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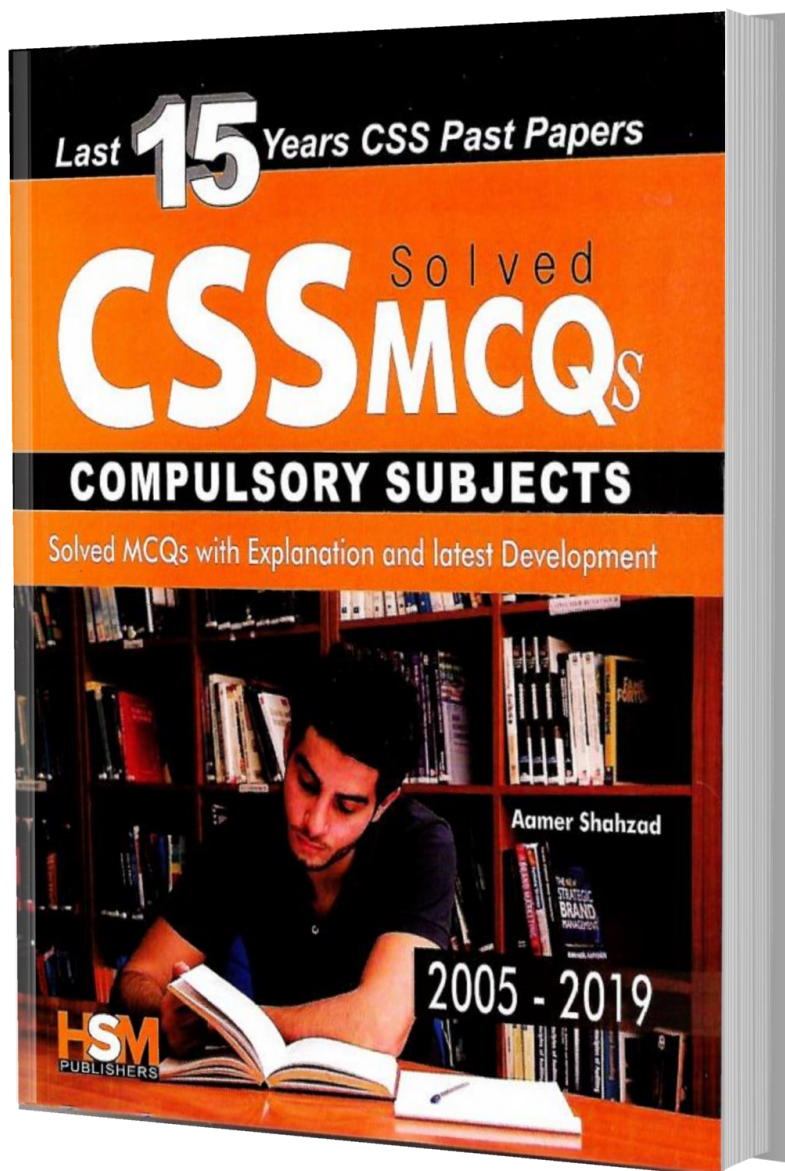
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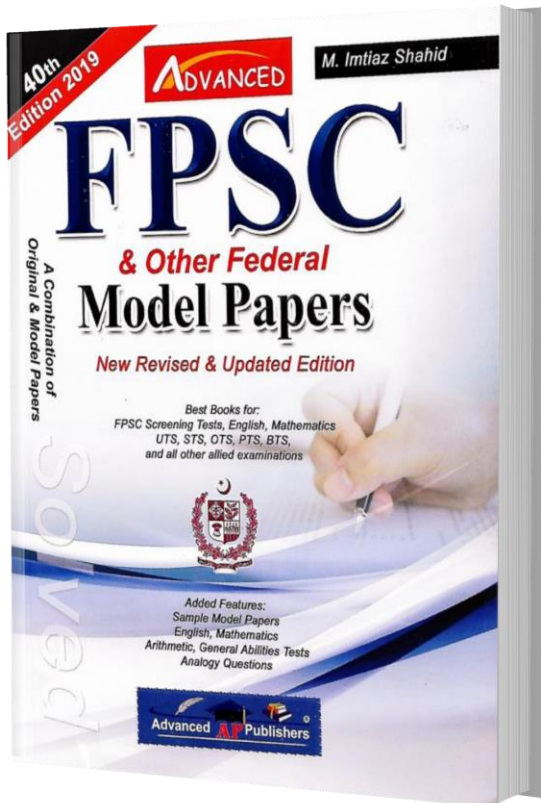
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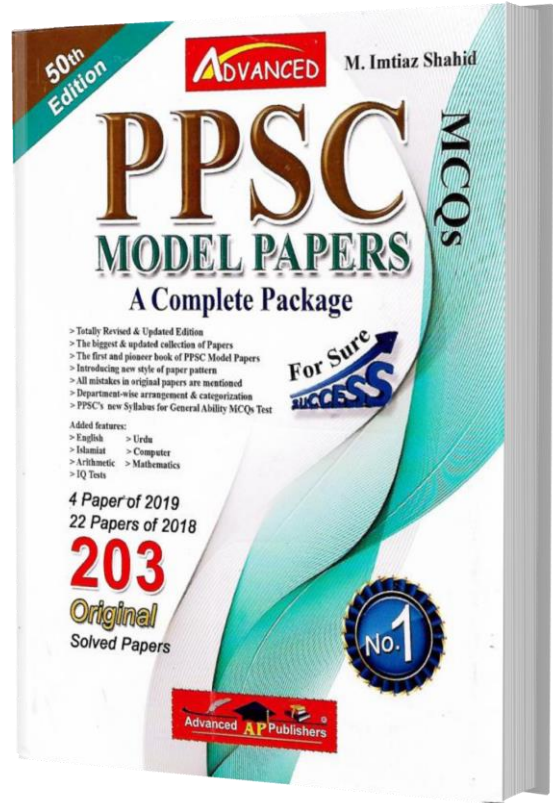


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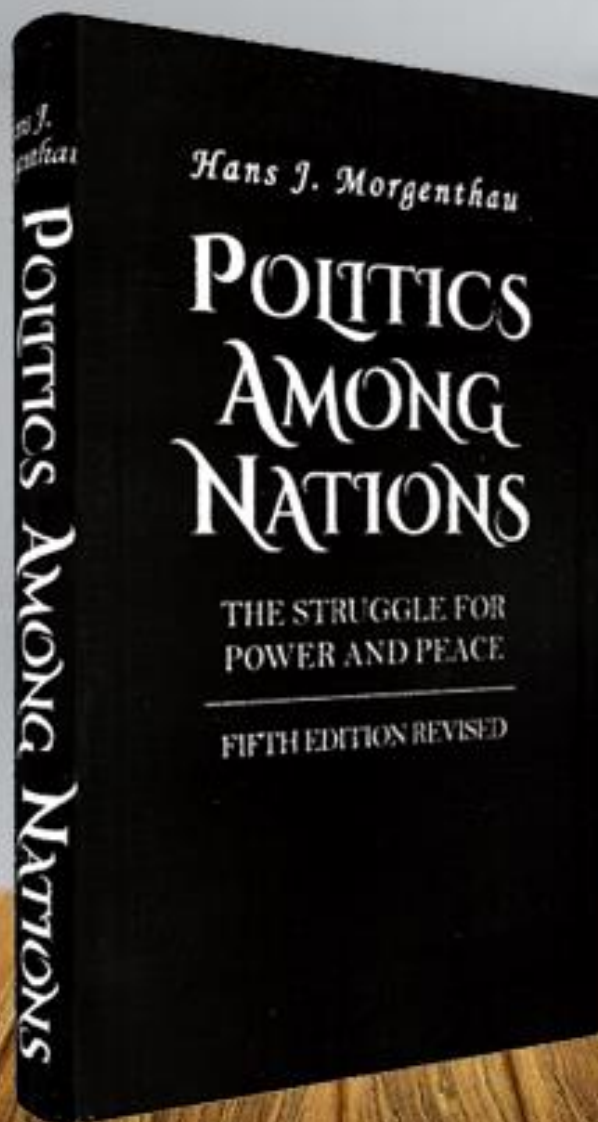
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AA-
S&P Rating in 2018

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Market cap in 2018

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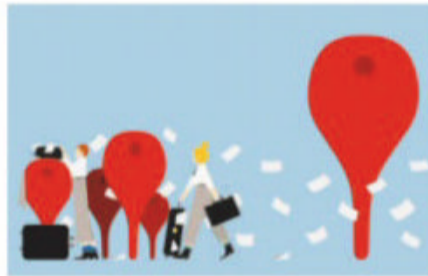
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After 20 years in power and weeks of mass protests, Abdelaziz Bouteflika, **Algeria's** ailing president, resigned. The announcement sparked celebrations in the capital, Algiers. Some fear that the old guard will try to hang on to power. Abdelkader Bensalah, the Speaker of the Senate (and a Bouteflika loyalist), is next in line as president, according to the constitution. He has 90 days to organise new elections.

The Iranian government ordered the evacuation of more than 70 villages in the province of Khuzestan because of flood-

ing. Dozens of people have been killed in the past two weeks, during **Iran's** worst rains in years. Iranian officials blamed American sanctions for impeding their aid efforts. American officials said Iran was mismanaging the crisis.

Thousands of Palestinians marked the first anniversary of an uprising along the **Israel-Gaza border**. Scores of activists approached the perimeter fence, throwing stones and explosives at the Israeli side. Four Palestinians were killed by Israeli soldiers. A broader ceasefire deal between Israel and Hamas, which rules Gaza, appeared to be holding.

The number of cholera cases in **Mozambique** rose sharply in areas affected by Cyclone Idai. Over 1,400 people have been infected, up from the 249 cases reported recently. Many of the affected areas still cannot be reached by road, complicating a mass vaccination campaign.

A return to the dark ages

Harsh new penalties came into force under **Brunei's** Islamic criminal code. Anal sex and sex outside marriage (including gay sex) can earn death by stoning. Thieves risk the amputation of a hand or foot.

Australia approved a new law imposing severe penalties on social-media firms that fail to remove footage of crimes such as murder and rape. **Singapore** proposed a new law that would allow similarly harsh punishments for those disseminating fake news.

Activists in **Thailand** questioned the opaque conduct of the Election Commission, which has not yet announced the results of last month's election. In response, the head of the military junta, which is supposedly soon to give way to civilian government, denounced the "incorrect thinking" on social media.

A bill was introduced to **Hong Kong's** legislature that would allow the extradition of criminal suspects to mainland China. Thousands of people marched against it, saying it could be used as a pretext to hand over people who are wanted for political reasons.

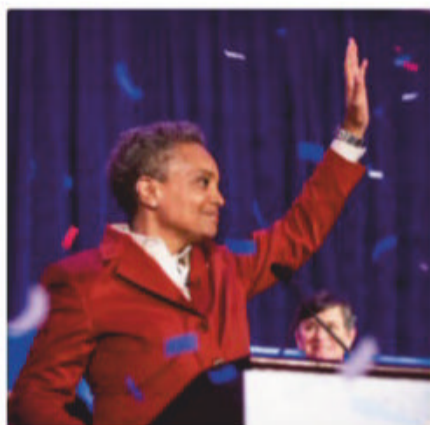
China declared that all types of fentanyl would be treated as controlled drugs. America had appealed to China to adopt tougher controls.

Mulling Mueller

America's attorney-general, William Barr, promised to provide a redacted version of the **Mueller report** to Congress by the middle of April. That was not enough for the Democrats running the House Judiciary Committee, who authorised (though did not issue) a subpoena to attain Mr Mueller's full, unredacted report into Russian interference in American politics. ▶▶

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► Lori Lightfoot won a run-off election to become **Chicago's** mayor, and will be the first black woman and gay person to hold the office. Ms Lightfoot trounced Toni Preckwinkle, a mainstay of the city's establishment. Her victory could herald a change in Chicago's machine politics.

Making the poor even poorer

Donald Trump suspended \$500m in aid to three **Central American countries**: El Salvador, Guatemala and Honduras. He complained that they were doing "absolutely nothing" to

stop migrants from leaving their countries and trying to get into America. Migration from the poor, violent Northern Triangle has recently surged on the Mexican border.

Venezuela's constituent assembly stripped the opposition's leader, Juan Guaidó, of his immunity from prosecution. More than 54 countries acknowledge Mr Guaidó, who leads the opposition-controlled national assembly, as Venezuela's interim president.

Brazil's right-wing president, Jair Bolsonaro, ordered the armed forces to "commemorate" a military coup that took place in 1964. Soldiers marched at their barracks in honour of the occasion, but thousands of people protested.

Canada's prime minister, Justin Trudeau, expelled two former cabinet ministers from the parliamentary caucus of his Liberal Party. He said Jody

Wilson-Raybould and Jane Philpott could no longer be part of a team in which they had no trust. Ms Wilson-Raybould has alleged that the prime minister's office had pressed her when she was attorney-general to drop the prosecution for corruption of a big engineering firm. Ms Philpott quit saying the "independence and integrity of our justice system" is at stake.

Walls come tumbling down

Volodymyr Zelensky, a TV comedian, won the first round of **Ukraine's** presidential election, beating more than 30 rivals. He will now face the incumbent, Petro Poroshenko, in a second round on April 21st.

Local elections in **Turkey** delivered a humiliating blow to the president, Recep Tayyip Erdogan. He lost in five of Turkey's six biggest cities, including Istanbul and Ankara, the capital.

A political novice, Zuzana Caputova, handily won in the second round of **Slovakia's** presidential election. It has been a bad week for Europe's incumbents.

Britain's Parliament was at an impasse over Brexit. Theresa May's withdrawal agreement with the EU was rejected again, as were alternatives to her plan. The prime minister held talks with the opposition in an effort to break the deadlock. MPs voted to ask for an extension, by one vote. European politicians looked on aghast, as they pondered whether to give Britain more time.

Police in Britain reported that two devices planted on rail tracks to cause disruption were related to **Brexit**, as one had a note attached threatening to bring the country to "its knees if we don't leave". The troublemaker's plans were derailed because of EU safety regulations to detect sabotage.



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In a prospectus published ahead of a huge bond sale, **Saudi Aramco** revealed for the first time how much money it makes. Saudi Arabia's state oil firm reaped \$356bn in revenues last year. Annual net profit came to \$11bn, almost twice that of Apple, the world's most valuable listed company. The prospectus also confirmed how important Saudi Aramco is to the country's economy. Oil accounted for 63% of the state's revenue in 2017 and 43% of the kingdom's GDP.

Saudi Arabia's cut in **oil** output has helped drive up the commodity's price in recent months. Brent crude traded around \$70 a barrel this week, the highest level this year.

The World Trade Organisation released an estimate for **global trade** in 2018, which grew by 3%, well below the 3.9% that the WTO had forecast in September. It expects the growth in trade to fall to 2.6% this year. The organisation blamed tariffs and related retaliatory measures, but also weaker economic growth, volatile markets and tighter monetary policy in developed countries. It warned governments that it would be a "historic mistake" to forget the "fundamental importance" of the rules-based trade system.

A preliminary report from Ethiopia's transport ministry into last month's fatal crash of a **Boeing 737 MAX 8** passenger plane found that the pilots followed the procedures issued by the manufacturer when the jet started nosediving. The report recommended that Boeing change the MAX's flight-control system.

Mark Zuckerberg's apparent change of heart in calling for more regulation of the tech giants got short shrift. Facebook's boss said governments should take a more active role in policing the internet in areas such as privacy and elections material. But one leading Democrat tweeted, "Does anyone even want his advice?" given that Facebook is

under investigation. Britain's information commissioner wondered if Facebook would now drop its appeal against the fine it received for the Cambridge Analytica scandal.

