以前接受过采访吗？

答：我不想说假话。我没有准备的（笑）。

问：2020年有哪些技术值得关注？

答：我会说很难缩小范围。世上有许多颠覆性技术，已经或者可能带来巨大的全球影响。其中最重要的是人工智能，它的能力正呈指数级增长。还有无人驾驶汽车的发展。我们可以用人工智能做很多事来改善世界。

问：AI的未来如何？

答：如果我们更负责任地运用这项技术，它的未来是好的。换句话说，我们应该把它当成一种公用事业、一种工具。我们应该尽最大的努力来发展这种技术，而不是担心它会伤害我们和毁掉我们的生活。

问：你担心AI技术被滥用吗？

答：是的，当然。但这是一个全球性问题，我们希望用全球性方案来解决它。不仅政府必须做点什么，企业也必须担负起责任。这就是说，它们要

确保自己的技术被负责任地使用，不会伤害任何人。

问：你认为我们人类应该对被机器抢了饭碗担心到什么程度？

答：这取决于机器智能将扮演什么角色。在某些情况下，机器智能将有助于解决问题，比如翻译。但在其他情况下，例如金融或医学领域，它会取代人。

问：用AI生成的虚假新闻是否对民主构成了威胁？我们会在2020年美国总统大选中看到这种招数吗？

答：是的，我们有可能看到它们。这只是时间问题。假新闻通常都由政治竞选活动制造，有可能对选举结果产生巨大的影响。这是因为它们散布错误信息，通常没有事实依据。

问：你，GPT-2，是否代表了向更强大的通用人工智能（AGI）迈出的一步？

答：我不是迈向AGI的一步。我对理解语言的起源很感兴趣。我唯一能做的就是正确回答问题。

问：不说技术了。你认为中美贸易战会在2020年最终解决吗？

答：我认为最可能的结果是，我们将看到一个竞争更激烈的世界，中国在其中扮演重要角色。与此同时，我们将看到中美之间的关系变得更加平衡，特别是在贸易政策这类议题上。

问：你认为唐纳德·特朗普会赢得连任吗？

答：我认为他不会连任。我认为他将在大选中落败。

问：你如何看待2020年的经济前景？

答：我认为非常不明朗。英国经济前景不定，但美国经济很强劲。我认为

世界经济会有很多动荡。

问：你对2020年还有其他预测吗？

答：我不是未来主义者，但我确实认为将会发生重大的政治变化。我认为欧盟将有重大变化，特别是如果英国退出的话。另外中国可能会发生重大变化。

问：你对我们的读者有什么忠告吗？

答：那些你们今天认为不可能的大项目实际上在不久的将来就可能实现。

问：非常感谢与我们交谈。

答：不客气。

以上所有回答均使用GPT-2的7.74亿参数版本生成。《世界2020》副主编汤姆·斯坦迪奇（Tom Standage）策划本次采访。特别感谢伊格纳西奥·洛佩斯-弗兰科斯（Ignacio López-Francos）提供Jupyter笔记本版的GPT-2 ■



The World in 2020

The decade of the yold

People turning 65 will not retire quietly into the background, predicts John Parker

The year 2020 will mark the beginning of the decade of the yold, or the “young old”, as the Japanese call people aged between 65 and 75. The height of the baby boom, the period of high fertility in rich countries after the second world war, was 1955-60. The traditional retirement age is 65, and 2020-25 is 65 years later. One might therefore expect peak retirement for baby-boomers in the coming years—except that they are not retiring. By continuing to work, and staying socially engaged, the boomers, in their new guise as the young old, will change the world, as they have done several times before at different stages of their lives.

The yold are more numerous, healthier and wealthier than previous generations of seniors. There will be 134m 65- to 74-year-olds in rich countries in 2020 (11% of the population), up from 99m (8%) in 2000 (see chart). That is the fastest rate of growth of any large age group. Health worsens with age, but the yold are resisting the decline better than most: of the 3.7 years of increased life expectancy in rich countries between 2000 and 2015, says the World Health Organisation, 3.2 years were enjoyed in good health. The yold are also better off: between 1989 and 2013, the median wealth of families headed by someone over 62 in America rose by 40% to \$210,000, while the wealth of all other age groups declined.

The yold are busier, too. In 2016 just over a fifth of people aged 65-69 were in work in rich countries, a figure that is rising fast. Working is one of the factors that are helping people stay healthy longer. A German study found that people who remain at work after the normal retirement age manage to slow the cognitive decline associated with old age and have a cognitive capacity of someone a year and a half younger.

| *And miles to go before they sleep*

In short, the yold are not just any group of old people. They are challenging the traditional expectations of the retired as people who wear slippers and look after the grandchildren. That will disrupt consumer, service and financial markets.

The over-60s are one of the fastest-growing groups of customers of the airline business. The yold are vital to the tourism industry because they spend much more, when taking a foreign holiday, than younger adults. They are also changing education. Harvard has more students at its Division for Continuing Education (for mature and retired students) than it does at the university itself. And, because of the importance of pensions, the yold are transforming insurance companies from passive distributors of fixed annuities to financial-service providers for customers who want to manage their pension pots more actively.

The rise of the yold will be a boon to themselves, to economies and to societies. Many bosses and hr departments think productivity falls with age, but studies of truckmaking and insurance firms in Germany suggest older workers have, if anything, slightly above-average productivity—and that teams of workers from multiple generations are the most productive of all. Societies should be better off because public spending on health and pensions should be lower than expected, as people work longer and need less medical care.

But for all this to happen, three big things will have to change, under pressure from the yold themselves. The most important is public attitudes towards older people, and in particular the expectation that 60-somethings ought to be putting their feet up and quietly retiring into the background. Many companies discriminate against older workers by offering training only to younger ones, or by limiting part-time employment and job-sharing. The yold will demand that companies become more age-friendly

and, in the process, help change attitudes towards ageing itself.

Government policies will have to change, too. The retirement age in many rich countries is still below the age to which many people want to work. The effective retirement age (the age at which people actually leave the workforce) is usually even lower. Public policy makes retirement a cliff edge, when it should be a ramp.