Lyft's ups and downs

Following a successful IPO, **Lyft's** stock pared back some of its gains, falling below the offer price of \$72 a share. The price had closed up 9% on the first day of trading, giving the ride-hailing company a market capitalisation of \$22bn.

Carlos Ghosn announced a forthcoming press conference "to tell the truth", presumably about the charges he faces for financial misconduct at Nissan. He was rearrested soon after in Tokyo on a new indictment and is expected to spend at least three weeks in jail. Mr Ghosn described this latest move by prosecutors as "outrageous and arbitrary".

Wells Fargo started the search for a new chief executive, after the abrupt resignation of Tim Sloan. Mr Sloan gave what many considered to be a poor performance in front of a congressional panel recently, when he was hauled in to explain what was described as a "pattern of consumer abuses"

at the bank. Wells Fargo wants to replace him with someone from outside the firm.

The IHS Markit British **manufacturing** index for March recorded by far the biggest jump in firms' inventories over the survey's 27 years, as companies stockpiled goods and components ahead of Brexit.

India's Supreme Court ruled that the **Reserve Bank of India** had overstepped its mark when directing banks to declare a default when a company defers loan payments, and force the company into bankruptcy if it does not resolve its debt position within 180 days. The court found that the central bank could intervene on individual corporate defaults but could not undertake such a sweeping action. It is a big blow to the RBI's effort to rein in India's corporate debt.

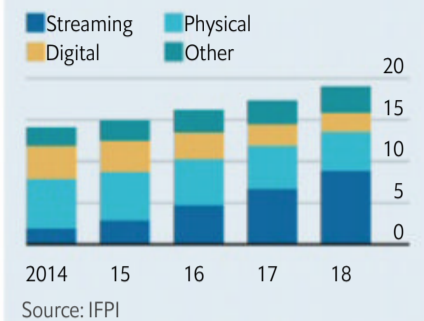
This year's flavour

Burger King started selling a plant-based version of the Whopper. The veggie burger, being rolled out at its stores in St Louis, is made by Impossible Foods, a Silicon Valley startup that is at the forefront of the **flowering plant-based foods** industry. The Impossible Whopper imitates the taste of

meat by using heme, an iron-rich protein, extracted from soyabean roots and mixed with other vegetable ingredients.

The right beat

Global recorded-music sales, \$bn



Global recorded-music sales grew by nearly 10% last year, according to the International Federation of the Phonographic Industry. Although revenues from digital downloads have fallen even faster than those from physical forms of music, such as vinyl albums, over the past five years, streamed music has surged. Nearly half of global sales now come from streaming, reversing an industry decline since 2001 that hit a trough in 2014. Music sales are still performing worse, however, than in the early noughties. The top three global music acts last year were Drake, BTS (a South Korean boy band) and Ed Sheeran. Queen were the sixth-best-selling act, boosted by the film "Bohemian Rhapsody".



Redesigning life

The promise and perils of synthetic biology

FOR THE past four billion years or so the only way for life on Earth to produce a sequence of DNA—a gene—was by copying a sequence it already had to hand. Sometimes the gene would be damaged or scrambled, the copying imperfect or undertaken repeatedly. From that raw material arose the glories of natural selection. But beneath it all, gene begat gene.

That is no longer true. Now genes can be written from scratch and edited repeatedly, like text in a word processor. The ability to engineer living things which this provides represents a fundamental change in the way humans interact with the planet's life. It permits the manufacture of all manner of things which used to be hard, even impossible, to make: pharmaceuticals, fuels, fabrics, foods and fragrances can all be built molecule by molecule. What cells do and what they can become is engineerable, too. Immune cells can be told to follow doctors' orders; stem cells better coaxed to turn into new tissues; fertilised eggs programmed to grow into creatures quite unlike their parents.

The earliest stages of such “synthetic biology” are already changing many industrial processes, transforming medicine and beginning to reach into the consumer world (see *Technology Quarterly*). Progress may be slow, but with the help of new tools and a big dollop of machine learning, biological manufacturing could eventually yield truly cornucopian technologies. Buildings may be grown from synthetic wood or coral. Mammoths produced from engineered elephant cells may yet stride across Siberia.

The scale of the potential changes seems hard to imagine. But look back through history, and humanity's relations with the living world have seen three great transformations: the exploitation of fossil fuels, the globalisation of the world's ecosystems after the European conquest of the Americas, and the domestication of crops and animals at the dawn of agriculture. All brought prosperity and progress, but with damaging side-effects. Synthetic biology promises similar transformation. To harness the promise and minimise the peril, it pays to learn the lessons of the past.

The new biology calls all in doubt

Start with the most recent of these previous shifts. Fossil fuels have enabled humans to drive remarkable economic expansion in the present using biological productivity from ages past, stored away in coal and oil. But much wilderness has been lost, and carbon atoms which last saw the atmosphere hundreds of millions of years ago have strengthened the planet's greenhouse effect to a degree that may prove catastrophic. Here, synthetic biology can do good. It is already being used to replace some products made from petrochemicals; in time it could replace some fuels, too. This week Burger King introduced into some of its restaurants a beefless Whopper that gets its meatiness from an engineered plant protein; such innovations could greatly ease a shift to less environmentally taxing diets. They could also be used to do more with less. Plants and their soil microbes could produce their own fertilisers and pesticides, ruminants less greenhouse gas—though to ensure that synthetic biology yields

such laudable environmental goals will take public policy as well as the cues of the market.

The second example of biological change sweeping the world is the Columbian exchange, in which the 16th century's newly global network of trade shuffled together the creatures of the New World and the Old. Horses, cattle and cotton were introduced to the Americas; maize, potatoes, chilli and tobacco to Europe, Africa and Asia. The ecosystems in which humans live became globalised as never before, providing more productive agriculture all round, richer diets for many. But there were also disastrous consequences. Measles, smallpox and other pathogens ran through the New World like a forest fire, claiming tens of millions of lives. The Europeans weaponised this catastrophe, conquering lands depleted and disordered by disease.

Synthetic biology could create such weapons by design: pathogens designed to weaken, to incapacitate or to kill, and perhaps also to limit themselves to particular types of target. There is real cause for concern here—but not for immediate alarm. For such weaponisation would, like the rest of cutting-edge synthetic biology, take highly skilled teams with significant resources. And armies already have lots of ways to flatten cities and kill people in large numbers. When it comes to mass destruction, a disease is a poor substitute for a nuke. What's more, today's synthetic-biology community lives up to ideals of openness and public service better than many older fields. Maintained and nurtured, that culture should serve as a powerful immune system against rogue elements.

The earliest biological transformation—domestication—produced what was hitherto the biggest change in how humans lived their lives. Haphazardly, then purposefully, humans bred cereals to be more bountiful, livestock to be more docile, dogs more obedient and cats more companionable (the last a partial success, at best). This allowed new densities of settlement and new forms of social organisation: the market, the city, the state. Humans domesticated themselves as well as their crops and animals, creating space for the drudgery of subsistence agriculture and oppressive political hierarchies.

Synthetic biology will have a similar cascading effect, transforming humans' relationships with each other and, potentially, their own biological nature. The ability to reprogram the embryo is, rightly, the site of most of today's ethical concerns. In future, they may extend further; what should one make of people with the upper-body strength of gorillas, or minds impervious to sorrow? How humans may choose to change themselves biologically is hard to say; that some choices will be controversial is not.

Which leads to the main way in which this transformation differs from the three that came before. Their significance was discovered only in retrospect. This time, there will be foresight. It will not be perfect: there will certainly be unanticipated effects. But synthetic biology will be driven by the pursuit of goals, both anticipated and desired. It will challenge the human capacity for wisdom and foresight. It might defeat it. But carefully nurtured, it might also help expand it. ■



The Brexit negotiations

A step in the right direction

At last, Theresa May is seeking a cross-party consensus on Brexit. The EU should allow her enough time

IT HAS BEEN clear for months that the entrenched hostility of hardline Tory Brexiteers and the Northern Irish Democratic Unionist Party (DUP) meant that Theresa May's Brexit deal would not pass in Parliament. This week the prime minister accepted reality by offering instead to negotiate with Jeremy Corbyn, the leader of the opposition Labour Party, on alternatives that could win a majority. Cross-party talks between two leaders notoriously reluctant to compromise may well fail, but if that happens Mrs May has offered to be bound by whatever solution MPs themselves support in further rounds of Commons voting.

There are two reasons to welcome this changed approach. The first is that, since Mrs May will surely have to erase some of the "red lines" she laid out over two years ago, the outcome looks almost certain to be a softer Brexit. This is likely to start with acceptance of a permanent customs union, which is both the clearest Labour objective and one that failed to win a Commons majority by only three votes this week. It may also imply closer alignment with the EU's single-market rules.

The second reason is that Mrs May has come out firmly against leaving with no deal (see Britain section). Hardline Brexiteers persist in pooh-poohing concerns about the potential costs of a no-deal Brexit as just another round of Project Fear. But as a briefing paper written for ministers by the cabinet secretary shows, the risks to the economy and to security are both genuine and serious. That the prime minister is now committed against pursuing this destructive option as a deliberate policy is a welcome shift.

That does not mean a no-deal Brexit cannot happen, as it remains the default choice on April 12th if no other action is taken. But Mrs May has confirmed that she will ask the EU for a further extension of this deadline at the summit to be held on April 10th. And, to ensure her spine stays stiffened, MPs are seeking to instruct her in a new law to call for more time.



Many EU leaders, whose unanimous approval is needed for any extension, may be reluctant to agree to it. Why give the vacillating Brits more time to squabble when they may still never come to an agreement? Why not just push Britain out now? The answer is that a no-deal Brexit would damage not just Britain but also many EU countries, most notably Ireland. If Mrs May can assure her fellow leaders that she is pursuing a new softer form of Brexit, they should give her whatever time it takes—even until the end of the year if need be.

A complication is that, if Britain is still a member in late May, EU leaders have made clear they will insist on it taking part in elections to the European Parliament. Mrs May is against this idea, as are some in other countries who are fretful about an upsurge of populist MEPs. But the new European Parliament is likely to have many more populists in it whether or not Britons vote. If the alternative is a no-deal Brexit, Britain should agree to elect MEPs, even if they sit for only a relatively short time.

None of this will be easy. It will demand patience and far-sightedness from EU leaders who are understandably fed up. It will demand sustained pragmatism and political deftness from a prime minister who has hitherto shown little evidence of either. And even if a softer Brexit eventually emerges, it will have loud, angry detractors on both sides. Tory hardliners will declare it to be a betrayal of the 2016 referendum. Hard-core remainers will decry it as an act of self-harm, a much worse outcome than staying in the EU. There is no easy way to manage the venom and fury on both sides—and the divisions in the country as a whole. But the most promising is to agree as part of a cross-party deal to put the outcome to a confirmatory referendum, an idea that lost by only 12 votes in the Commons this week. Mrs May's belated willingness to seek consensus is welcome. Her next step should be to promise that any deal will be put to the public for a final say. ■

Algeria

So begins the real battle

The resignation of President Abdelaziz Bouteflika is a good start. Now overhaul the system that kept him in power

AFTER WEEKS of angry protests, the streets of Algeria erupted again on April 2nd—this time in celebration. President Abdelaziz Bouteflika, who had clung to power for 20 years, had at last stepped down. Joyful Algerians, many of whom have known only one leader, draped themselves in the national flag and spoke of a new era for the country. "Game over", read one of the banners hoisted by the crowd.

In fact the battle for Algeria is just beginning (see Middle East & Africa section). Mr Bouteflika, who suffered a debilitating stroke in 2013, was merely a figurehead for a shadowy group of businessmen, politicians and generals who really run the coun-

try. His fall, therefore, is merely a symbolic victory. The old invalid is gone, but if Algeria is to move to "the better future" that Mr Bouteflika—or, more likely, his coterie—wrote about in his resignation letter, then much bigger changes are needed.

The country is entering a period fraught with risk. Mr Bouteflika's resignation was preceded by other empty concessions—a new prime minister, vague promises of a political transition—aimed at calming the masses. But these have emboldened the protesters, whose ambitions are growing. They will not be satisfied with the constitutional way forward, which would see Abdelkader Bensalah, the Speaker of the Senate and a Bouteflika ►►

loyalist, assume the presidency until an election is held. Many, quite rightly, want a new start.

As the protesters move closer to the real centres of power, the ruling cabal looks increasingly nervous. The army chief, General Ahmed Gaid Salah, has tried—and failed—to control each step of the process. Officials have warned of bloodshed, evoking Algeria's civil war in their efforts to avoid real reform. That conflict began after the last free and fair parliamentary election, in 1991. The first round of voting was won by Islamists, so the generals cancelled the rest. Some 200,000 people were killed in the fighting that followed, which lasted for most of the 1990s. The civil war in neighbouring Libya also provides a dark warning of what can happen when a dictator is overthrown.

There is certainly a danger of violence, but the protesters have remained determinedly peaceful. Islamists are not nearly as powerful as they once were and, anyway, have kept mostly quiet. Algeria's tribal divisions are less pronounced than Libya's. Tellingly, only those in power speak of the possibility of a new round of violence, perhaps out of habit. For decades they have justified their ruthlessness by pointing to the bloody past. Yet it is the ruling elite that has fallen to in-fighting. Several of Mr Bouteflika's allies have been detained, some while allegedly trying to get their ill-gotten gains out of the country. Some see a purge orchestrated by General Salah.

That is no way forward. The ruling cabal should follow Mr Bouteflika's lead in giving up power—and so too should General Salah, who seems loth to relinquish the army's role as the arbiter

of politics. He has chided those who sought to extend the president's rule in order to preserve "their narrow personal interests". Yet he himself backed Mr Bouteflika until it was clear that the protests would not stop. The demonstrators want a clean break from the out-of-touch old guard, including the general. Algeria needs soldiers who are comfortable with civilian rule, and who value freedom as much as stability.

A caretaker government is needed to oversee the process of creating a more open system, starting with a national conference. But for that to happen, the opposition must get its act together. An umbrella organisation of liberals, Islamists and trade unionists, to name just a few of the groups taking part in the protests, was created last month on a vague platform of reforms, but it already seems to be falling apart. If an election were to be held in 90 days, as the constitution requires, it is not clear who would represent the opposition or if it could even mount an effective campaign. That has led to growing fears that Algeria could go the way of Egypt, where protesters toppled an old dictator in 2011, but the fracturing of the opposition eventually allowed the army to retake control. Tunisians, by contrast, worked together to shore up their nascent democracy.

In getting rid of Mr Bouteflika without bloodshed, the Algerian protesters have achieved much, but their victory is far from complete. They need to learn from their neighbours, and unite until a new regime is embedded. Peaceful transition to democracy is a rare flower in the Arab world's political desert; but it could just flourish in Algeria's parched soil. ■

European banks

The land of the living dead

Europe's zombie banks need to rediscover their lust for life

IS THERE ANY more miserable spectacle in global business than that of Europe's lenders? A decade after the crisis they are stumbling around in a fog of bad performance, defeatism and complacency. European bank shares have sunk by 22% in the past 12 months. Deutsche Bank and Commerzbank are conducting merger talks with all the skill and clarity of purpose of Britain's Brexit negotiators. Two Nordic lenders, Danske Bank and Swedbank, are embroiled in a giant money-laundering scandal. The industry makes a puny return on equity of 6.5% and investors think it is worth less than its liquidation value. Amazingly, many European banks and regulators are resigned to this state of affairs. In fact it is a danger to investors and to Europe's faltering economy.

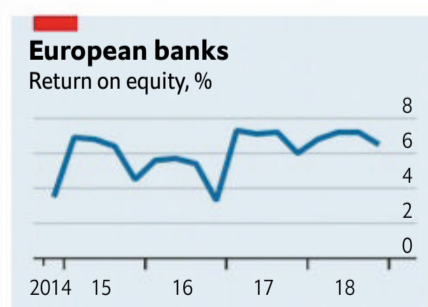
The banks make two excuses, both of which are largely rubbish. One is that it is not their fault. Unlike America, where banks have a return on equity of 12%, Europe does not have strongly positive government-bond yields, or a pool of investment-banking profits like that on Wall Street, or a vast, integrated home market. All this is true, but European banks have been lamentably slow at cutting their costs, something which is well within their control. As a rough rule of thumb, efficient banks report cost-to-income ratios below 50%. Yet almost three-quarters of European lenders have ratios above 60%. Redundant property, inefficient technology and bloated executive perks are the order of the day.

The banks' second excuse is that their lousy profitability does not really matter. Their capital buffers have been boosted, they argue, so why should regulators and taxpayers care about the bottom line? And shareholders, the banks hint, have learned to live with the idea that European lenders are unable to make a return of 10%, the hurdle rate investors demand from American banks and most other sectors (see Finance section).

This is bunkum, too. Profits do matter. They make banks safer: they can be used to absorb bad-debt costs or rebuild capital buffers when recession strikes. Depressed valuations show that far from tolerating European banks, most investors eschew them. As a result many lenders, including Deutsche, have too few blue-chip long-term institutional shareholders who are prepared to hold serially incompetent managers to account. And when the next downturn comes and banks need

to raise capital, which investor would be foolish enough to give even more money to firms that do not regard allocating resources profitably as one of their responsibilities?

Rather than accept this miserable situation, European banks need to do two things. First, embrace an efficiency and digitisation drive. Costs are falling at an annual rate of about 4%, according to analysts at UBS. This is not enough. As consumers switch to banking on their phones there are big opportunities to cut legacy IT spending and back-office and branch expenses. Lloyds, in ▶▶



▶ Britain, has cut its cost-income ratio to 49% and expects to get to close to 40% by 2020. The digital German arm of ING, a Dutch bank, boasts a return on equity of over 20% in a country that is supposedly a bankers' graveyard. If other banks do not do this they will soon find that they have lost market share to new digital finance and payments competitors—both fintech firms and the Silicon Valley giants such as Amazon—that can operate with a fraction of their costs and which treat customers better.

Second, banks need to push for consolidation. The evidence from America and Asia suggests that scale is becoming a bigger advantage in banking than ever before, allowing the huge investments in technology platforms and data-analysis to take place. Europe has too many lenders—48 firms are considered impor-

tant enough to be subject to regular “stress tests”. The banks complain that the reason for this is that Europe has not harmonised its rules and regulations. But this is only half the story. Most big banks are loth to cede their independence, and their bosses love the status that comes with running a big lender. And banks' failure to get their own houses in order means that investors doubt that managers can handle integrating two big firms.

European banks face two paths. The one they are on promises financial and economic instability when the next recession strikes, and long-term decline. The other path is to get fit for the digital age and subject themselves to the financial disciplines that American banks, and almost all other industries, accept as a fact of life. It should not be a hard decision. ■

Welfare in India

The beauty of breadth

Indian politicians are promising more cash for the poor. They should be less selective

GOOD KING WENCESLAS thought of the poor when the weather turned cold. Election season has the same effect on India's politicians. With national polls looming in April and May, the two main political parties are competing to shower money on the indigent. The governing Bharatiya Janata Party (BJP) has already started paying benefits to farmers who own less than two hectares (five acres) of land. The Congress party promises cash payments for the poorest 50m households. The new focus on the problem is admirable, but these ideas need rethinking.

India has about 50m people living in extreme poverty, according to the World Poverty Clock, an Austrian research project. Many others are severely pinched. Yet India's safety-net is both immensely complicated, with over 950 centrally funded schemes and subsidies, and stingy. Old people protested in the capital last year, complaining that the central-government pension of 200 rupees (\$3) a month has been frozen since 2007. Much of the money spent on welfare never gets to the poor. Numerous subsidies for fertiliser, power, water and so forth are snaffled by better-off farmers or go into officials' pockets. A large rural employment scheme does mostly reach poor people, since nobody else is prepared to dig ditches all day under the hot sun. But it is expensive to run and prevents participants from doing any other work. A study carried out in Bihar, a poor state, by the World Bank estimated that you could cut poverty at least as much by taking the money for the scheme and dividing it among the entire population, whether poor or not.

It is welcome, then, that the parties are vying to come up with better schemes. And it is especially encouraging that both the BJP and Congress are proposing simply to give people money. Distributing cash is cheaper than handing out jobs or food, and allows poor people to buy whatever they need. As bank accounts spread and India's biometric ID system matures, it should be possible to curb fraud and theft.

Yet the politicians' plans are ill thought out. Even if the BJP's bung to farmers manages to get round the problem that many lack clear land titles, it will do nothing for landless labourers, who are often poorer than smallholders. It would have perverse consequences, too, for it would discourage small farmers from

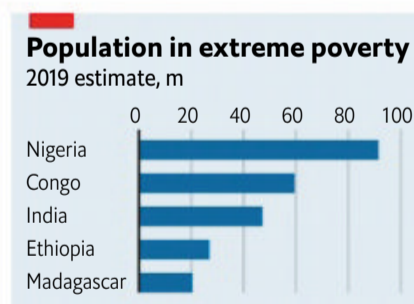
getting bigger. Congress's scheme to pay needy families 6,000 rupees a month is better (see Asia section), but faces the practical and political difficulties involved in targeting the poor.

Targeting welfare is costly and difficult in a country like India. How is the state supposed to identify the poorest 50m households in a country where income and spending are so hard to track? If it looks for signs such as straw roofs, it will almost certainly miss many poor people, especially in the cities. The political economy of targeted schemes is also tricky. In countries with minimal welfare states, schemes with few beneficiaries also have few supporters, and therefore risk being quietly wound down or diminished by inflation. And any formula used to target the bottom 20% is likely to be so opaque that people will never know whether they should have been included or not, so cannot fight for their entitlements. A workfare scheme in Argentina, *trabajar*,

was so well-targeted—75% of its beneficiaries were among the bottom 30%—that it lost political support and was replaced by a benefit with broader appeal. As Amartya Sen, an Indian economist, put it, benefits that go only to the poor often end up being poor benefits.

Two years ago a government report suggested a bold new approach. Instead of a universal basic income—an idea doing the rounds in rich countries—create a nearly universal scheme from which you exclude the richest quarter of the population. They are easier (and therefore cheaper) to spot than the poorest. The report estimated that poverty could be virtually eradicated at a cost of 5% of GDP—just about the same as the combined cost of the existing schemes and subsidies. Transfers to the very poor would be lower under Congress's plan, but since a broader scheme's chances of survival are higher, indigent Indians would probably benefit more in the long run.

Binning the hotch-potch of existing schemes and implementing a radical new system would be politically difficult. Yet the broader plan may have a better chance than a targeted scheme, since many of the beneficiaries of the old schemes would get some cash under the new one. And it must be worth a try. The eradication of one of the world's very worst problems is a prize worth fighting for. ■





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Mike LaRhette, President (left); John Harthorne, Founder and Former CEO (center); Scott Bailey, Executive Director (right)



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Mental-health issues

It was gratifying to read your leader on mental-health care (“Shrinks, expanded”, March 16th). But as far as Britain goes, people who work in this area are far from being “trained amateurs”. Many have a background in cognitive behavioural therapy and professional qualifications, including mental-health nursing, occupational therapy and so on.

Also, psychiatrists and psychological therapists do a completely different job; the terms are not interchangeable. Psychiatrists are doctors and can prescribe medication. The vast majority of them are not qualified to provide talking therapy. To suggest that therapists provide a cheap alternative to psychiatrists is to show a fundamental misunderstanding of their respective roles and expertise.

DIANE SHIELDS
Brighton

Laypeople, such as teachers or bartenders, trained in psychological “first aid” can identify people with depression or anxiety, cheer them up and refer them to care services. However, such amateurs are not a new wonder-cure. People who suffer from depression also often misuse alcohol or drugs. They may have a hidden history of child abuse. They may have subtle personality disorders that cycles them back into social conflicts that lead to depression.

A firefighter with a few weekends of training in basic cognitive behavioural techniques would never be capable of addressing such deeper issues. The “talking cure” is no exception to the maxim: you get what you pay for.

MICHAEL HANNA
New York

The only possible solution for providing evidence-based psychological treatment to everyone with anxiety and depression is self-guided or therapist-guided cognitive behaviour therapy over the internet. Numerous clinical trials have shown this to be

effective and it now forms part of routine care in Australia, Canada, Scandinavian countries and the Netherlands. The effects compare well with trials of antidepressant medication, are enduring and far exceed natural remission. Moreover, the principles are universal and have been shown to work in Arabic and Chinese.

PROFESSOR OLAV NIELSEN
PROFESSOR NICK TITOV
Macquarie University
Sydney

We are seeing an important push to destigmatise mental-health problems and raise awareness. The many people now coming forward probably indicates some unmet need. But we may also be convincing people that they are ill when they are not.

The rise of social media and a cultural expectation of happiness, coupled with the lowering of some diagnostic thresholds, makes me question whether our services are overburdened with people who are facing some stress or negative emotions, which have been incorrectly pathologised and pushed into the realm of sickness. What are the consequences for individuals, for wider society, and our resilience, of over-medicalisation?

DR CLAIRE INGHAM
London

Regulate social media

Following the Christchurch shooting, you made only tangential reference to social media, which is part of the core of today’s terrorism (“The new face of terror, much like the old”, March 23rd). Self regulation has failed with social-media companies. Carrying hate and terror content on media platforms should be criminalised, something along the lines of a code of conduct for social media. This would establish an international criminal jurisdiction with independent judges who have the power to impose fines on offending host countries and companies alike in the amount of billions of dollars, much like recent American bank fines.

The reasons are that, first, compared with finance, social media’s aiding, abetting and facilitating terrorism is by far the greater crime. And second, only big fines have the capacity to threaten these companies with extinguishing their profit and share price. Only then will they change their conduct.

JOHN GOODMAN
Auckland

Europe and Africa

Your package on “The new scramble for Africa” (March 9th) shone a light on the demographic trends that make the continent a global player worthy of genuine partnership. But you underplayed the importance of Europe. The two continents are just 14km (8.5 miles) apart at their closest point. The European Union and its member states are Africa’s largest donors, supplying more than half the aid the continent receives. Africa exported twice the value of goods to the EU as it did to China in 2017. The EU and its member states have more embassies in the region than either superpower.

However, Europe and Africa share something much more fundamental: a future dependent on one another. A genuine partnership of equals that prioritises mutual interests through rapid funding in education, health and infrastructure for Africa’s youth would contribute to global growth. Europe’s investment must be bolder in terms of financing, policy and governance reforms than what is currently on the table. The EU’s seven-year budget, being negotiated right now, is the time to grasp that opportunity.

TIM COLE
Europe executive director
ONE Campaign
London

Promises, promises

You ran a “humorous” collection of snippets recalling all the broken Brexit promises (“Magical thinking”, March 30th). But you omitted David Cameron’s announcement on

February 20th 2016, when he called the Brexit referendum. After recommending that Britain remain in what he laughingly described as a “reformed” European Union (and also pointing to the threat to the British economy if we left the single market) the then prime minister nevertheless went on to propose that “the British people decide our future in Europe” at the ballot box, specifically that “the choice is in your hands”.

Or how about this other Brexit pledge, from the leaflet setting out the government’s official position, which was sent to every single British household ahead of the referendum. The government wanted Britain to remain in the EU, but the leaflet promised that this “once in a generation decision” was ours, and that “the government will implement what you decide”.

We weighed up the facts and made that choice on June 23rd 2016. To leave the EU.
RICHARD ROBINSON
London

Mixing fake drinks

After reading about how disruptive technology may change the whiskey industry (“Going against the grain”, March 9th) I was reminded of a delightful short story by P.G. Wodehouse in his collection, “Meet Mr Mulliner”.

Mr Mulliner’s brother, Wilfred, was “the clever one of the family”. His was “the brain which had electrified the world of science by discovering that if you mixed a stiffish oxygen and potassium and added a splash of trinitrotoluol and a spot of old brandy you got something that could be sold in America as champagne at a hundred and fifty dollars the case.”

FABRIZIO GALIMBERTI
Braybrook, Australia

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Director of Communications Geneva, Switzerland

Gavi is a public-private partnership committed to saving children's lives and protecting people's health by increasing equitable use of vaccines in lower-income countries. The Vaccine Alliance brings together developing country and donor governments, the World Health Organization, UNICEF, the World Bank, the vaccine industry, technical agencies, civil society, the Bill & Melinda Gates Foundation and other private sector partners. Since 2000, Gavi has contributed to the immunisation of nearly 700 million children and the prevention of more than 10 million future deaths.

Gavi is seeking to appoint a new Director of Communications, who will be a prominent member of the Gavi Leadership Team and play a strategic role in the organisation. The Director of Communications will lead an international team of communication professionals to continue to raise the profile of Gavi, the Vaccine Alliance and immunisation, by positioning them within an increasingly broader global health context. Including the ongoing development of Gavi's brand and narrative, strengthening of its digital engagement and the preservation of its reputation.

The Director of Communications will also be an excellent communicator with seasoned political judgement, scaling up public support and increase alliance partner while having in-depth knowledge of digital communications and campaigns. Ensuring a fully integrated and aligned 'campaign' approach that is targeted and effective with the many audiences Gavi seeks to reach.

Candidates for the role will be accomplished leaders of a communication function and accustomed to operating at the most senior levels in complex international organisations. They will bring an appreciation of Gavi's public-private partnership model. From whatever sectoral background they come, whether commercial, government, or third sector, they will display the resilience and leadership to thrive in a multi-stakeholder environment. While scale and global reach will be important qualifications, Gavi will place a particular premium on solutions-oriented leaders, who provide clear and practicable advice to colleagues.

Gavi is committed to diversity within its workforce and encourages applications from all qualified candidates.

The Gavi Alliance has retained Russell Reynolds Associates to advise on this appointment. For further information about the position and additional details on qualifications, requirements, terms and conditions of service and how to apply, please visit: www.rraresponses.com

The closing date for applications is 29th April 2019.



SENIOR LEADERSHIP RECRUITMENTS NATO HEADQUARTERS (BRUSSELS)

The NATO Secretary General is looking to recruit principal officials for his most senior management team to be his primary advisors in the following areas:

- **Executive Management** (ref. 190185, post of ASG/EM)
- **Political Affairs and Security Policy** (ref. 190186, post of ASG/PASP)

There are 8 Assistant Secretaries General, all of whom report to the NATO Secretary General and are also accountable to the North Atlantic Council. As a member of the Secretary General's senior management team, each Assistant Secretary General is also expected to contribute to overall policy development and delivery, including in areas beyond their direct set of responsibilities.