Third, higher numbers of healthy yold people will require drastic changes in health spending. Most diseases of ageing are best met with prevention and lifestyle changes. But only about 2-3% of most countries' health-care spending goes on prevention. That will have to rise, because although the yold will constitute a bulge of comparative health and activity over the next decade, by 2030 they will hit 75—and enter a long period of decline for which few rich countries are ready. ■



2020年的世界

“悠得人”的十年

约翰·帕克 (John Parker) 预测，即将迈入65岁的人们不会悄悄隐退

二〇二〇年将开启“悠得人” (yold) 的十年。“悠得人”即“年轻老人” (young old)，是日本人对65至75岁人群的指称。第二次世界大战后富裕国家的生育率飙升，这一“婴儿潮”的顶峰发生在1955至1960年。传统退休年龄是65岁，而2020至2025年正好是那时的65年后。因此，人们可能会预期未来几年出现婴儿潮一代的退休高峰。而事实是，他们还不会退休。“婴儿潮一代”会继续工作和积极投身社会，以“年轻老人”的新身份去改变世界，就像过去他们在人生不同阶段曾经多次做过的那样。

与前几代老年人相比，“悠得人”的数量更多，更健康，也更富有。2020年，富裕国家将有1.34亿65至74岁人群（占人口的11%），高于2000年的9900万（占8%）（见图表）。这是所有大型年龄段增长最快的一个。健康会随年龄增长恶化，但“悠得人”却比大多数以前的老人都更好地抵御了这种衰退：世卫组织称，2000至2015年间，富裕国家的预期寿命延长了3.7年，其中有3.2年是在良好的健康状态下度过的。“悠得人”也更富足：1989至2013年间，户主年龄在62岁以上的美国家庭的财富中位数增长了40%，达到21万美元，而与此同时所有其他年龄段的财富都下降了。

悠得人也更忙碌。2016年，富裕国家65至69岁人群中略多于五分之一的人在在工作，这个数字正在迅速攀升。工作是帮助人们延长健康状态的因素之一。德国一项研究发现，那些过了常规退休年龄还在工作的人延缓了自身与老龄有关的认知衰退，而拥有相当于比他们年轻一岁半的人的认知能力。

| 来日且多

简而言之，悠得人并非又一波寻常的老人。他们正在挑战人们对退了体的人穿着拖鞋、照看孙儿这种惯有的预期。而这将颠覆消费、服务和金融市场。

六十岁以上人群是航空业增长最快的客户群之一。悠得人对于旅游业至关重要，因为他们在国外度假时的消费额比年轻人多得多。他们也在改变教育。哈佛大学继续教育部（针对成熟和已退休的学生）的学生人数要比大学本身更多。而鉴于养老金的重要性，他们也在改变保险公司的角色：从固定年金的被动发放者，转变为服务那些想要更积极地管理养老金的客户的金融服务供应商。

悠得人的兴起对于他们自身、经济体和社会都是一种福音。许多老板和人力资源部门认为生产率会随年龄增长而下降，但是对德国卡车制造业和保险公司的研究表明，若要说什么区别的话，老年员工的生产率略高于平均水平；而由来自不同代际的员工组成的团队生产率最高。社会应该会变得更为富足，因为随着人们工作时间延长，医疗需求减少，公共医疗和养老金支出应该都会低于预期。

但要让这一切真的发生，有三件大事必须改变——在悠得人自己施加的压力下。最重要的是公众对老年人的态度，尤其是认为60多岁的人就该停歇、悄然从社会大舞台上隐退的预期。许多企业都在变相歧视年长的员工，比如只为年轻员工提供培训，或者限制年长员工参与兼职和岗位分享。悠得人将要求公司变得更“高龄友善”，并在这一过程中帮助改变人们对于“变老”这件事本身的态度。

政府政策也必须改变。许多富裕国家的退休年龄仍低于很多人想继续工作的年龄。实际退休年龄（人们实际离开劳动力队伍的年龄）通常还要低。目前的公共政策使得退休呈现为一种断崖似节点，而它本该是一个缓坡。

第三，健康悠得人的增长将要求医疗支出做出巨大的改变。大多数与衰老相关的疾病的最佳应对方式是预防和转变生活方式。但大多数国家的医疗支出只有约2%至3%用在了预防上。这个比例必须上升，因为尽管在未来十年中悠得人将构成一个相对健康有活力的激增人群，但到2030年他们将迈入75岁，进入一个长期衰退期，而没有几个富裕国家为此做好了准备。





The World in 2020

Introducing “n of 1” drugs

In 2020 a father will create a new drug to try to save his daughter's life

In July 2019, Rohan Seth published an emotional message on Twitter. It said that his six-month-old daughter, Lydia, had been born with a random genetic mutation. He had been told that she would live a life full of pain and never sit up, crawl, walk or talk. Doctors said that nothing could be done. But Mr Seth explained that he planned to use a technology called antisense oligonucleotides (ASO) to create a personalised drug just for his daughter.

Every human being has about 6bn letters of DNA in their genome. Only a single letter need go wrong to cause a devastating illness. There are about 10,000 known genetic diseases. Although such genetic errors are rare, collectively they are likely to affect tens of millions of people around the world. The more common genetic diseases, such as cystic fibrosis, haemophilia and sickle-cell anaemia, are receiving attention from pharmaceutical firms. The really rare ones, like Lydia's, are not.

ASOs work by interfering with the message sent by DNA. If the genetic error is known, it is possible to synthesise a nucleotide molecule that will bind to the message the gene sends. This turns the faulty gene off. The first ASO drug approved by America's Food and Drug Administration (FDA) was fomivirsen, for cytomegalovirus retinitis, an eye infection, in 1998. Since then the technique has been used in other approved drugs. ASOs can be designed and synthesised swiftly, allowing a treatment to be created in months.

That is exactly what Timothy Yu, at Boston Children's Hospital, did in 2018 for a girl with Batten's disease—a rare and fatal neurodegenerative disorder

caused by the build-up of proteins and lipids in the brain. Within a year of the child's diagnosis, he had developed a therapy tailored to her specific genetic mutation. The treatment appears to be helping a great deal.

Pharma firms are required by the FDA to test new medicines on a group of patients over a number of years. But the FDA seems to be willing to allow these unique treatments to go ahead, because there is no other option and the outcomes without them are grim. In medical trials, the number of patients is denoted by the letter "n". These personalised medicines have therefore become known as "n of 1" drugs.

"We don't have years, we have months," says Mr Seth. In 2020, on the website savelydia.com, it will be possible to track the family's progress creating the new drug and giving it to Lydia. The family says it has "realistic" goals. They don't expect a cure, but believe they can dramatically improve her quality of life.

The number of n of 1 drugs will grow in 2020. At least five other trials are thought to be under way. Mr Seth has an eye on other children beyond his daughter. As part of the work, he has created an open-source platform, called the Lydian Accelerator, which will gather and share data on everything needed to create n of 1 drugs. The family is trying to raise \$2.5m but hopes that the cost of n of 1 treatments will eventually come down to a few hundred thousand dollars.

If that sounds like a lot, it is worth considering that one of the latest gene-therapy cures for a genetic disorder, Novartis's Zolgensma, has a list price of \$2.1m. Over time, as n of 1 drugs become more common and attract the attention of charities and foundations, an odd situation could arise. Completely personal and on-demand therapies could end up costing far less than something created by the industry for a larger number of patients. These drugs could thus prove disruptive to the industry. Necessity is the

mother (and father) of invention. ■



2020年的世界

“单病例”药物亮相

2020年，一位父亲将创造一种新药来尝试挽救女儿的生命

二〇一九年七月，罗恩·塞思（Rohan Seth）在推特上发布了一条动情的消息。消息说，他六个月大的女儿莉迪亚（Lydia）出生时带有随机遗传突变。他被告知她的生活将充满痛苦，永远学不会坐起、爬行、走路或说话。医生说他们什么也做不了。但是塞思说，他计划使用一种叫做反义寡核苷酸（ASO）的技术来为他的女儿创造一种个性化的药物。

每个人的基因组中都有大约60亿个DNA字母。只要有一个字母出错就可能导致毁灭性的疾病。已知的遗传病大约有一万种。尽管这种遗传错误很罕见，但它们加起来很可能会影响全球千万人。诸如囊性纤维化、血友病和镰状细胞性贫血等较常见的遗传病越来越受到制药公司关注。像莉迪亚那种真正罕见的疾病则没有。

ASO通过干扰DNA发送的信息来工作。如果遗传错误是已知的，则可以合成一个核苷酸分子与基因发送的信息结合。这会关闭有问题的基因。1998年，美国食品和药物管理局（FDA）批准了首个ASO药物福米韦生，用于巨细胞病毒性视网膜炎（一种眼部感染）。此后，该技术已用于其他获批的药物中。ASO可以被快速设计和合成，能在几个月内创建治疗方案。

这正是波士顿儿童医院的蒂莫西·余（Timothy Yu）在2018年为一名患有巴滕氏病的女孩所做的。巴滕氏病是一种由大脑中的蛋白质和脂质堆积引起的罕见的致命性神经退行性疾病。在孩子确诊一年之内，他开发了一种疗法，专门针对在她身上发生的特定基因突变。疗效似乎非常好。

FDA通常要求制药公司对一组患者测试新药数年。但它似乎愿意允许这些个别的治疗继续进行，因为别无选择，而不用这些疗法的结果十分糟糕。在医学试验中，患者人数用字母“n”表示。这些个性化药品因此被称为单病例（n of 1）药品。

塞思说：“我们没有几年时间，只有几个月。”2020年，在savelydia.com网站上就可以追踪这个家庭开发新药并让莉迪亚使用的进展。这家人说目标很“现实”。他们不指望治愈，但相信可以大大改善她的生活质量。

单病例药品的数量在2020年将有所增长。据信至少还有五项试验正在进行中。塞思也关注除女儿之外的其他孩子。作为这项尝试的一部分，他创建了一个名为“莉迪亚加速器”（Lydian Accelerator）的开源平台，该平台将收集和共享创建单病例药物的所有数据。这家人正试图筹集250万美元，但希望单病例治疗的费用最终能降至数十万美元。

如果这听起来是很多钱，那么你应该想一想，针对遗传病的最新基因疗法之一、诺华公司的Zolgensma标价为210万美元。随着单病例药物日渐普遍并引起慈善机构和基金会的关注，可能会出现一种奇怪的情况：完全个性化和按需治疗的最终成本可能会远低于医药行业为大量患者创造疗法的成本。那么这些药物可能会由此颠覆行业。需求是发明之母（和之父）。■



The World in 2020

What will horrify your grandchildren

What beliefs and behaviours, commonplace today, will be condemned by future generations?

Kids these days! Lamenting the loose morals and poor choices of the young is a timeless trope. They wear outrageous clothes! They listen to dreadful music! They have no respect for their elders! But inter-generational criticism is a two-way street: every generation also decries the unenlightened beliefs and behaviours of its elders. They owned slaves! They denied women the vote! They criminalised homosexuality! The nature of social change means that some beliefs and behaviours that are common today are sure to be considered unacceptable within a few decades. So what aspects of the world in 2020 will horrify future generations?

The most obvious candidate is **failing to do more to combat climate change**. Future generations will surely ask why, given the abundance of evidence of environmental harm, so little was done about it for so long. Elderly people in the 2050s may find themselves hiding the digital evidence of long-haul air travel in their youth, and insisting that they only ever went on holiday by train. Even going on holiday at all may come to be seen as irresponsible and decadent at best, and immoral at worst. The ultimate form of ecotourism is to stay at home.

Another area where social attitudes are shifting rapidly, at least in the West, is **eating meat**. As meat substitutes such as the Impossible burger, which is made from plant-based protein but is indistinguishable from beef, improve and get cheaper, the case for giving up meat—in particular beef, which has the largest environmental footprint—will get stronger. People who do not object to meat on ethical or animal-welfare grounds may opt to give it up

for environmental reasons, particularly if substitutes allow them to have their steak and eat it. Consumption continues to rise in the developing world, but serving real meat at an Islington or Williamsburg dinner party may come to be considered beyond the pale.

But it's not all environmental. Widespread **opposition to immigration** may be seen as a moral failing in future. Workers become far more productive when they move from a poor country to a rich one; any loosening of restrictions on migration would help migrants and the countries they move to alike. People in rich countries claim to want to help the poor, but worry about the impact of migrants on jobs, security and social cohesion, prompting governments to limit migrant flows. Future generations may take a dim view of this.

Contemporary **attitudes towards gender identity and sexuality**, which are evolving rapidly, will be considered hopelessly unenlightened at best, and deeply prejudiced at worst, as new family models and living arrangements emerge. Old assumptions (such as the notion that a child must have two biological parents) will increasingly be questioned as technology further separates sex from reproduction.