Candidates for these positions must be able to demonstrate the following:

- a strong background in one of the subject areas mentioned above, developed through 10-15 years of experience
- a university degree (Master's level preferred) in a relevant field
- experience working in a multilateral environment or an environment with a variety of stakeholders from multi-cultural backgrounds
- a proven track record of experience in progressively senior posts, recent experience in senior-level leadership positions and significant professional experience in managerial positions
- experience facilitating high-level dialogue and consensus
- proven leadership in leading and transforming organisations
- the following minimum levels of NATO's official languages (English/French): VI ("Proficiency") in one; I ("Beginner") in the other.

Selection of candidates for NATO posts is based upon the merit principle. Further information concerning the positions and details of how to apply can be found on www.nato.int/recruitment

Closing date for applications: 14 April 2019



Short-listed candidates will be required to undergo an external assessment followed by testing and interview at NATO Headquarters. The selection procedures are expected to take place in May and June 2019.



Great wheels of China

BEIJING

A long-held ambition to dominate the global car industry will make China a force in the future of personal transport

THE VEHICLES on Beijing's boulevards offer little evidence that China has a car industry at all. Range Rovers seem to outnumber all the Havals, Changans and BYDs put together; you sometimes see nothing but a stream of Volkswagens and Toyotas. And when you notice how slowly those congested streams flow you would certainly be hard put to imagine the country's car industry expanding further. But the Chinese government has plans to prove you wrong on both points. China is set to whizz out of the automotive slow lane.

Chinese carmakers already make more cars than those of any other country. They also make more electric cars than anyone else, laying a claim to the industry's future. Beyond that, China's rulers, carmakers and tech firms also want to take advantage of the upheavals in how people get around beyond driving their own car—ride-hailing apps, autonomous vehicles, bike- and scooter-sharing schemes, smart public transport and more. A mediocre track record as carmakers need not be an obstacle

in this. Indeed, it may be an advantage.

What is going on today is not modern China's first transport revolution. Crossing the road in a big Chinese city three decades ago the few cars you would have seen in the sea of bicycles would almost all have been either official limousines or beaten-up Japanese saloons touting as taxis. The government saw this carlessness as a flaw to be filled in by a new domestic industry: a clear path to industrial development and export earnings. Needing some yeast to get things growing, in the 1980s it allowed foreign companies to establish joint ventures with state-run firms such as FAW and SAIC.

This joint-venture strategy achieved many of its aims. The cars in Beijing may carry foreign badges, but they are Chinese made. The country produced 23m cars last year, outstripping Europe and putting America in the shade (see chart 1 on next page). In terms of quality, though, the results have been poorer. No Chinese carmaker is remotely as impressive in its sector as Huawei, say, is in telecoms.

Chinese carmakers, feather-bedded by the cash the joint ventures generated and with a vast market for nobby middlin cars beyond the biggest cities, proved slow to learn the fine arts of setting up and managing supply chains and assembling cars in volume to exacting tolerances. Recently, though, this has been changing.

The Chinese consumer's desperate desire for four-wheeled transport has, to some extent, been sated. With some 325m cars now on its roads China endures eight of the top 20 most congested cities in the world, according to TomTom, a navigation firm. A survey by Bain & Co, a consulting firm, found that in 2017 the number of Chinese people who felt owning a car improved social status fell below 50%. After two decades of year-on-year growth, sales of new cars fell slightly in 2018.

Some of China's 70-odd domestic carmakers have concluded that it is time to start making better cars. They have improved both their engineering and their design. Lin Huaibin of IHS Markit, a research firm, points out that some firms now splash out on Western designers—witness the sleek suvs which will grace the Shanghai motor show when it opens on April 16th. By some estimates domestic sales will surpass those of foreign brands by 2020.

Some Chinese firms are now looking at exports to the West: Geely, GAC and Great Wall are particularly ambitious in this respect. America's imposition of tariffs last ▶▶

► year put a dent in some of these plans, and there have been other problems. For example, GAC has found that American dealers are not keen to market its G8 SUV under the company's Trumpchi brand. But Europe, and eventually America, are seen both as plausible export destinations and, for some, as investment opportunities. In 2018 Geely, by far the most ambitious in the latter respect, revealed that it had amassed 9.7% of Germany's mighty Daimler to add to the controlling stake in Sweden's Volvo the company already owned.

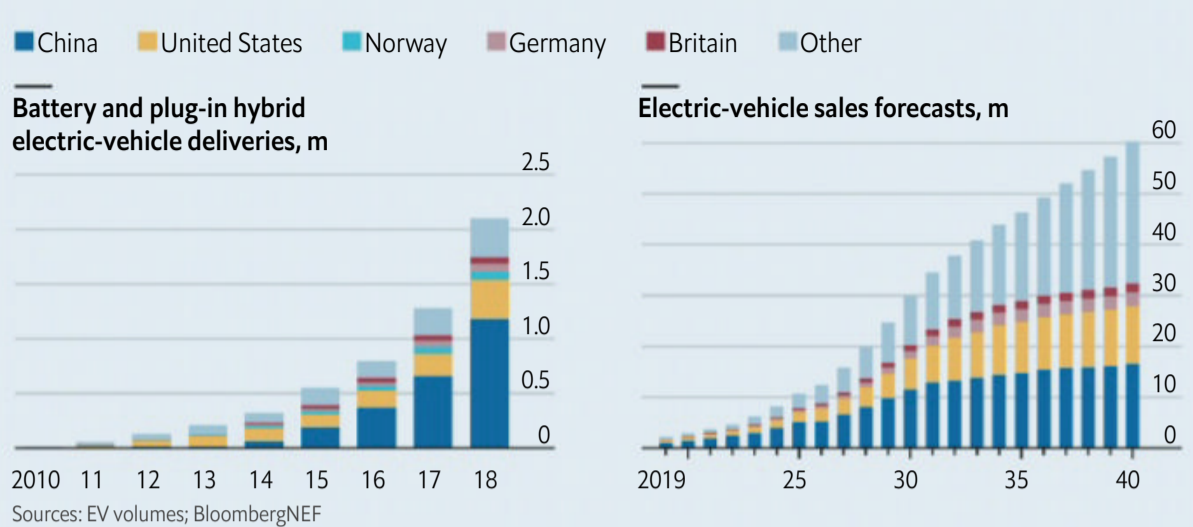
The government has plans to further the sector's progress. It has said it will allow foreign carmakers to take full control of their Chinese joint ventures, increasing competition and attracting investment. It is also fostering consolidation. It is drafting proposals to encourage successful independent firms such as Geely and Great Wall to invest in state-owned clunkers. Perennial whispers that the government is going to merge state-owned FAW, Dongfeng and Changan are getting louder.

But China's plans for making cars—one of ten sectors targeted for special attention in its "Made in China 2025" policy—do not depend merely on using its size to surpass the West in volume and an increasingly competitive home market to catch up in quality. It wants to use industrial policy to overtake the West on the road to the future.

Mark Wakefield of AlixPartners, a consulting firm, identifies a key component of this as a "strategy to dominate" electric vehicles. The idea has many attractions. Several Western governments have called time on internal-combustion engines which burn fossil fuels. Emission rules in Europe are tightening, Britain and France have said they see no role for cars powered only by internal combustion after 2040. So the market seems there.

Carmakers all around world know that this transition is under way. Tesla is built on it; some incumbents, like Volkswagen, are thoroughly on board. But quite a few European, American and Japanese firms are holding back. Some of those concentrating on the mass market think high bat-

Wave of the future



tery costs mean electric cars will not be profitable for some time. Others simply seem too culturally invested in the fine points of internal-combustion engines—much more complex than electric ones—to break away from them.

There is much less such concern in China. The proud engineering tradition that surrounds internal-combustion engines at venerable carmakers is largely absent, as are the sunk costs that add to their perceived value. What is more, because the country's carmakers are not particularly politically powerful, any unease they may feel will not matter much; BYD's sway in Beijing is hardly BMW's in Berlin. The industry is thus largely united around abandoning the internal-combustion engine.

Electric shock

The strategy also fits with China's other industrial strengths. It is a huge producer of batteries and wants to be the biggest in the world, in the same way that it has become the dominant provider of solar panels. Chinese battery-makers are growing rapidly and signing deals with lithium producers around the world. CATL, the biggest car-battery maker in China, is building a new plant second only in size to Tesla's gigafactory in Nevada. China's total planned battery-making capacity is three times that which the rest of the world will construct.

Electric vehicles have attractions that go beyond the benefits to the car industry and synergies with battery-making. As Bill Russo of Automobility, a consulting firm based in Shanghai, points out, China is keen to reduce its oil imports, currently the largest in the world. It also wants to clean its air and cut its carbon-dioxide emissions. Electric vehicles will not make a huge impact in these respects as long as China's grid is largely fired by coal. But reducing the exhaust-pipe emissions on city streets is a plus even if smoke keeps belching from power-plant chimneys.

China's government has used several means to increase both the supply of electric vehicles and the demand for them. Car-

makers earn tradable credits when they produce "new energy vehicles", which include hybrids and fuel-cell-powered cars as well as electric cars. This year carmakers are required to earn or buy credits equivalent to 10% of their internal-combustion-engine sales. In 2020 the requirement will be 12%. Such rules may disadvantage foreign manufacturers, all the more so when, as it is rumoured, they get to hear of changes later than domestic companies do. The non-Chinese battery-makers with which foreign car companies like to work, such as LG of South Korea and Panasonic of Japan, were until recently restricted in the Chinese market.

To stimulate demand, electric vehicles are generously subsidised and exempt from purchase taxes. They are also exempt from the restrictions placed on the purchase of cars with internal-combustion engines in six of the biggest cities. Further measures include requiring public-sector bodies to buy electric vehicles—a big boost for buses—and favouring car-sharing businesses that use them. The country's charging infrastructure is far ahead of the rest of the world's. Beijing has more public charging points than Germany.

Together, these stimuli have created an electric-vehicle boom (see chart 2). Chinese electric-car sales are expected to hit 1.5m this year, compared with 1.1m in 2018. Colin McKerracher, head of advanced transport at Bloomberg New Energy Finance, goes so far as to suggest that the current rapid rate of growth in electric-vehicle sales, coupled with the decline in overall car sales seen last year, may mean that sales of cars powered by internal-combustion engines in China have already peaked.

Compared with the thriving home market, Chinese exports of electric cars remain small so far. But its busmakers are showing the way. Almost all of the 400,000 electric buses in circulation around the world were made in China. Most are used at home, easing congestion and pollution, but exports are growing. According to BYD, one of China's biggest bus manufacturers, its vehi- ►

Quantity, if not quality

World passenger car production 2018*, m



cles are used in more than 300 cities in other countries.

Exports are not the only route to global power. The size of the Chinese market will help to “suck the world’s [electric-vehicle] supply chain into China,” says Mr Russo. Western mass-market carmakers keen to electrify but struggling with the investments required may increasingly license technology or buy hardware from Chinese firms. If more of the supply chain for electric vehicles is in China than anywhere else, Chinese-made power trains may become the global standard.

The speed with which China is taking the lead in electrification puts it in a good position to profit from its convergence with two other distinct but related big shifts in transport; autonomy and sharing. In the West, companies from the technology world, not the carmaking world, are in the driving seat. The same is true in China, where the “big three” internet giants, Alibaba, Baidu and Tencent, are at the centre of a web of investments in autonomous cars and mobility apps as well as electric vehicles. And unlike its carmakers, China’s tech giants are already world class.

Mobility, upward

China has more internet users than any other country and it generates more data than anywhere else. The ubiquity of digital-payment systems helps to run seamless services for China’s burgeoning middle-classes, who are among the keenest in the world to try the latest gadgets and apps. And car ownership is still low by developed-country standards. Little wonder that China is already the world’s largest market for rides ordered from a smartphone.

Both Alibaba and Tencent are investors in Didi Chuxing, the world’s biggest ride-sharing company. It has over 550m registered users and provides 30m rides a day, dwarfing the 15m Uber provides worldwide. Didi has spread across South-East Asia and invested in India and Europe. In March the two big tech firms teamed up with FAW, Dongfeng, Changan and other investors to sink \$1.5bn into a competing ridesharing venture, spreading their bet.

Ride-hailing on this scale may be bringing about a structural shift in the car market; people buy with an eye for others as well as themselves. According to Roland Berger, a consultancy, in 2017 around 10% of all cars in China were “shared”; that is, either taxis or used for ride-hailing, car-sharing and similar schemes. That is ten times the number in the West. If the world is making a decisive turn from the goal of everyone owning cars to the goal of everyone being able to access mobility when needed, China is well ahead (see chart 3).

As well as investing in ride hailing, the tech giants are also ploughing money directly into carmaking. Baidu and Tencent



are investors in NIO, the most promising of the “Chinese Teslas”. Xpeng, WM Motor, Byton and others all intend to produce cars which both epitomise and extend the smartphone way of life.

The tech sector is not only interested in batteries. Its investors have made large investments in pedal power, with mixed success. A vast fleet of rentable bikes has sprung up over the past three years—as have mountains of their abandoned carcasses. Mobike, partly financed by Tencent, now has over 230m registered users, mostly in China. Ofo, its largest and Alibaba-backed rival, is teetering on the brink of bankruptcy. Whether such businesses can persist when their rental incomes fall far short of the capital costs remains unclear. If they can, it will be because of the value that tech firms capture from the data they provide. Providing the best advice on when to get on a bike, when to wait a minute for a bus and when to hail a Didi would bring with it an impressive flow of cash.

The tech giants are also making strides in autonomy. Baidu and Tencent have been testing self-driving cars on public roads since the start of last year. Like Lyft and Uber in America, Didi is aiming to build autonomous robotaxis. In partnership with King Long, a bus company, Baidu is also deploying driverless shuttles in several Chi-

nese cities, including Beijing and Shenzhen. They hope to introduce them on Japanese roads in 2019.

McKinsey, a consulting firm, reckons that China lags two or three years behind America in autonomous driving. Companies like Waymo, Google’s self-driving unit, still have an edge. But Chinese artificial-intelligence research, the field that autonomy most relies on, is in general impressive. It is another of the ten “Made in China 2025” industries, and if that proves a help, rather than a loser-backing hindrance, it may well soon be second to none.

Chinese companies are also working hard on the other technologies autonomy will require. Alibaba, Baidu and Tencent all own high-definition mapping companies. RoboSense, a startup in which Alibaba, SAIC and BAIC, another carmaker, have all invested, is taking on Western firms developing the lidar sensors that tell autonomous vehicles about their surroundings. Most crucially China is becoming the world leader in 5G mobile-communications technology, which is expected to be vital for the lightning-fast connectivity that autonomous cars will require.

In this field, too, the weakness of Chinese carmakers may be a sort of strength. In the West co-operation between tech firms and carmakers is wary; neither wants to give too much away. But China’s dominant tech firms are close collaborators with domestic vehicle-makers—and indeed foreign ones. Non-Chinese carmakers are starting to run tests in Chinese cities rather than in Europe and parts of America, where the rules are tighter. Roadstar, which is testing self-driving electric-vehicles in Shenzhen, and Pony, which is developing autonomous taxis in Guangzhou, are tapping into tech talent in Silicon Valley. Baidu has been developing Apollo, an open-source self-driving system which it hopes to establish as an industry standard, in California since 2015. Daimler, BMW and Ford have all agreed to sign on.