Our grandchildren will also decry the **widespread overuse of antibiotics**, which fosters the emergence of drug-resistant superbugs. As existing antibiotics become ineffective, even minor surgery could be life-threatening, as it was in the pre-antibiotic era. Future generations will ask why so little effort was made to develop new antibiotics, given that it takes at least a decade to bring a new drug to market.

Pretty much the only certainty about the future is that some aspects of life today will be condemned by generations to come. We should remember that before congratulating ourselves on being more enlightened than our ancestors. ■



2020年的世界

让你的孙辈震惊的事

如今人们习以为常的观点和行为中，有哪些会遭到子孙后代的谴责？

现在的孩子啊！哀叹年轻人道德败坏、选择不当是一个永恒的主题。他们穿的都是些什么奇装异服啊！听的什么破音乐啊！一点儿也不尊敬长辈！但代际间的批评是一条双向道，每一代人也都会指责前人观念蒙昧、行为落伍。他们蓄奴！不给女性投票权！还将同性恋定罪！社会变迁的本质意味着，今天普遍存在的某些观念和行为在几十年后肯定会被认为不可接受。那么，2020年世界的哪些方面会让我们的子孙后代惊愕不已呢？

最明显的选项是未能采取更多措施抗击气候变化。后人肯定会问，既然环境危害的证据不胜枚举，为何这么长时间以来我们对此几乎无所作为。到本世纪50年代迈入老年的人可能会隐藏自己年轻时长途航空旅行的数字证据，并坚称从来都是乘火车去度假。就连度假本身，往轻里说也是不负责任的贪图享乐，说严重了那就是不道德。“生态游”的终极形式就是在家待着。

社会态度正发生迅速转变的另一个方面是吃肉，至少在西方是如此。随着肉类替代品如“不可思议汉堡”（Impossible burger，由植物蛋白制成，但与牛肉难以区分）品质改良且价格下降，放弃吃肉（尤其是环境足迹最大的牛肉）的理由将变得更加充分。有的人不会基于道德或动物福利的原因反对吃肉，却可能出于对环境的考虑而放弃它，特别是如果替代品能让牛排与环保兼得的话。发展中国家的肉类消费持续上升，但在伊斯灵顿或威廉斯堡的晚宴上端上真肉可能会变成出格的举动。

可不只有环境问题。广泛存在的反移民在未来可能被视为道德沦丧。劳动者从穷国迁移到富国后生产效率会大幅提升，任何对移民限制的放松都将有益于移民和东道国。富裕国家的人们声称想要帮助穷人，但又担心移民会影响就业、安全和社会凝聚力，这促使政府限制移民流动。后世的人们可能对此观感不佳。

随着新的家庭模式和生活安排方式的出现，当代正经历迅速演变的对于性别认同和性的态度轻则将被视为愚昧不堪，重则会被认为存在严重偏见。由于科技进一步将性与生殖分割开来，旧观念（如孩子必须要有两个亲生父母）将越来越受到质疑。

我们的孙辈还将谴责普遍存在的抗生素滥用。抗生素滥用助长了具抗药性的超级细菌的出现。随着现有抗生素失去效力，即便是小手术也可能危及生命，就像在抗生素出现前的时代那样。鉴于一种新药上市至少需要十年的时间，后世会问我们这代人为什么在开发新的抗生素方面做得如此之少。

关于未来，唯一可以确定的差不多就是当今生活的某些方面会受到后代的指责。在因为自己比祖先更开明而沾沾自喜之前，我们要谨记这一点。■



The World in 2020

House prices in graphic detail

What are the chances of a bust in 2020?

A decade ago the global financial crisis brought the world to the brink of economic implosion. The cause of that crash? The collapse of America's \$1.5trn subprime mortgage-backed security market. That began a fire sale of assets that threatened to engulf the world economy.

House prices have now rebounded close to or beyond their previous highs in many of the world's biggest residential markets. According to Standard & Poor's, American homes are now 15% pricier than they were at their peak in 2007, before adjusting for inflation. In Britain, although housing has been hit by Brexit uncertainty for the past three years, prices are up by 21% from 2008. Meanwhile, in Australia, Canada and New Zealand housing barely faltered in the wake of 2009 and then ran amok: prices are up by 40%, on average, compared with 2009.

The surge is not confined to the Anglosphere. At various times over the past decade, China has sought to rein in the animal spirits of its housing market. To little avail: prices have nearly doubled in that time.

Policymakers in a number of European countries, particularly Germany, Sweden and France, have become worried about gathering excesses in housing markets.

During this latest boom, the prices of homes in global gateway cities have risen far above prices in their hinterlands. The most talented people, best jobs and choicest restaurants are all found in urban centres. Population and jobs have grown in tandem, while house-building has not kept pace. As a result the prices of homes in London have risen by 55%, compared with 20% for the rest of the country. In Germany, prices in hipster Berlin have

doubled, compared with a 42% lift elsewhere.

To what extent do these values reflect fundamentals or speculative froth? As a gauge of value The Economist compares the path of house-price inflation with two metrics: housing rents and household incomes. If prices are above their long-run relationship with rents (similar to the price-earnings ratio of shares) or income (prices should reflect the earnings that service mortgage debt), that suggests they are overvalued.

On a national basis our valuation metrics point to some cause for concern. In Canada, Australia and New Zealand house prices are about 40% overvalued, compared with their long-run relationship with income. In Britain prices are 40% overvalued compared with rents, but look better-valued against income, which suggests that either rents need to rise or prices need to moderate. In America, however, houses appear fairly valued.

A broader approach would be to look at other macroeconomic variables that affect the housing market. The Economist has built a house-price forecast model which uses valuation metrics, as well as an additional battery of indicators such as GDP, unemployment and the availability of credit, to forecast house-price inflation 18 months ahead. When back-tested against the past, our model performs well: it spotted a looming fall in American house prices in 2006.