China’s plan is to create an ecosystem for mobility, one comprised of cars, apps, data, standards, communications and more, that can be deployed anywhere around the world. If the carmaking world were facing just one vast technological change, such ambition from a country with a short track record might seem hubristic. But the combined challenge of electrification and autonomy is stretching Western incumbents enough that some, maybe many, will snap. China’s carmakers and tech giants will face stiff competition from those Western counterparts that are at the forefront of the race to create the future of mobility. But if Chinese firms do it faster and cheaper than their competitors, the evidence of their existence will not only stretch along Chinese roads but the highways of the rest of the world. ■





Air strikes

Bombs astray

How many civilians does America kill in air strikes? The Pentagon doesn't know

AMERICA HAS conducted 108 air strikes in Somalia since 2017, killing some 800 people. The Pentagon says they were all jihadists. Amnesty International, a human rights organisation, disagrees. It has gathered detailed evidence suggesting that five recent strikes alone killed 14 civilians. That discrepancy between the civilians that external observers say have been killed in American air strikes and the number the government owns up to is repeated across the world.

Donald Trump came to office pledging to wind down America's wars. Instead, he ramped some of them up. The campaign in Somalia against al-Shabab, a brutal jihadist group which is aligned to al-Qaeda and controls a quarter of the country, saw the number of air strikes trebled from 14 in 2016 to 45 last year. There were 28 in the first three months of 2019 alone.

In part, that may reflect looser rules. Barack Obama had decreed that commanders in places like Somalia and Pakistan—outside of formal war zones like Iraq—required “near certainty” that a target was a high-value terrorist, no civilians would be killed or injured except in “extraordinary circumstances”, and decisions would be

informed by inter-agency consultation.

In 2017 Mr Trump overhauled these rules. He not only diluted Mr Obama's special restrictions on secret wars, but also allowed specific countries to be declared an “area of active hostilities”. In such places, International Humanitarian Law (IHL)—the more permissive rules that apply in avowed battlefields like Iraq and Afghanistan—would be in force.

In Somalia this meant commanders now needed only “reasonable certainty” that a target was present, and could make their decision without recourse to officials back home. This increased the risk of civilians being misidentified as combatants. Separately, the shift to IHL also meant that commanders could go after foot-soldiers, not just al-Shabab bigwigs.

Disputes over the civilian toll from air campaigns go well beyond Somalia. More American bombs and missiles fell on Afghanistan in 2018 than in any year since published records began a decade ago—more than five times as many as in 2015. Civilian deaths from air strikes correspondingly rose by 87% between 2017 and 2018 to 463, according to Action on Armed Violence (AOAV), a monitoring group.

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That includes bombs dropped by the Afghan air force, which has far less experience in using precision weapons. But the United Nations Assistance Mission in Afghanistan (UNAMA), whose estimates are similar to those of AOAV, says that 62% of aerial casualties—deaths and injuries—were inflicted by the NATO-led coalition, whose air power is largely American. NATO accepts just 62 of those deaths, a small proportion of UNAMA's total, though it agrees that another 68 are disputed.

A similar story has played out in the Middle East. By March the American-led coalition battling Islamic State across Iraq and Syria had owned up to at least 1,257 civilian deaths since the start of the war. Airwars, a London-based NGO, says the figure is probably six times higher, over 7,500—an average of one civilian death every four strikes. Airwars is particularly scathing of Britain's claim to have killed just one civilian among 4,000 or so enemies. Britain, it says, is “seemingly incapable of detecting civilian casualties from its urban actions.”

Fog of law

This uncertainty stems in part from the nature of modern war. On most of its battlefields, small bands of American and allied special forces quietly direct air strikes using laser guidance and other high-tech methods. But America also outsources the job to regional allies, such as Kurdish rebels in Syria and secret paramilitary units made up of Afghans. Many of these local proxies can call in air strikes, but they have neither the inclination nor the expertise to conduct detailed investigations of the af- ▶

▶ termath on the ground.

That leaves America reliant on overhead imagery, coupled with what limited human or electronic intelligence may trickle in, to count bodies. This is particularly limiting when it comes to evaluating casualties inside buildings in built-up areas. In some cases the people on the ground—whether al-Shabab in Somalia or Pakistan's intelligence agency—deliberately obfuscate matters, keeping the press away from bombed areas. But America's own rules also appear to be part of the problem.

American commanders evaluate casualty claims made by external organisations in inconsistent and sometimes restrictive ways. One study of Iraq and Syria by Azmat Khan and Anand Gopal for the *New York Times* in 2017 found that armed forces would entertain allegations only within 50 metres of an air strike, considerably narrower than the blast radius of some American weapons. In other cases they were more reasonable, considering claims within several miles.

American commanders may also be primed to underestimate figures. Larry Lewis, a former official who led seven Pentagon studies on how to avoid civilian casualties in Afghanistan, points out that America's pre-strike process for estimating collateral damage, though rigorous, "has never been calibrated with real world data to test its accuracy."

The Pentagon has taken note of all this criticism. In February it partially declassified a study from 2018 of civilian casualties caused over the previous three years. The study insisted that there was a "widespread priority to minimise civilian casualties from the highest to the lowest levels," but found that the coalition against Islamic State had systematically undercounted.

The report said that 58% of civilian casualties assessed as "credible" came from external allegations, not internal sources. In fact, America's armed forces often turn to the very same NGOs that hold their feet to the fire on these matters. In 2018 the vast majority of civilian casualty assessments published by the coalition—over 1,000 alleged events—were sourced to Airwars, the NGO based in London.

Airwars now liaises closely with American forces, and both sides swap data on a regular basis. "Progressively over time we've seen improvements in our relationship and the standard of their assessments and ours," says Chris Woods, Airwars' founder and director.

The Pentagon's study exhorted officials to build on efforts like these. It urged officials to "systematically seek out additional sources of information on potential civilian casualties," including social media and NGOs. It proposed that commanders around the world should take on staff to reconcile the Pentagon's claims with those

of others, and standardise their process for making assessments. Its general thrust was to encourage transparency.

Mr Woods says that the Americans have been "pioneering" on addressing civilian harm, "way ahead of Europeans". That, he suggests, is the result of pressure from legislation and bipartisan interest from Congress. On May 1st the Pentagon is due to publish a congressionally mandated report on global civilian casualties.

But not everyone seems on board. On March 6th Mr Trump revoked an executive order by Mr Obama which had required intelligence officials to publish civilian casualties in undeclared war zones like Pakistan and Yemen, mostly from CIA drone strikes. "Superfluous reporting requirements," said the National Security Council, "distract our intelligence professionals from their primary mission." In contrast to the Pentagon's recent efforts to improve transparency, the White House decision is a dismaying step backwards. ■

Out and seeking office

A welcome shrug

SOUTH BEND, INDIANA

Gay mayors? Who cares?

IT MADE FOR AN awkward first-date conversation. Pete Buttigieg, the mayor of South Bend in Indiana, recalls that he and Chasten Glezman talked about how he would be seeking higher political office. How would his boyfriend-to-be—now husband—feel about the public scrutiny? And how might voters respond to a same-sex couple on the campaign trail?

Mr Buttigieg had an inkling voters would mostly shrug. He had been nervous about coming out as the incumbent mayor in 2015, but he went on to win re-election that year with 80% of the vote. In South Bend even conservatives and Catholics cared more about his efforts to revive a once-struggling industrial city or his spell soldiering in Afghanistan. Almost the only time his sexual orientation now gets mentioned, he says, is when somebody wants to tell him they are at ease with it. Attitudes to once controversial issues can flip from bold to normal with baffling speed, he says.

The 37-year-old mayor is testing that notion nationally, trying a long-shot run to become the Democrats' presidential candidate. He raised \$7m in the past quarter, a decent sum that should place him among the more serious contenders in a crowded field. He reckons his identity, as "young, out, from the Midwest" helps win initial interest, then voters will judge him on his

skill as a speaker and his ideas.

It is much the same story in Chicago, where Lori Lightfoot, a 56-year-old African-American woman married to another woman, won a landslide victory in a run-off election to become mayor on April 2nd. "I'm an out lesbian, married with a child, running in this city, the first to ever make the ballot from the LGBTQ community," she says. Recalling her arrival in Chicago in the 1980s, she says such a thing was "not even remotely possible back in those days."

Her mayoral campaign saw tense moments. In one debate her opponent, Toni Preckwinkle, praised her openness about her sexuality, a comment that sounded like a dogwhistle intended to deter more conservative African-American voters. Leaflets also appeared outside black churches warning that Ms Lightfoot would oversee a gay cabal in city hall. But voters again mostly shrugged. More appeared interested in her positioning as an outsider, promises to tackle corruption and her pledge to cut police violence.

As mayor of America's third-largest city she can help to shift perceptions of gay politicians some more. Annise Parker was mayor of Houston from 2010 to 2016 and now leads the LGBTQ Victory Fund, which helps to advise other out politicians. She praises Ms Lightfoot's disciplined campaign and expects the success will further move "the national imagination", deepening acceptance of gay politicians and giving the city something to cheer. She says Houston came to be seen as more diverse, open and appealing after voters repeatedly elected her to various posts.

Gay politicians are growing unexceptional. Colorado has a gay governor, Jared Polis, and Oregon has a lesbian one, Kate ▶▶



A former management consultant

► Brown. Ms Parker estimates there are roughly 700 openly gay public officials nationally, including two senators and eight members of Congress (all of them Democrats). The Victory Fund endorsed 274 candidates in November's elections. Of these, Ms Parker says, only five were Republicans (and all five lost).

Americans have had 45 years to get used to gay people in public office. Kathy Koza-chenko, a student in Ann Arbor, Michigan, was the first successful gay candidate anywhere, winning a city council seat in April 1974. But opinion has shifted quickly more recently, along with popular acceptance of gay marriage. It amounts to a quiet, welcome and probably irreversible turn in social attitudes.

The Pew Research Centre found nearly half (46%) of Americans were still put off by a candidate known to be gay in 2007, but that fell to just 26% by 2016 and is probably lower now. Younger voters are least bothered. Among Democrats, Republicans and members of every large religious group (other than evangelicals), a majority of respondents said a candidate's sexual orientation is irrelevant. For some it might be an asset. Mr Buttigieg, for example, might struggle harder to get a sympathetic hearing from some progressive voters if he were merely white, male, highly educated and a former management consultant.

Why have attitudes changed? The AIDS crisis in the 1980s forced many gay men to come out. Then, as laws ended discrimination, more felt ready to do the same. Once most people realised they personally knew someone who was gay, they grew less likely to object to gay politicians. Jonathan Rauch of the Brookings Institution (and a former *Economist* writer) says gay activists started by demanding equal rights from the 1970s, and then from the 1990s also sought equal responsibilities, such as the chance to serve in the armed forces, marry and become parents. That process, he says, led to the triumph of an "assimilationist" model, in which gay people are accepted by others as fitting into an existing social order, rather than seen as trying to up-end it.

Mr Rauch cheers politicians who are open about their orientation, but not defined by it. Renewed hostility is possible. President Donald Trump has hounded transgender people, for example in ordering them out of the armed forces. But even he has not criticised openly gay politicians. The political space open to Mr Buttigieg and others should thus continue to grow. "In the world where I grew up it was inconceivable an openly gay and married person could run for president," says Mr Rauch of South Bend's mayor. His odds remain long, but they are better than for any other openly gay politician in American history. And by running, Mr Buttigieg makes it easier for the next out politician to try. ■



Melanin and money

The colour of wealth

WASHINGTON, DC

The black-white wealth gap has been constant for half a century

FEW AMERICANS remember Greenwood, a once-prosperous African-American neighbourhood in Tulsa, Oklahoma, that was known as Black Wall Street. In 1921 Dick Rowland, a black shoeshiner, was charged with attempting to rape a white lift-girl in a downtown office building. An incensed white mob gathered at the courthouse to lynch him, then proceeded to Greenwood for two days of rioting, looting and murder. City officials aided and abetted the violence. In the end 35 blocks were destroyed, 10,000 black people were made homeless, and as many as 300 were killed. Residents reported aeroplanes flying overhead, dropping explosives. It was one of the worst incidents of racial violence since the civil war. Tens of millions of dollars in black wealth were destroyed or stolen. No compensation was awarded to either the victims or their descendants.

American history is replete with horrific episodes that prevented the accumulation of black wealth for centuries: first slavery, then indentured servitude under Jim Crow, segregated housing and schooling, seizure of property and racial discrimination. The result was that in 1962, two years before the passage of landmark civil-rights legislation and the Great Society programme, the average wealth of white households was seven times greater than that of black households. Yet after decades of declining discrimination and the con-

struction of a modern welfare state, that ratio remains the same. The mean of black household wealth is \$138,200—for whites, that number is \$933,700.

Median wealth is smaller, but even more lopsided. The typical black family has just \$17,100 compared with the typical white one, which has \$171,000. The discrepancies are caused by low incomes and by debt. Compared with whites, black Americans have higher debt loads: 19.4% of black households have net wealth at or below \$0, compared with 9.2% of whites. There had been slow improvement over the decades, but the Great Recession of 2007-08 wiped this out, since blacks were disproportionately harmed by the subprime mortgage blow-up. Because of that, home-ownership, the conventional wealth-building tool of the middle class, stands at 42% among blacks—only one percentage point higher than it was in 1968—compared with 73% for whites.

Determining what lies behind the persistent wealth gap is essential to fixing it. The thinking ascendant on the left blames both present-day discrimination and the long history of racist public policies, such as redlining, an official practice that made it harder for blacks to get mortgages, and so permanently disrupted the transmission of wealth between generations. One cure for this state of affairs is reparations, a one-off cash transfer to compensate for the last- ►

ing effects of slavery and discrimination. The idea, long popular on the political fringe, has emerged as a faultline among the Democratic presidential primary contenders. Julián Castro, Barack Obama's former housing secretary, criticised Senator Bernie Sanders for dismissing the idea. Elizabeth Warren, a Massachusetts senator, says she is on board, and suggested that Native Americans should be "part of the conversation" too.

But more ordinary forces could also be at play. Wealth is, at its core, the accumulation of savings over time. Lower salaries (and lower saving rates) thus limit the opportunity for wealth growth. A recent study by Dionissi Aliprantis and Daniel Carroll, research economists at the Federal Reserve Bank of Cleveland, argues that the persistent racial gap in wealth can be entirely accounted for by the racial gap in income. According to the latest figures, from 2017, the median black household takes in \$40,258 a year compared with \$68,145 for the typical white one. Calculations by Edward Wolff, an economist at New York University, suggest that inheritances can explain about 23% of the racial wealth gap. His research suggests that the gap would close only modestly if blacks inherited wealth to the same extent as whites do.

If the cause of the persistent wealth gap is really a long-term income disparity, the policies needed to rectify it are different. Even as discrimination has declined and the country has instituted affirmative action programmes in university admissions and some job hiring, the black-white income gap remains high. A portion of this is due to present-day discrimination. There is strong evidence that employers are less likely to call back applicants with black-sounding names, for example. But there have also been other structural changes to black America that have led to this stagnant outcome: deindustrialisation, which hit blacks living in cities especially hard, rising incarceration rates and the decline of stable two-parent families. These are all tied up in a complex tangle of pathology, all

of which is to some degree the legacy of historical racism. But a lump-sum reparations payment, even if sizeable, would not lead to wealth convergence if present-day racial income patterns remained fixed.

And the politics of reparations remains treacherous. Even race-neutral anti-poverty programmes, like cash welfare and food stamps, already attract fierce opposition, in no small part because they are often seen by white voters as handouts to minorities and immigrants. Reparations would surely worsen the racial divide—perhaps to Donald Trump's electoral benefit.

A more promising proposal for narrowing the inheritance gap, offered by Darrick Hamilton and William Darity, two economists, is "baby bonds"—essentially trust accounts for every child born in America, which could not be accessed until adulthood. The federal government would top up these accounts each year, depositing more for poorer families. Cory Booker, a New Jersey senator running for president, has proposed legislation to do this.