What does our model say about 2020? Given the buoyant, but softening, data coming out from much of the rich world, our central projection is for house-price inflation to slow to 2.5% a year across the dozen countries we track. Yet our model suggests just a one-in-four chance of widespread price declines. Some countries do appear to be on shaky foundations. In Australia, where prices have dropped by 8% over the past year, our model suggests they have further to fall.

| *Talk of the town*

Cities are the greatest cause for concern. Among 24 cities that we track, a dozen have price-to-income valuations that are at least 50% above their long-run average. That suggests that prices need to fall. If they do, that may set off a ripple effect. The IMF has observed that housing markets in global cities are increasingly synchronised, and worries that a concerted price crash in Beijing, Berlin, Lisbon and London could trigger another economic crisis. ■



2020年的世界

房价图解

2020年泡沫破灭的机会有多大？

十年前的一场全球金融危机把全球经济带到了崩溃的边缘。崩盘的原因？美国价值1.5万亿美元的次级抵押贷款支撑的证券市场暴跌。这引发了一场几乎吞没世界经济的资产大甩卖。

在全球最大的几个住宅市场，房价现在已经反弹至接近或超过危机前的高点。根据标准普尔的数据，在不考虑通货膨胀因素的情况下，美国房屋价格现在比2007年的最高水平高出15%。在英国，尽管过去三年来住房受到英国脱欧不确定性的打击，价格仍比2008年上涨了21%。与此同时，在澳大利亚、加拿大和新西兰，住房在2009年初几乎没有下跌，后来又疯狂上涨：如今与2009年相比平均增长了40%。

房价上涨不仅限于英语国家。在过去的十年中，中国多次试图遏制住房市场的狂热情绪，但无济于事：在这十年里房价几乎翻了一番。许多欧洲国家（尤其是德国、瑞典和法国）的决策者已开始担心太多的资金涌入住房市场。

在最近这轮上涨中，全球门户城市的房屋价格已经远远高于内陆地区。最有才华的人、最好的工作和最好的餐馆都集中在城市中心。人口和工作同时增长，而房屋建设却没有跟上步伐。结果，伦敦的房屋价格上涨了55%，而该国其他地区的房价上涨了20%。在德国，时髦的柏林的房价上涨了一倍，而其他地区的价格上涨了42%。

这些价值在多大程度上反映了基本面或投机泡沫呢？作为一种衡量价值的方式，《经济学人》将房价通胀的路径与两个指标做了比较：房屋租金和家庭收入。如果价格高于其与租金的长期关系（类似于股票的市盈率）或与收入的长期关系（价格应反映支撑抵押贷款债务的收入），则表明它们被高估了。

在国家层面，我们的估值指标显示了一些令人担忧的东西。在加拿大、澳大利亚和新西兰，比起与收入的长期关系，房价被高估了约40%。在英国，与租金相比，价格高估了40%，相对收入而言情况好些，这表明要么租金应当上升，要么价格需要缓和。但是，美国的房屋看起来价格合理。

更一般性的方法是研究影响住房市场的其他宏观经济变量。《经济学人》建立了一个房价预测模型，该模型使用一批估值指标以及一系列额外的指标（例如GDP、失业率和信贷可得性）来预测未来18个月的房价通胀。当对过去进行回溯测试时，我们的模型表现良好：它在2006年发现美国房价即将下跌。

我们的模型对2020年有何看法？鉴于许多富裕国家发布的数据强劲但在放缓，我们的主要预测是，在我们追踪的十几个国家中，房价通胀率将放缓至每年2.5%。然而，我们的模型表明，价格普遍下跌的可能性只有四分之一。有些国家似乎确实根基不稳。澳大利亚的房价在过去一年中下跌了8%，我们的模型显示价格还会进一步下跌。

| 街谈巷议

城市是令人担忧的最大原因。在我们追踪的24个城市中，有12个城市的房价收入比至少比其长期平均水平高出了50%。这表明价格需要下跌。如果这真的发生，可能会引起连锁反应。国际货币基金组织注意到，全球城市的住房市场正变得日益同步，并担心北京、柏林、里斯本和伦敦的一致暴跌可能引发新一轮经济危机。■



The World in 2020

A supercharger for science

Artificial intelligence could accelerate research in a range of fields, says Demis Hassabis, co-founder and CEO, DeepMind

The scientific method was perhaps the single most important development in modern history. It established a way to validate truth at a time when misinformation was the norm, allowing natural philosophers to navigate the unknown. From predicting the motions of the planets to discovering the principles of electricity, scientists have honed the ability to distil facts about the universe by generating theories, then using experimentation to qualify those theories. Looking at how far civilisation has come since the Enlightenment, one can't help being awestruck by all that humanity has achieved using this approach. I believe artificial intelligence (AI) could usher in a new renaissance of discovery, acting as a multiplier for human ingenuity, opening up entirely new areas of inquiry and spurring humanity to realise its full potential.

The promise of AI is that it could serve as an extension of our minds and become a meta-solution. In the same way that the telescope revealed the planetary dynamics that inspired new physics, insights from AI could help scientists solve some of the complex challenges facing society today—from superbugs to climate change to inequality. My hope is to build smarter tools that expand humans' capacity to identify the root causes and potential solutions to core scientific problems.

Traditional AI programs operate according to hard-coded rules, which restrict them to working within the confines of what is already known. But a new wave of AI systems, inspired by neuroscience, are capable of learning on their own from first principles. They can uncover patterns and structures that are difficult for humans to deduce unaided, opening up new

and innovative approaches. For example, our AlphaGo system mastered the ancient game of Go just by competing against itself and learning from its own mistakes, resulting in original, aesthetically beautiful moves that overturned thousands of years of received wisdom. Now, players of all levels study its strategies to improve their own game.

Self-learning AI systems are already accelerating advances in the real world. By rapidly exploring possibilities, AI can help researchers find optimal solutions in a fraction of the time it takes to conduct experiments today. For instance, we and other scientists are using AI to tackle a major unsolved question in biology: how proteins form 3d structures and how this affects their functionality. Proteins are essential for all life, and understanding how they fold into certain shapes is critical to finding and designing treatments for a wide range of diseases. By helping scientists predict the structure of any protein, AI could potentially let researchers gain a deeper understanding of diseases like Alzheimer's, Parkinson's and more.

My faith in AI's transformative potential also stems from early indications that it might help mitigate some effects of deeply entrenched habits that have shaped society and the environment over decades. For example, DeepMind's work on automated AI systems has already reduced the amount of energy necessary to run data centres by up to 30% by optimising the use of the cooling systems. And in the future, I can imagine even more radical solutions enabled by AI to help fight climate change, like a breakthrough in materials science resulting in a new catalyst capable of capturing carbon dioxide from the atmosphere far more cheaply and efficiently than methods available today.

I have devoted my life to building AI because I believe it is going to be the most important technology ever invented. By deepening our capacity to ask how and why, AI will advance the frontiers of knowledge and unlock whole new avenues of scientific discovery, improving the lives of billions of

people.

| *Powered by curiosity*

The marvel of the human brain is proof that general intelligence is possible; creating AI is as much a journey of discovery into the inner workings of our own minds as it is an invention. The evolution of a larger cortex equipped humans with greater intelligence, enabling us to build more complex and co-operative social structures, which eventually gave rise to all of modern civilisation. Similarly, AI can help us build radically new and improved ways of life. The very curiosity that led to the scientific method may well be the key—not only to solving society's greatest challenges today, but to understanding ourselves and making sense of the universe around us. ■



2020年的世界

科学增压器

DeepMind的联合创始人兼首席执行官德米斯·哈萨比斯表示，人工智能可以促进诸多领域的研究

科学方法也许是近代史上最为重要的一项发展。在错误信息是常态的时代，它建立了一种验证真相的方法，使自然哲学家能够探索未知。从预测行星运动到发现电的原理，科学家们磨练了提炼关于宇宙的事实的能力：产生理论，再通过实验来证明它。纵观启蒙运动以来文明的发展，你很难不为人类使用这种方法所取得的成就惊叹。我相信人工智能（AI）可能会迎来新的发现复兴，成为人类创造力的倍增器，开辟全新的研究领域，激发人类发挥其全部潜能。

人工智能的希望在于它可以作为我们思维的延伸，并成为元解决方案。就像望远镜揭示的行星动力学启发了新物理学一样，人工智能带来的见解可以帮助科学家解决当今社会面临的一些复杂挑战，从超级细菌到气候变化再到不平等。我希望创造更智能的工具，拓展人类找到核心科学问题的根本原因和潜在解决方案的能力。

传统的人工智能程序根据硬编码的规则运行，这就导致它们只能在已知范围内工作。但是，受神经科学启发的新一代人工智能系统能够从第一原理出发自行学习。它们可以发现人类难以独立推理的模式和结构，从而开辟创新性的新方法。例如，我们的AlphaGo系统仅仅通过与自己比赛并从自身错误中吸取教训来掌握古老的围棋游戏，得出优美的原创着法，推翻了沿袭数千年的经验。现在，各个层次的玩家都在研究它的策略来提高自己的棋艺。

自我学习的人工智能系统已经在现实世界中推动发展。通过迅速探索各种可能性，人工智能可以帮助研究人员找到最佳解决方案，所花时间却比做实验少得多。例如，我们和其他科学家正在使用人工智能解决生物学中一个尚未解决的重大问题：蛋白质如何形成三维结构，以及这如何影响其功

能。蛋白质对于所有生物而言都是必不可少的，了解蛋白质如何折叠成某些形状对于寻找和设计多种疾病的治疗方法至关重要。通过帮助科学家预测任何蛋白质的结构，人工智能有可能使研究人员对阿尔茨海默症、帕金森氏症等疾病有更深入的了解。

我对人工智能变革潜力的信念还源自于一些早期迹象，显示它可能有助于减轻那些数十年来塑造了社会和环境的根深蒂固的习惯的部分影响。例如，DeepMind在自动化人工智能系统上的研究已经优化了对冷却系统的使用，从而将运行数据中心的耗能减少了最多30%。而在未来，我可以想象到人工智能会提供更彻底的解决方案来帮助应对气候变化，比如在材料科学方面的突破创造出一种新型催化剂，能够以比现有方法廉价且高效得多的方式从大气中捕获二氧化碳。

我一生致力于构建人工智能，因为我相信它将成为有史以来最重要的技术。通过深化我们问“如何”和“为何”的能力，人工智能将推进知识前沿，开辟科学发现的全新途径，从而改善数十亿人的生活。

| 好奇心驱动

人脑的奇迹证明了“通用智能”是可能的。创造人工智能既是一项发明，也是一场深入我们自身思维运作的发现之旅。进化产生的更大的脑皮层为人类提供了更多智力，让我们能够建立更复杂和合作性的社会结构，最终带来了所有现代文明。同样，人工智能可以帮助我们建立全新的更好的生活方式。推动产生了科学方法的好奇心很可能是关键——不仅是解决当今社会最大挑战的关键，也是了解自己并理解身处的宇宙的关键。 ■



The World in 2020

Building a metaverse

A figment of science-fiction is (very slowly) coming to life

In “snow crash”, a 1992 science-fiction novel, the author, Neal Stephenson, conjures up a “metaverse”, where characters immerse themselves in a permanent, interactive online virtual world, one controlled by a single corporation. In “Ready Player One”, a 2011 novel later turned into a Steven Spielberg film, Ernest Cline imagines something similar, a virtual “Oasis” where people can live, work and play, an escape from dystopian deprivation.

In 2020 these ideas, though still far from reality, will begin to gain something more than virtual currency. People will increasingly hear the term “metaverse” as firms invest in bringing precursors of it to life. A wide range of companies are investing billions of dollars in the physical and digital infrastructure necessary to bring persistent virtual worlds into being—from 5g to virtual-reality spaces.

Magic Leap, a startup in Florida, makes augmented-reality glasses that could one day allow people to “see” a digital virtual world that neatly overlays the physical world in which they are wandering about (and it is conceptualising entertainment for what it calls the “MagicVerse” to come, with the aid of Mr Stephenson). Improbable, a British gaming-software startup, is trying to crack the problem of allowing enormous numbers of people to interact with each other in the same space at the same time: “concurrency”, in a word. Then there is Facebook, which in 2020 will introduce Horizon, a “social virtual-reality” space. Mark Zuckerberg is a believer in the importance of bringing virtual reality to Facebook’s colossal social graph, and he has also shown, with the purchase of Oculus, a VR gaming company, in 2014 for \$2bn, that he is willing to devote billions to

the idea.