The annual cost would be \$82bn, ac-

ording to one analysis from Columbia University (for context, the budget for the federal Department of Housing and Urban Development is \$53bn). Universal access to the trust accounts might stave off opposition. "In a lot of ways, it is replicating what happened in the New Deal with the GI bill and the federal housing loans that excluded blacks," says Mr Hamilton. He also likens the idea to the birth of the Social Security (pensions) programme. "We as a society decided that we didn't want our elderly to be economically insecure. So the government came up with a programme. We don't have anything for young people except subsistence programmes to keep them from being destitute," he says.

One vulnerability is that the policy has a built-in lag time of 18 years and benefits a constituency that cannot vote or hire lobbyists. Britain introduced a similar scheme, only to cancel it six years later. And although a government-funded inheritance would go some way to making up for historical injustices, it would not erase the black-white income gap. ■

Southern history

After abolition

WASHINGTON, DC

The sons of slaveholders quickly recovered their fathers' wealth

SOcialism never took hold in America, John Steinbeck allegedly quipped, because the poor saw themselves not as an exploited proletariat, but as temporarily embarrassed millionaires. Yet in the case of southern slaveholders, who lost much of their wealth after the abolition of slavery in America and General William Sherman's scorched-earth "march to the sea", those millionaires who were indeed temporarily embarrassed seemed to recover quite quickly. That is the surprising result of a meticulous study of historical census data by three economists, Philipp Ager, Leah Boustan and Katherine Eriksson.

Before the civil war, the South was deeply unequal. Among white households, those at the 90th percentile of the wealth distribution owned 14 times as much as those at the median. By contrast, in today's seemingly inegalitarian times, the ratio among white households is just 9.5 to one. Roughly 50% of the wealth in the antebellum South was held in slaves. After the surrender of the Confederacy in 1865, all this disappeared: wealth for the top 1% dropped by 76% between the censuses of 1860 and 1870. This had the effect of reducing inequality—but only temporarily. By the next census, in 1880, the sons of slaveholders had recovered the wealth standings of

their fathers compared with those who grew up in non-slaveholding households. By 1900, they had surpassed them.

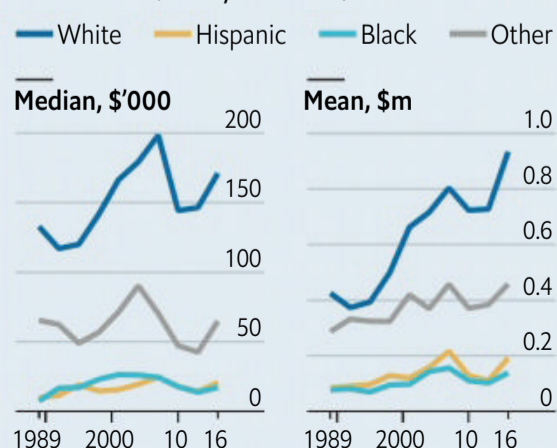
After ruling out other possible explanations, such as greater skills or business acumen, the economists interpret this recovery as the result of elite networks acting as an invisible safety-net. The sons of slaveholders married into wealthy families and obtained well-compensated white-collar work, reversing even large declines in fortunes.

A long line of economists, from John Maynard Keynes to Thomas Piketty, have noted that wealth begets wealth. But an opposite dynamic has been observed in studies of black Americans more than 100 years after the end of slavery. A study of all Americans born between 1978 and 1983, by economists Raj Chetty, Nathaniel Hendren, Maggie Jones and Sonya Porter, found that even the black sons of wealthy parents exhibited extraordinary downward mobility relative to whites. They also had much higher rates of incarceration. Unlike white slaveholders after the civil war, intergenerational transmission of black wealth one century later seems much more fragile.

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"The intergenerational effects of a large wealth shock: white Southerners after the civil war," by P. Ager, L. Boustan and K. Eriksson.

It's been a long time

United States, family net worth, 2016 dollars



Traffic jams

It's not up to you

NEW YORK

Manhattan embraces road pricing

NEW YORK'S congestion is among the worst in the world, according to an advisory panel's report published earlier this year. Crossing midtown by car is soul-destroying. In 2016 the average speed was 4.7 miles per hour, not much quicker than a brisk stroll. But relief is in sight. On April 1st (no, really), state lawmakers agreed to implement congestion-pricing, making New York the first big American city to do so. By 2021 vehicles will have to pay to enter Manhattan south of 60th street.

Similar proposals go back 50 years but have always stalled. The Regional Plan Association proposed road-pricing in 1996. Michael Bloomberg's 2007 plan was not even debated on the state legislature floor. This time, with Andrew Cuomo, the state governor, at the wheel and Bill de Blasio, New York's mayor, riding shotgun, it looks as if this time is different.

Much of the detail, including how much drivers will have to pay, how they will pay and how often they will pay, have yet to be decided. A "traffic mobility review board" will be set up to work all this out. New Yorkers living in the fee zone who make less than \$60,000 a year will be exempt. Other drivers, including motorcyclists, the city's civil servants, disabled drivers, the trucking industry, New Jersey's governor and commuters, all want discounts, credits or exemptions, too, which bodes ill.

If done right, congestion-pricing could be expanded beyond Manhattan. New York can learn from other cities. Singapore, for instance, which has had pricing for decades, adjusts prices regularly. It can also learn from mistakes. London, which rolled out its pricing in 2003, bizarrely is only starting to charge on-demand car hires like Uber. Stockholm exempted too many vehicles, which caused a drop in fee revenue.

Other car-clogged cities considering tolls, including Los Angeles, Philadelphia, Portland, San Francisco and Seattle, are watching New York. A mayor-appointed task force in Boston recommended a \$5 fee, but so far Marty Walsh, the mayor, is pumping the breaks. "We really have to be a good example," says Nicole Gelinias of the Manhattan Institute, a New York think-tank. Moody's, a credit-rating agency, said the plan is a "credit positive" for the city, the state and the Metropolitan Transportation Authority. The only possible roadblock to the scheme is New Yorkers themselves—54% oppose fees. ■



Campaigning and activism

Political speed-dating

ATKINSON, NEW HAMPSHIRE

The Granite State's political culture is wonderfully strange

SPEND MORE than ten minutes talking to a political junkie in New Hampshire, and you will hear some version of this old chestnut: Ask a New Hampshirite if he plans to vote for Candidate X for president, and he'll say, "I don't know; I've only seen her three times." The Granite State holds the first presidential primary (Iowa selects a candidate a week earlier, but through caucuses rather than an election), so voters there expect, and receive in profusion, face-to-face contact with anyone who wants their vote. During a recent five-day stretch, eight candidates popped up across the state, their appearances fostered by groups of dedicated local volunteers. This fits well with the state's political culture, which is equal parts charming and lunatic.

Larry Drake, who chairs the Rockingham County Democrats, a Republican-leaning region in the state's south-eastern corner, and reckons he has seen 15 declared and prospective candidates so far in this cycle, explains that New Hampshire has kept its methods of political administration relatively unchanged for the past few centuries. To ensure that ordinary citizens can take part in the political process, the state begins its legislative sessions in winter, when farms lie fallow. The bedrock political entity is the town rather than the county or region and, as in much of New England, town Boards of Selectmen—in effect, powerful city councils—make virtually all political decisions. State legislators' pay was set at \$100 a year in 1889, and there

it has remained.

New Hampshire has a famously libertarian ethos. It has no income or general sales tax, preferring to gouge outsiders with hefty hotel, restaurant and hire-car taxes, and tolls where highways cross the state border. Since 2003 the Free State Project has been asking libertarians to move to the state, to put their ideas into practice.

Somehow this ethos has produced a profusion of government. New Hampshire has 424 state legislators, or one for every 2,557 residents of voting age (if California used the same ratio, it would have a 11,920-person legislature). This makes it not just the biggest state legislature in America, but the third-biggest legislative body in the Anglophone world, behind only the United States Congress and Britain's Parliament. In addition to the legislature and governor it elects an executive council, a five-member body first convened in 1680 to check the royal governor's power. The council today approves and monitors agency budgets, and can veto the governor's pardons and appointments. It is, in short, a state that takes participatory democracy seriously.

That is where Mr Drake comes in. He is a compact, genial retired labour economist who spent 32 years studying employment patterns at the Bureau of Labour Statistics in Washington, DC, before retiring to southern New Hampshire. He has been politically active since attending an anti-war march in 1968, and has chaired the Rockingham County Democrats for seven years.

Over breakfast at a country club in Atkinson, where Donald Trump held one of his last pre-election rallies, George Hamblen, a party chairman in the neighbouring town of Plaistow, credits Mr Drake with "building something out of nothing". On a recent presidential-election map, southern New Hampshire is solidly Republican. Republicans outnumber Democrats in 34 of Rockingham's 37 towns. Mr Drake's job entails building local party organs where none existed before, and persuading people to run for local office even though they will probably lose. It helps that he is a self-described "people person", with a warm, patient manner and an easy laugh.

Over one weekend in mid-March Mr Drake attended two town caucuses, where local party committees chose leaders, as well as town hall meetings with two presidential candidates: Amy Klobuchar, who spoke in a gym at a local school, and John Hickenlooper, who made a deeply on-brand appearance at a deconsecrated church that is now a bar (Mr Hickenlooper once owned a brew pub). A caucus made Mr Drake miss a third; Tulsi Gabbard drew a crowd to a public library in Plaistow.

He will undoubtedly see them again. "If they don't come here," says Mr Drake, "it's political malpractice." New Hampshire is small, but an early victory lets a candidate ▶▶

► build momentum and then a war-chest. The state also lets candidates hone their retail skills. Debates and huge rallies come later; New Hampshire events are intimate. Before Ms Klobuchar took the stage, the chairman of the Rye Democrats thanked “Mr Philbrick for letting us use the bank’s parking lot”, and asked how many people had children who played basketball in the gym (a lot of hands went up).

Asked which candidate he favours, Mr Drake will not be drawn. “I made a conscious decision to be neutral in the primary,” he explains. The 2016 primary between Hillary Clinton and Bernie Sanders fractured friendships, and “bad feelings” lingered in 2008 between supporters of Mrs Clinton and Barack Obama. Most Democrats seem to understand that harbouring grudges this year could hand the White House back to Mr Trump. ■

Happiness and voting

Loss aversion

Why picking a party is like following a sports team

AS ANY SPORTS fan will admit, supporting your team is agony. Not only must all but one side lose in any competition, but humans seem hard-wired to feel the pain of a loss more keenly than the pleasure of a win. This phenomenon is called “loss aversion” and crops up in many areas of life. Most people would rather forgo the chance of winning \$1.10 than risk losing \$1. Even capuchin monkeys, it is said, show loss aversion. A new study by Sergio Pinto of the University of Maryland and others finds it in American politics, too.

Political engagement is correlated with happiness. That may seem hard to believe at a time when most political activity seems to increase the sum of human misery, but the recent World Happiness Report, an annual survey backed by the UN, lays out compelling evidence. A sample of 1,300 (American) respondents shows a link between reported levels of “life satisfaction” and turnout at elections, even when controlling for age and income. In Britain, the propensity to vote rises as people become happier. (Perhaps this explains why British turnout went down steadily for decades.) A study from 2005 in the *Review of Economic Studies* found that people are considerably happier when the party they support is in power.

It is not clear why these two things should be linked. It could be that people who are unhappy about their lives are more likely to be dissatisfied with the political

system and opt out. Or the two factors could be linked to a third which influences voting, such as marriage. Married people report higher levels of happiness and vote more reliably. Or perhaps voting just makes people happier. Charitable giving and altruism certainly make people feel better about themselves (studies have found this is true even for infants). Perhaps engaging in politics has a similar effect.

Whatever the reason, the impact of happiness on political engagement is substantial. In America it has as big an effect on voting as education does. In both cases, the higher the level the higher the turnout.

So it was more surprising than it might appear when Mr Pinto and his colleagues found that the two recent presidential elections have produced a net decrease in American happiness. The day after the vote in 2016 saw a big and understandable crash in the reported life satisfaction of Democrats. Two months later Democrats were still more miserable than they had been before the vote. There was an offsetting rise in Republican satisfaction, but it was only a third as large as the Democratic fall and it dissipated quickly. On some measures—such as people’s expectations about the election’s impact on their community—Republicans became more pessimistic.

As with happiness and voting, the Trump effect was substantial. The reduction in Democrats’ current and expected life satisfaction was as large as that which happens when people lose their jobs or get health problems which prevent normal activities. The results cannot be explained away as based on poor data. They are drawn from a large sample and from unusually detailed data by Gallup Healthways, which surveys 15,000 people a month.

So what is the explanation? There are three possibilities, not mutually exclusive. It’s “very much a loss-aversion story”, says

Carol Graham of the Brookings Institution, a think-tank, who is one of the study’s authors. On the African savannah, early humans benefited only a little from an extra meal but might starve if they missed one. So they evolved to avoid potential losses. In contemporary politics, loss aversion may moderate the happiness effect.

Next, Donald Trump magnifies the impact. As an iconoclast, surprise winner and self-declared offender against all things liberals hold dear, Mr Trump was always likely to make Democrats more upset than any other Republican victor would have done. On the Republican side, a study in 2018 by Jeph Herrin of the Yale School of Medicine found that counties which voted for Mr Trump had lower levels of reported well-being than average, and saw big falls in that well-being between 2012 and 2016. Perhaps Mr Trump’s victory simply meant that these areas reverted to the mean.

Third, different dimensions of happiness seem to matter. Psychologists distinguish between evaluative and hedonic well-being. Evaluative means how you assess your life: are you very happy, somewhat happy and so on? Hedonic well-being refers to specific emotions: did you experience stress, enjoyment or anger yesterday? Evaluative well-being is more stable than the hedonic kind. It is possible that the political system and basic democratic procedures, being part of people’s long-term make-up, influence feelings of evaluative happiness, which do not change so much, whereas the results of particular polls trigger more volatile emotions of anger, worry and stress. That suggests that, if picking a party is like following a sports team, political engagement is more akin to liking sports in general. If so, the current president might reduce American happiness without necessarily doing much damage to contentment about the political system. ■



It’s hard to come by



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The United States and Latin America (1)

Go home, and don't come back

MEXICO CITY

The first of two pieces on Donald Trump's policies towards Latin America looks at the attempt to stop migration from Central America by cutting off aid

IN 2014 THOUSANDS of children from Central America's Northern Triangle—El Salvador, Guatemala and Honduras—turned up at the United States' southern border. President Barack Obama convinced a Republican-controlled Congress to double American aid to the region to reduce the violence and poverty that help cause mass migration. Now it has surged again, but Mr Obama's successor, Donald Trump, has favoured a different tack. Despite "taking our money", Northern Triangle countries are "doing absolutely nothing" to prevent emigration, he complained. On March 31st he cut off \$500m a year of aid to the region. Mexico ("all talk and no action") did not escape his fury. He threatened to close the border between the two countries.

For a president elected on a promise to curb immigration, the numbers are provoking. In February 76,000 migrants were stopped trying to cross the United States-Mexico border. Among families and unaccompanied children, nearly all were Central Americans. Kirstjen Nielsen, the secretary of homeland security, thinks nearly 100,000 came in March. If that rate is sustained all year the number of attempted

border-crossings will approach the historic peak reached in 2000, of 1.6m.

Mr Trump's anti-immigration rhetoric kept people away at first. Border apprehensions dropped in the 18 months after he won the presidency in November 2016. People who put off their journeys then are now making them. Tougher American policies on its border, such as separating children from parents and slowing the processing of asylum claims, are not deterring

migrants. Many of them see this as a "now or never moment", analysts say. People-smuggling gangs encourage that belief.