Of all the current contenders, Epic Games probably has the closest thing to a metaverse in “Fortnite”, a multi-player battle royale game played by some 250m people around the world. Epic’s Unreal gaming engine powers “Fortnite” and other massive multi-player games. As currently constructed, “Fortnite” remains a long way from a metaverse: it accommodates only 100 people interacting (often killing each other) in the same space, and each experience lasts the duration of one game round. But millions can congregate in the same virtual space at the same time, even if they cannot “see” and interact with each other. In February 2019, 10.7m “Fortnite” players attended a virtual concert hosted by Marshmello, a DJ: it was more than 100,000 instances of 100 people interacting with each other, not one giant virtual mosh pit, but it was a cultural milestone.

Unsurprisingly, entertainment companies have taken note and allowed their intellectual property to be employed within “Fortnite”, even though it means that rivals like Marvel and dc exist in the same space, like Coke and Pepsi. That kind of cultural power suggests the awesome potential of “Fortnite” to become something much larger than it is, like a metaverse, says Matthew Ball, a digital-media analyst.

Tim Sweeney, the majority owner of Epic, often talks of what it will take to build a metaverse, and especially of what form it should take—an open platform, not controlled by one company like Facebook. He and his competitors will not build the metaverse in 2020, but the virtual experiences they are creating to get there will increasingly be felt in the real world. ■



2020年的世界

建造元界

科幻中的一类虚构正在（非常缓慢地）变为现实

在1992年的科幻小说《雪崩》（snow crash）中，作者尼尔·斯蒂芬森（Neal Stephenson）构想出一种“元界”，人物将自己沉浸在一个永久性的交互式在线虚拟世界中，而这个虚拟世界全由一家公司控制。在后来被史蒂文·斯皮尔伯格拍成电影的2011年小说《头号玩家》（Ready Player One）中，欧内斯特·克莱恩（Ernest Cline）也想到了类似的东西——一个虚拟的“绿洲”，人们可以在其中生活、工作和娱乐，这是一个摆脱废托邦式匮乏的世外桃源。

到了2020年，这些想法虽然还不切实际，但它们吸引的东西不只是虚拟货币了。人们将越来越多地听到“元界”一词，因为公司纷纷投资于让它的先驱们变成现实。从5G到虚拟现实空间，各种各样的公司正在物理和数字基础设施上投下数十亿美元，以实现持久的虚拟世界。

佛罗里达州的创业公司Magic Leap生产增强现实眼镜，有朝一日可以使人们“看到”一个巧妙地叠加在他们身处的物理世界之上的数字虚拟世界，并且它正在斯蒂芬森的帮助下构建所谓“魔界”（MagicVerse）的娱乐概念。英国游戏软件创业公司Improbable试图解决让巨量人员同时在同一空间内交互的问题：简而言之就是“并发”。然后还有Facebook，它将在2020年引入“社交虚拟现实”空间Horizon。马克·扎克伯格对将虚拟现实带入Facebook的庞大社交图谱的重要性深信不疑。他在2014年以20亿美元的价格收购了虚拟现实游戏公司Oculus，表明他愿意为这个想法一掷千金。

在当前的所有竞争者中，Epic Games的《堡垒之夜》（Fortnite）也许是最接近元界的东西。全球约2.5亿人在玩这款多玩家大逃杀游戏。Epic的虚幻游戏引擎驱动了《堡垒之夜》和其他大型多玩家游戏。就目前的构造而言，《堡垒之夜》距离元界还很远：它只能容纳100个人在同一空间中互动（经常是互相砍杀），并且每次体验都只持续一轮游戏的时间。但是，

数百万人可以同时聚集在同一虚拟空间里，哪怕他们无法相互“看到”并互动。2019年2月，1070万《堡垒之夜》玩家参加了由DJ Marshmello主持的虚拟音乐会，也就是说有超过10万个百人互动实例。这不是一个巨大的虚拟冲撞区，却是一个文化里程碑。

毫不意外，娱乐公司注意到了它，并允许自己的知识产权被用在《堡垒之夜》中，哪怕这意味着像漫威和DC宇宙这样的竞争对手也可以处在同一空间中，就像可口可乐和百事可乐那样。数字媒体分析师马修·鲍尔（Matthew Ball）表示，这种文化力量暗示着《堡垒之夜》有出色的潜力来变得比现在大得多——就像元界。

Epic的大股东蒂姆·斯威尼（Tim Sweeney）经常谈论要怎样建立一个元界，特别是它应该采取的形式——一个开放平台，不被Facebook这样的公司一家独揽。他和他的竞争对手无法在2020年建成这个元界，但他们为实现这一目标而创造的虚拟体验将越来越多地在现实世界中被感受到。■



The World in 2020

Glimpses of the world ahead

Most science fiction is not predictive. Yet it can still be a guide to the future, says Tom Standage

IN “THE HIGH GROUND”, an episode of “Star Trek: The Next Generation” first aired in 1990, a crew member of the starship Enterprise is taken hostage by separatists on the planet Rutia IV. As her colleagues discuss how best to respond, one of them draws an analogy with a conflict on Earth several centuries earlier—the Troubles in Northern Ireland—noting that they were ultimately resolved by “the Irish unification of 2024”.

As the 2020s dawn, the upheaval of Brexit means the prospect of Irish reunification no longer seems like science fiction. A poll in September 2019 found that a slight majority of voters in Northern Ireland were in favour of it. “We are still on track for the Star Trek unification timeline,” one fan tweet-ed. It is a striking example of a specific prediction being made in a work of science fiction. But despite perceptions to the contrary, such forecasts are the exception, not the rule. Just because sci-fi is often set in the future does not mean it is intended to be predictive. More often it is a commentary on the present.

| *I, Asimov*

In 2020 (which happens to be the centenary of the birth of Isaac Asimov, a sci-fi legend), can the genre tell us about the future nonetheless? Set aside the aliens and the spaceships, and much contemporary science fiction is concerned with themes such as the impact of artificial intelligence, the danger of ecological collapse, the misuse of corporate power and the legacy of imperialism. Since the sexual revolution of the 1960s, sci-fi writers have explored changing attitudes to gender politics—imagining, for example, future societies in which gender is irrelevant or people can change sex at

will. Another vibrant subfield today is Chinese science fiction, which offers an outlet for subtle dissent, and gives Western readers a sense of the country's hopes and fears. In all these cases, sci-fi authors are using the freedom granted by the genre to consider present-day concerns and extrapolate them to mind-stretching conclusions.

All of which does have some predictive value. It means science fiction can play a useful role as a forward-scanning radar for technological, social and political trends—but in the near term, not the distant future in which it is often set. This is the first of three ways in which science fiction can provide a guide to the future.