They are now especially active in impoverished rural Guatemala, which has been hurt by drought and low coffee prices. A new smuggling network packs Guatemalans into buses, which take them to the American border in days. Half of the families caught there are Guatemalan. Most are seeking asylum. They are not single men trying to cross illegally. So "coyotes", as smugglers are called, have no need to sneak them into the United States.

More visible are "caravans" of hundreds, or even thousands, of migrants, usually starting in Honduras. Travelling initially on foot, they find safety in numbers and in the attention they get from the media. (They also attract Mr Trump's notice; he calls them an "invasion".) Mexico's new left-wing president, Andrés Manuel López Obrador, has more sympathy for them than his predecessor did and has done less to stop them. As migration has soared, deportations by Mexico have fallen.

Mr Trump's aid cut-off is a blunt instrument. It hurts El Salvador, home to 37% of families with children apprehended in 2016 but only 9% of them this year, as much as the other two countries. It ends financial support for security forces and police battling drug-trafficking to the United States. Mr Trump has not made clear what governments might do to restart the aid flow.

The surge in migration does not justify Mr Trump's claim that the aid has done no good. The Northern Triangle's high murder



▶ rate, one big reason that people flee, has dropped sharply, thanks partly to American aid. Some observers contend that the exodus would have been even bigger without that decline.

Administrators of aid say its goal was to strengthen things like law enforcement, employment and tax collection, which is a slow process. Aid becomes ever more effective over time as lessons are learnt, says Marcela Escobari, an American aid official under Mr Obama. Continuity matters. Plan Colombia helped bring peace to that country because it was sustained for 15 years without cuts, Ms Escobari says.

Mr Trump is also wrong to claim that aid recipients are “doing nothing” for the money. Already, it comes with conditions: the United States can withhold 25% if a country does not go after people-trafficking net-

works or deter migration. Half depends on progress in 12 areas of governance, such as tax collection and tackling corruption. Northern Triangle governments must also spend billions of dollars of their own money on state-building. Such conditional aid “empowers the right people” within governments, says Juan Ricardo Ortega of the Inter-American Development Bank.

Mexico has had some success in placating Mr Trump. On March 28th its government said it would form a “containment belt” at the country’s narrowest point. After Mexico arrested some people-smugglers on April 1st, Mr Trump tweeted his gratitude. He stopped threatening to close the border, perhaps because advisers pointed out that this would hurt both economies. The Northern Triangle, it seems, has less clout in Washington. ■

its exports to the United States, which was almost its only cash buyer. This has forced PDVSA to sell oil at smaller profit to new, more distant clients, for example India. It has also made it harder for PDVSA to import diluents (needed to process its heavy oil) and diesel. That difficulty has contributed to two long power cuts across much of Venezuela in the past month.

On March 22nd the Treasury added Venezuela’s state development bank to the list of bodies with which American financial institutions should have no dealings. This will “shut down their whole network of dollar transactions”, says a senior administration official. Individuals in the regime and family members, some of whom are studying at American universities, have had their bank accounts blocked and their visas revoked.

The third prong is humanitarian aid. An attempt to take aid across a border bridge from Colombia was easily blocked by the regime. The Red Cross says it will start delivering aid this month on “a scale similar to Syria” to some 650,000 people. That represents a tacit climbdown by Mr Maduro, who has always denied the existence of a humanitarian emergency. Lastly, the American administration is trying to develop the capacity of Mr Guaidó’s team to rebuild Venezuela.

Although the armed forces have stuck by Mr Maduro, the government does not trust them. Army units have their weapons locked up at night and their fuel rationed, says the American official. A former Venezuelan intelligence officer has revealed videos of dissident officers being tortured. The government is using paramilitary forces to suppress demonstrations and arrest opposition activists, and relies on 2,000-5,000 Cuban intelligence and security personnel to prevent any military rebellion. “They are inserted into the military chain of command with the authority to give orders,” says William Brownfield, a former American ambassador in Caracas.

In response, the Trump administration is increasing the pressure on Cuba. It has partially activated Title III of the Helms-Burton Act, which has been suspended by presidents since its passage in 1996. This would allow Americans to sue some foreign companies that use assets expropriated after the Cuban revolution of 1959. But Cuba’s communist regime has survived 60 years of American economic pressure. “The message to the Cubans is ‘You’re next,’” says a former official. “They have no reason to help” in Venezuela.

The administration insists that the regime is weaker and the opposition stronger than at the start of the year. “Maduro can’t govern, I think that’s setting in,” says the official. “So eventually it will be difficult for them to stay in power.” Maybe. Perhaps the collapse of public services will prompt ▶▶



The United States and Latin America (2)

Breaking the stalemate

WASHINGTON, DC

The American plan to unseat Nicolás Maduro does not seem to be working

“NOBODY PREDICTED the date of the Russian revolution,” notes Elliott Abrams, Donald Trump’s special representative for Venezuela. “We have no ability to predict when regimes collapse. But we’re heightening the contradictions.”

When Donald Trump’s administration recognised Juan Guaidó (pictured), the speaker of Venezuela’s national assembly, as the country’s interim president and imposed sanctions against the oil industry in January, some believed that the armed forces would quickly abandon Nicolás Maduro. But although living conditions are

deteriorating, the regime shows no sign of imploding. Indeed, it is cautiously taking the offensive. It has arrested Roberto Marrero, Mr Guaidó’s chief-of-staff, has stripped Mr Guaidó of his political rights and may be poised to arrest him too.

The Americans are pursuing their aim, which they describe as “constitutional regime change”, through a four-pronged strategy. The first prong is diplomatic: 54 countries now recognise Mr Guaidó as president. The second, and most important, is stronger sanctions. Those against PDVSA, the state oil monopoly, have halted

▶ a popular uprising. But after the massive demonstrations that followed Mr Guaidó's proclamation as interim president, there are signs that the opposition is losing heart and momentum. Daily life, amid cuts in power and thus water supplies, is grim. In a report published this week, Human Rights Watch and Johns Hopkins University found increased maternal and infant deaths, the unchecked spread of diseases such as measles, diphtheria and tuberculosis and high levels of child malnutrition. Officials know that sanctions will add to hardship, and thus to emigration.

But what else can the Americans do? Mr Trump has repeatedly refused to rule out military action, but a conventional invasion of a country more than twice the size of Iraq, with many armed civilians, would be a massive and risky undertaking. Mr Brownfield suggests that some Venezuelan emigrants could become anti-regime guerrillas, but Colombia's government would be nervous of that.

The alternative is to put much more stress on negotiation, while encouraging Latin America and Europe to increase the pressure by freezing the assets of regime

leaders. In 2015-16 Mr Maduro used talks to buy time and divide the opposition. But they look inevitable. The Americans say the only topic for discussion with Mr Maduro and a handful of his cronies would be the conditions of their departure. But in the run-up to a free election all factions, including the ruling *chavista* movement, should be included, says one official. Those with long memories recall that all democratic transitions in Latin America, except in Grenada and Panama, required talks. The two exceptions were where the United States invaded. ■

Bello Blaming the conquistadors

Mexico's president is wrong to seek an apology for the distant past

SCRATCH MANY a Latin American and you will find, not far below the surface, resentment against Spain and its conquistadors. The resentment is often focused on the tons of gold and silver the Spaniards carried off. More recently it has been directed at their ill treatment of indigenous peoples in the Americas.

So Andrés Manuel López Obrador, Mexico's new president, who is also a keen amateur historian, was on solid political ground when last month he demanded that Felipe VI, Spain's current king, and Pope Francis publicly apologise for the conquest. "The offences that the original peoples suffered should be recognised," he said. "Thousands of people were killed...one culture, one civilisation imposed itself on another."

He was speaking on the 500th anniversary of Hernán Cortés's first landing in Mexico, in Tabasco, his beloved home state. As always with AMLO (as Mexicans call him), his tone was soothingly moderate. His intention, he insisted, was to seek a historic reconciliation. He, too, would apologise for the abuse of Amerindians by the independent Mexican republic. He did not dispute the official Mexican myth, carved in a monument in the Square of the Three Cultures in the heart of Mexico City, that the conquest was "the meeting of two cultures" that produced a third, *mestizo* one. But it was also, he rightly said, "an invasion" involving acts of "subjugation".

His remarks caused a storm in Spain, partly because a defensive Spanish nationalism has been revived by Catalan separatism and partly because they came in the midst of an election campaign. Josep Borrell, the Socialist foreign minister, said Spain "obviously" was not going to offer an "extemporaneous apology", just as it would not ask France to say

sorry for "what Napoleon's troops did when they invaded Spain". Pablo Casado, the leader of the conservative opposition, said that AMLO's call was "a real affront to Spain", which should celebrate its historical role in Mexico "with pride".

Nevertheless, AMLO's demand is a fashionable one. Both Tony Blair and Bill Clinton apologised for their countries' role in the slave trade. Visiting Bolivia in 2015, Pope Francis himself asked for forgiveness "for crimes committed against the native peoples during the so-called conquest".

Yet AMLO's call is a mistaken one, for two reasons. First, it begs the question of who should apologise to whom. The peoples in Mexico in 1519 were not the "original" ones but later arrivals. They, too, committed what nowadays would be called crimes against humanity—systematic human sacrifice in the case of the Mexica (Aztecs). And modern Mexico is above all a *mestizo* nation, of mixed Amerindian and Spanish descent. Having worked with the Chontal Indians of Tabasco, Mr López Obrador can certainly claim to be closer to his country's indigenous

peoples than were many of his predecessors. But as his name betrays, his forebears were mainly Spanish. Rather than today's Spaniards, "it is AMLO and Mexicans who are descendants of the conquistadors", wrote José Álvarez Junco, a Spanish historian, in *El País*, a Madrid newspaper. "Explain to me, please, why I have to apologise for something that my forefathers didn't do to someone whose forefathers surely did?"

Second, it is one thing to apologise for crimes within memory, another for the distant past. In a critique of the cult of "historical memory" David Rieff, an American writer, points out that psychological evidence shows that the trauma suffered by survivors lasts at most for four generations. Beyond that, history should simply be understood on its own terms and in its temporal context rather than be rewritten by governments or recruited for political purposes.

The record shows that Spain's colonial empire was not Mr Casado's spotless creation, but nor was it uniquely bad. Most of the Amerindians who died did so from diseases to which they had no immunity. Shortly after Cortés, Bartolomé de las Casas, a Dominican friar, denounced ill-treatment of Amerindians, prompting an anguished debate at the Spanish court. Compared with Britain's North American empire, which largely exterminated or excluded natives, the Spanish colonial order was "inclusive", giving Amerindians "at least a limited space of their own", as J.H. Elliott, a British historian, has noted.

AMLO was elected on a promise to offer Mexico a historic "transformation". So far his policies fall well short of that. Rather than dwell on past wrongs, he should concentrate on improving the lot of today's Mexicans.





Fighting poverty in India

The war on penury

NUH, HARYANA

The big, national parties vie for poor voters' affections

"IT WILL BE days of joy," says Rajmati, a health worker in Haryana state, when asked what an extra 6,000 rupees (\$87) a month would mean to the poor households in her village. "It will also mean that you can survive without a husband." Her enthusiasm is shared by the other villagers gathered in her back room, where she provides health checks, postnatal care and immunisations. One says she would use the cash to open a bangle shop. Another has more immediate aspirations: "more wheat, oil and sugar" for her seven children, and more money for their education.

Six thousand rupees, with no strings attached, is what the Congress party is promising to hand out to the poorest fifth of households if it wins power in the national election that begins on April 11th. The party's leader, Rahul Gandhi, has described the scheme, known by its Hindi acronym of NYAY (or justice), as a "surgical strike" on poverty. In reality, it is more like dropping barrelfuls of ordnance from 30,000 feet. It also escalates the "alms race" between the

national parties, which are competing to show their generosity to the poor by offering health care, debt forgiveness and cash. After the ruling Bharatiya Janata Party (BJP) lost three state elections in December, it rushed to alleviate rural disgruntlement, pledging to pay 6,000 rupees a year to farmers with less than two hectares (five acres) of land. By the end of March some 47m had received their first instalment, according to the government.

Such ambitious efforts are imaginable for two reasons. First, India has become a

(lower) middle-income country with a GDP that will soon cross \$2,000 per person (and \$10,000 per household). NYAY will cost no more than 1.2% of India's rapidly growing output, says one of its architects—a slightly, but not wildly, optimistic estimate. Second, India's payments system has greatly improved. More than 350m people, over half of them women, have benefited from the government's effort to open no-frills bank accounts, and most people now have an official means of identification. All the women in Rajmati's back room have an Aadhaar card (which gives them a unique identity number) and a bank account, although they complain about the cost of travelling to the nearest branch in a town over 5km away. Where possible, NYAY will be paid into bank accounts held by women, not their husbands. "If it goes to the men, they'll take it away and never come home until they've drunk it all," says Rajmati, raising an imaginary bottle to her lips.

What has not greatly improved is the government's ability to identify the poor. It already hands out ration cards to people deemed "below the poverty line", entitling them to subsidised food and fuel. But many poor people lack these cards, and many cardholders are not poor. In rural districts the authorities typically decide eligibility based on the advice of village councils, the condition of people's houses and a survey of household assets.

The surveys can be horribly outdated. ►►

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► Haryana's last was in 2007. They can also skew incentives. "People make their houses look bad, to get the BPL card, and then buy gold," Rajmati complains. NYAY might contribute to this injustice (or *anyay*) by stripping benefits from people striving to escape the bottom fifth and rewarding people striving deceitfully to enter it. The workfare scheme Congress introduced in 2005 avoided this problem, since anyone willing to perform hard labour at low wages must be needy.

Spotting the poor is, if anything, becoming harder. Martin Ravallion of

Georgetown University points out that poverty in the countryside has fallen, moving closer to rates in the cities. The poorest are no longer confined to deprived rural districts, nor is everyone in such districts poor. In 2018 Rajmati's district was identified as India's most backward by a government think-tank. It can look that way, with many huts made of straw and squat bamboo storehouses, sealed with dung and stippled with pretty decorations. But new money is making inroads, visible in a resort hotel and country mansions covered in bougainvillea. Outside Rajmati's vil-

lage, an Uber taxi struggles along an unpaved road through a wheat field, an envoy from the gig economy to the agrarian.

These conspicuous signs of prosperity suggest an alternative approach to fighting poverty. Rather than struggling to include all the identifiably poor, why not exclude the identifiably rich? Arvind Subramanian, the former chief economic adviser to the current government, has proposed paying a near-universal basic income of roughly half the amount proposed by Congress (about 700 rupees per person, which would amount to over 3,000 rupees for the aver- ►►

Banyan Older than the hills

States that like to remember their history also have to do a lot of forgetting

NOWHERE MORE than in Asia do states and their rulers tend to think they represent not just, say, defined territories or peoples with a shared language, but rather whole civilisations, often cosmically ordained. Strongmen running Central Asian states erect monuments to themselves as heirs to nomadic empires. In Cambodia the autocrat, Hun Sen, collects titles such as "Illustrious Prince, Great Supreme Protector and Famed Warrior" in conscious emulation of the former god-kings of Angkor Wat, the jungle complex which itself was built to represent the centre of Hindu and Buddhist cosmology. And in Japan next month a new emperor will be enthroned who is supposedly a direct descendant of Emperor Jimmu, whose reign began in 660BC and whose illustrious ancestors, in turn, include the goddess of the sun. Just being a simple nation-state is not always enough these days.