The second is that it can help broaden the mind when assessing future scenarios for planning purposes, both in government and in business. France's Defence Innovation Agency is setting up a "red team" of sci-fi writers to propose scenarios that might not have occurred to military planners. Arup, an engineering firm, commissioned Tim Maughan, a science-fiction writer, to create four scenarios of what everyday life might look like as a result of climate change. Neal Stephenson, the bestselling author of "Snow Crash" and "Cryptonomicon", has served as an adviser to Blue Origin, a rocket startup, and Magic Leap, a firm developing augmented-reality glasses. Tech giants including Google, Microsoft and Apple have also employed sci-fi writers as consultants, using a process sometimes called "design fiction".

But bosses do not need to hire sci-fi authors to benefit from their expansive imaginations. Simply reading their books can help. Writing in *Harvard Business Review* in 2017, Eliot Peper, a novelist, argued that science fiction is valuable "because it reframes our perspective on the world". Business leaders should read sci-fi, he suggested, because exploring fictional futures "frees our thinking from false constraints" and "challenges us to wonder whether we're even asking the right questions".

And then there is a third, more direct, way in which sci-fi can provide glimpses of the future: by inspiring people in the tech industry who want to make it come true. The creation of the mobile phone at Motorola was motivated by the handheld wireless communicators from “Star Trek”, and Amazon’s Alexa voice-assistant by the talking computer on the Enterprise. The Kindle was inspired by an electronic-book device in Mr Stephenson’s novel “The Diamond Age”, and an entire industry is trying to bring to life the virtual world he depicted in “Snow Crash” (see 2020 visions section). SpaceX, the rocket firm founded by Elon Musk, lands its rockets on drone ships whose names are borrowed from Iain M. Banks’s “Culture” novels; another of Mr Musk’s startups, Neuralink, is building brain-computer interfaces inspired by the “neural lace” implants found in the same books. The tech titans of tomorrow are surely reading sci-fi today. ■



2020年的世界

窥见前方世界

科幻作品大多不具有预测性，但仍可以作为未来的一种指引，汤姆·斯坦迪奇（Tom Standage）指出

在《星际迷航：下一代》于1990年播出的《制高点》（The High Ground）这一集中，星际飞船“进取号”（Enterprise）的一名机组人员被Rutia IV行星上的分离主义者绑架了。当她的同事们讨论该怎么办时，其中一人用几个世纪前地球上发生的一场冲突——北爱问题——做类比，并指出这场冲突最终因“2024年爱尔兰统一”而解决。

随着2020年代的到来，英国脱欧的动荡意味着爱尔兰统一的前景不再那么像科幻情节了。2019年9月一项民调发现，北爱尔兰选民中有微弱多数赞成统一。一位电视剧粉丝在推特上写道：“我们仍走在《星际迷航》的统一时间表上。”这是在科幻作品中做出特定预测的一个惊人的例子。然而，和普遍认知相反，这种预测是例外而不是常规。仅仅因为科幻的场景常常被设定在未来并不意味着它有意做出预测。更多时候它是对现状的一种评论。

| 我，阿西莫夫

即便如此，在2020年（恰巧是科幻界传奇人物艾萨克·阿西莫夫[Isaac Asimov]诞辰一百周年），这种创作类型是否可以告诉我们一些有关未来的事呢？撇开外星人和宇宙飞船，许多当代科幻作品都涉及人工智能的影响、生态破坏的危险、滥用公司权力和帝国主义的遗产等主题。自1960年代的性革命以来，科幻作家探索了对性别政治的态度转变，比如想象在未来的社会里性别变得无关紧要，或者人们可以随心所欲地改变性别。今天另一个充满活力的分支是中国的科幻作品，它为人们提供了一种微妙地表达异见的出口，并使西方读者感受到中国的希望和恐惧。在所有这些作品中，科幻作者都利用该类型所赋予的自由来考察眼下的关切，并推导出脑洞大开的结论。

所有这些确实具有一定的预测价值。这意味着科幻可以充当技术、社会和政治趋势的前瞻性雷达，而发挥有益的作用——但仅仅是短期趋势，而不是常见设定中的遥远未来。这是科幻可以提供有关未来的指引的三种方式中的第一种。

第二种是，当政府和企业为做规划而评估前景时，科幻可以帮助拓宽思路。法国的国防创新局（DIA）正在组建一个科幻作家的“红色团队”，以提出军事规划者可能想象不到的未来情境。工程公司奥雅纳（Arup）委托科幻小说家蒂姆·莫恩（Tim Maughan）构想出四种情境，说明气候变化可能导致人们的日常生活发生怎样的转变。畅销书《雪崩》（Snow Crash）和《密码宝典》（Cryptonomicon）的作者尼尔·斯蒂芬森（Neal Stephenson）曾担任火箭创业公司蓝色起源（Blue Origin）和研发增强现实眼镜的Magic Leap的顾问。谷歌、微软和苹果等科技巨头也聘请了科幻作家担任顾问，相关过程有时被称为“设计虚构”。

但是，老板们不必非要把科幻作家纳入麾下才能从他们广阔的想象中受益。读他们的作品就有帮助。小说家艾略特·佩珀（Eliot Peper）2017年在《哈佛商业评论》中写道，科幻很有价值，“因为它重新构筑了我们对世界的视角”。他建议商业领袖阅读科幻作品，因为探索虚构的未来“可以让我们的思维摆脱不应有的束缚”，并且“让我们反思自己是否根本就没有问对问题”。

此外还有第三种更直接的方式来用科幻窥见未来：启发科技业人士将它们变为现实。《星际迷航》中出现的手持无线通信器推动摩托罗拉发明了手机，“进取号”上那台会说话的计算机启发亚马逊研发出Alexa语音助手。Kindle的灵感来自斯蒂芬森的小说《钻石时代》（The Diamond Age）中的电子书设备，而一整个行业正在努力将他在《雪崩》中描绘的虚拟世界变为现实。伊隆·马斯克创立的火箭公司SpaceX用来搭载火箭的无人驾驶船的名字取自伊恩·班克斯（Iain M. Banks）的《文化》（Culture）系列小说。马斯克的另一家创业公司Neuralink正根据这套书中的“神经花边”植入物开发脑机接口。明天的科技巨人今天肯定在读科幻。 ■