No country plays up the idea of representing a civilisation more than China does. Visitors to Zhongnanhai, the leadership compound in Beijing, are rarely spared a lecture on how, uniquely, China is an "ancient civilisation with over 5,000 years of history". Although that is an exaggeration, a continuous Chinese state has existed, by and large, since the Qin empire unified a number of warring states in 221BC. It has shaped China's awareness of itself—and how it expects others to treat it.

As Lucian Pye, a sinologist, once wrote, it is as if the Roman or Carolingian empire survived today in its heartland, trying to function as a nation-state. Yet perhaps a civilisation masquerading as a state, as Pye called China, helps explain the modern autocratic state's durability in the face of many predictions of its demise. China's affairs of state are con-

ducted in near-total secrecy in Zhongnanhai, with dark scandals always present. Yet the projected grandeur of government gives all Chinese, as Pye put it, a right to pride and dignity. Or as Xi Jinping, China's ruler, says, a civilisation "carries the soul of a country on its back".

China's sense of itself as a glorious civilisation encompasses a long history, a vast geography, a huge population and the incorporation of lesser cultures and peoples. It is also fostered as the flipside of a sense of victimhood over colonial depredations. India offers many parallels, and it is no surprise that notions of a civilisational state are on the rise there, too. In particular, they are embraced by Narendra Modi, the prime minister, and supporters of his Bharatiya Janata Party, for whom the ancient scriptures of Hinduism, above all, represent the glory and essence of India.

In India Hindu nationalists decry the Western rationalism and universal values embraced by Jawaharlal Nehru and his political heirs. In China enthusiasts of a civilisational state go further, and credit it with the country's development success.



Zhang Weiwei of Fudan University in Shanghai argues that the Communist Party's pragmatism and its gradual approach to reforms are rooted in an ancient awareness of China's vast size and complexity, and in a hard-wired imperial aversion to chaos. Arguments like these provide a convenient primordial imprimatur for all manner of abuses, from the suppression of civil liberties to the rejection of any external criticism.

But history is messy. Those trying to maintain a civilisational mindset must wilfully debase big portions of it. In India, it is not just colonialism and its aftermath that have distorted the true culture in the eyes of Hindu nationalists. They also resent much earlier waves of Muslim conquest and seek to expunge their legacy. Undoing 800-odd years of Islamic influence is impossible, and offensive to India's 190m Muslims—although that has not prevented the BJP from using the idea as a successful organising principle.

The Chinese government, too, often chooses to disregard inconvenient episodes. The violent upheaval of the Cultural Revolution, for instance, sits awkwardly with the claim that the Communist Party is upholding China's time-honoured preference for stability. Other contradictions are even more awkward. The reformist May 4th movement of 1919, which gave birth to the Communist Party itself, was profoundly critical of Confucianism and other conservative aspects of Chinese culture. As the 100th anniversary of the movement approaches, the party will have to perform intellectual contortions as both a convert to the virtues of China's ancient civilisation and as the notional torch-bearer of the May 4th spirit. Confucian ethics are not much guide there.

age household) to all but the richest quarter of Indians. Those to be left out could be identified by their ownership of a car, air-conditioner, large bank balance—or a mansion covered in bougainvillea.

IS NYAY, or something like it, any more likely to become a reality? Congress's electoral prospects look slim. But NYAY's sheer scale may force the BJP to offer something similar in response. Almost 60% of India's poor, at last count, live in the six states that provide 69% of the BJP's seats. Arun Jaitley, the finance minister, argues that the BJP's existing schemes are more generous, taken together, than Congress's proposal. NYAY, he says, is a "bluff" that people will not believe. But in rural Haryana, Rajmati and her clients enjoy entertaining the idea. Do they think an extra 6,000 rupees is too good to be true? It's "too good to doubt", says one. ■

Indonesia's presidential election

General lethargy

BANDUNG

Prabowo Subianto's campaign looks half-hearted

THE CROWD at the University of the Republic of Indonesia in the city of Bandung surges towards the stage in anticipation. Then, to whoops and applause, Prabowo Subianto appears, sporting sunglasses and a traditional *peci*—a sort of small, black fez. After a prayer, the presidential candidate delivers a fiery speech, full of indignation. Indonesia, he says, lags behind neighbouring countries on all kinds of measures, from literacy rates to the performance of its national football team. He blames corruption and foreigners: "If we are weak, we are going to be stomped upon by other nations."

In the campaign for presidential and legislative elections on April 17th, Mr Prabowo is selling himself as the antidote to such weakness. The retired three-star general trades on his reputation for toughness, a stark contrast to his opponent, incumbent president Joko Widodo, or Jokowi, who nurtures a man-of-the-people persona. Mr Prabowo's image is not just a branding exercise. He is accused of committing various human-rights abuses during his military career, including the kidnapping of pro-democracy activists. He was certainly a loyal defender of his father-in-law, Suharto, a strongman whose 30-year rule ended in 1998. That is a plus for many of his supporters, who yearn for a strong government. Naufal Ubaidillah, a student at the rally, says Indonesia suffers from an "inferiority complex" and Mr Prabowo would not be bullied by other countries.

The strongman's clownish side also appeals to voters. At the rally his wisecracking has the crowd guffawing. A campaign brochure released in December played up his lighthearted side. It responded to rumours that his penis was lost in a military accident (not true, apparently) and parried questions about his love of horses ("What is wrong with horses?" it exclaims).

But Mr Prabowo's routine has become rather tired. He ran for vice-president in 2009 and then for the top job in 2014. Both times voters turned him down. Has his offering changed enough to win them round?

Mr Prabowo has toned himself down somewhat. His campaign in 2014 was full of props designed to remind voters of Sukarno, Indonesia's founding father, such as white safari jackets and retro microphones, points out Stephen Sherlock of the University of New South Wales. All of that has gone. He rarely calls for a return to Sukarno's constitution of 1945, which would be a step back for democracy. And he is more forthcoming about being part of the ruling class, although he still derides it.

Mr Prabowo is also less energetic. He used to give speeches in three districts in a day, hopping between them in his helicopter. Today, the 67-year-old can only manage one, often looking worn out. Illness led him to cancel a speech in January. In 2014 televised debates were one of his strengths. Now he looks lacklustre in them. And he seems to have less money to spend, perhaps because his brother, who bankrolled previous runs, has been less generous. Mr Prabowo's aides joke about running a "value-package campaign".

Mr Prabowo's running mate, Sandiaga Uno, a businessman, has picked up the slack. His jam-packed schedule has made him the face of the campaign. He is also a big donor. Last year he raised roughly \$40m by selling shares in his private-equity firm. He may be thinking of the long-run rewards. This campaign will put him in good stead to run for president in 2024.

Jokowi has enjoyed a 20-percentage-point lead in the polls since well before he or Mr Prabowo officially entered the race, in August. Many observers wonder why Mr Prabowo, apparently short of both funds and energy, bothered to run at all. One explanation is that he expected to be campaigning under different circumstances. In August the currency, the rupiah, had fallen to levels not seen since the Asian financial crisis in 1997-98, owing to fears of a global trade war. Some analysts were predicting an imminent downturn, which would have tilted the odds in Mr Prabowo's favour.

Another reason to run is that a big, national campaign helps the parliamentary candidates of the Great Indonesia Movement Party, or Gerindra, the outfit Mr Prabowo founded in 2008. Mr Sandiaga is also a member of Gerindra. Choosing him as a



I'll say this only once

running-mate, instead of a representative of one of the other parties backing the ticket, alienated Mr Prabowo's allies. The decision has led some experts to speculate that Mr Prabowo is less interested in winning the election than in maximising Gerindra's power in parliament. He could then use its clout to retain influence over the government, defend his and his family's interests and perhaps secure a senior job. If that is the plan, it is working: the party is on course for its best parliamentary showing. Mr Prabowo may finally get a seat at the top table, just not the one he always wanted. ■

Regulating social media

Laws against lies

SINGAPORE

Asian governments try to curb fake news and online malice

EVEN ON April Fools' Day, Singapore's government was in no mood for fun. K. Shanmugam, the law minister, warned lawmakers of the dangers of unregulated speech, handing them a list of "offensive song lyrics", which included hits by Lady Gaga and Ariana Grande. Shortly afterwards the government introduced a bill in parliament to curb fake news. If passed into law, which is likely, it would be among the world's most far-reaching. Under its provisions, those found guilty of spreading "false statements of fact" online face fines of up to S\$1m (\$740,000) or a maximum of 10 years in jail. Social-media sites such as Facebook and Twitter would be required to take down posts the government deems false or to publish corrections.

Although few Asian governments have drawn up plans as extensive as Singapore's, ►►

▶ many say they are looking for ways to limit online disinformation. Among the region's autocrats, this is usually code for suppressing criticism. Prayuth Chan-ocha, the head of Thailand's military junta, recently denounced social media as an incubator for "incorrect thinking"—by which he appeared to mean complaints about the election he rigged last month. His government has pushed through several laws that allow it to monitor and curb online dissent.

For governments with purer motives, striking a balance between public security and civil liberties is hard. Taiwan's is worried about disinformation campaigns from China, which it accuses of trying to manipulate Taiwanese elections. This week it announced plans to ban Chinese-owned video-streaming services. The chairman of its National Communications Commission resigned on April 2nd, after being criticised for her failure to tackle fake news.

Australia's parliament, meanwhile, adopted a harsh new law on social media this week in response to the recent mass shooting in New Zealand, which was live-streamed on Facebook and which users tried to share more than a million times. The law allows the authorities to hit social-media companies that fail to remove material showing acts of terrorism, rape or murder with fines of up to a tenth of their annual turnover. Executives, both in Australia and abroad, can be jailed if their companies do not make adequate efforts to remove such posts.

Critics accuse the government, which faces an election next month, of attempting to capitalise on public horror at the atrocity in New Zealand. The bill was written in a weekend and rushed through parliament in just three days before politicians returned to their constituencies to begin campaigning. It includes no detail on

how quickly the content concerned must be removed. Even with bulked-up teams of moderators and new artificial intelligence, it is difficult for firms to expunge offensive material instantly. Complying with the law "would be impossible", says Fergus Hanson of the Australian Strategic Policy Institute, a think-tank.

At least the type of content at issue is relatively clear. Singapore's law gives ministers the initial right to decide what information is both false and injurious to the public interest. That encompasses any untruth that might harm "public tranquillity", "friendly relations of Singapore with other countries" and "public confidence in the performance of...the government". Singaporeans will still be free, the government insists, to express whatever opinions they like. Whether Ms Grande's and Lady Gaga's fanciful lyrics count as opinions or falsehoods, the government has not said. ■

Brunei

The end is Brunei

SINGAPORE

An absolute monarch espouses the absolutely indefensible

THE MOST famous person to have been accused of theft in Brunei is Prince Jefri Bolkiah, the brother of Sultan Hasanal Bolkiah. The government said he embezzled almost \$15bn from a sovereign-wealth fund, and pursued him in courts around the world until he agreed to make some restitution. He has a reputation as a philanderer, too. Several women have claimed that he kept them in sexual slavery in a crowded harem. (The prince named one of his yachts *Tits* and its two tenders *Nipple 1* and *Nipple 2*.) And then there is the question of the vast personal wealth of the sultan himself, who rules the tiny, oil-soaked sliver of Borneo as an absolute monarch. He owns a gold-plated Rolls-Royce, and lives in a palace with air-conditioned stables for 200 polo ponies, which, although perfectly legal, could be seen as wholesale theft from his 430,000 subjects, who derive far less benefit from Brunei's resources than he does.

The sultan, presumably, did not have that kind of theft in mind when he pushed for the adoption of a harsh Islamic penal code, which came into force on April 3rd. Among other brutal punishments, it calls for the amputation of a hand or foot as punishment for thieves, and death by stoning for adultery or sex outside marriage. Sex between men, anal sex and insulting the Prophet are also all punishable by stoning. Whipping is prescribed for all manner of crimes; children are not necessarily exempt.

In practice, the barbarity will probably be limited. For one thing, multiple witnesses to the crimes in question are required for these grisly sentences to be applied. Brunei's prosecutors do not seem that zealous. Although the death penalty has long been on the books, there have been no executions since 1957.

Yet there is no guarantee that Brunei's courts will not implement the new laws. And even if they hesitate, it remains striking that the sultan, without any obvious prodding from his subjects, felt it necessary to bolster his legitimacy by espousing such a cruel interpretation of Islam. Perhaps he wanted to distract them from other, even less defensible aspects of his rule.



Defending the faith in style

Gun control

Never again

SYDNEY

New Zealand's parliament bans semi-automatic rifles

ATTEMPTS TO STRENGTHEN New Zealand's gun-control laws have failed in parliament four times over the past 20 years. That was before a white supremacist laid siege to two mosques in the city of Christchurch on March 15th, killing 50 people. This week a bill to ban the kind of high-powered semi-automatic weapons that he used was introduced; every MP but one supports it. It should sail into law in days.

New Zealand has one of the world's highest rates of gun ownership, with 26 guns per 100 people. That puts it 20th out of the 230 countries and territories ranked by the Small Arms Survey, a research institute. Despite this, it ranks only 172nd out of 195 countries in terms of deaths per person from firearms, according to data from the University of Washington (see chart on next page). Total killings with guns are typically in the single digits each year, out of a population of 4.8m.

The already low rate of killings with guns is one reason why it will be hard to discern the new law's effectiveness. Australia adopted similar legislation in 1996 after a mass shooting in the state of Tasmania. The Australian government banned semi-automatic rifles, created a national gun registry and bought firearms from citizens, as New Zealand intends to. The stock of licensed guns fell by about a third.

Firearm-related suicides and homicides fell after the legislation passed. But ▶▶

A variable toll

Gun ownership and homicides, 2017



Sources: Institute for Health Metrics and Evaluation; Small Arms Survey

*England and Wales

► firearm deaths had already been falling before 1996, and the pace did not notably accelerate. Moreover, gun violence was declining in many other rich countries, few of which had adopted stricter gun laws.

Australia's gun reforms almost entirely eliminated mass shootings. Between 1980 and 1996 there were 13 incidents in which five or more victims were shot to death. There has been just one since. But until Christchurch, New Zealand had not seen any mass shootings in over 20 years, despite the many semi-automatic rifles.

This suggests that social norms have been New Zealand's best defence against mass shootings. But as Philip Alpers of the University of Sydney notes, the killer in Christchurch would simply not have been able to buy such deadly weapons in his home country, Australia. ■

German-Koreans

Where the Rhine meets the Pacific

MAINZ AND NAMHAE

An ersatz German village tries to lure South Korean emigrants home

WHEN SHE arrived in Germany from South Korea in 1967 to work as a nurse, Min-ja Fliess was planning to stay for three years before going home to get married. More than 50 years later, she is still there. Sitting in the living room of Sukil Lee, a 90-year-old paediatrician, in Mainz, a small town in western Germany, she talks about her extended stay. "When I arrived I thought German men were intimidating," she says. Now she has two children with her German husband and returns to South Korea only on holiday.

Mrs Fliess first came to Germany in response to an ad Dr Lee placed in a South Korean newspaper all those years ago. The hospital where he worked was short of nur-

ses, so he was encouraging qualified young Koreans to apply. In total, more than 10,000 South Korean women arrived in the 1960s and 1970s to work as nurses in German hospitals. (A similar number of South Korean men came to work in coal mines during the same period.) The government of Park Chung-hee, South Korea's strongman at the time, supported the exodus because the remittances the emigrants sent back helped to finance industrialisation. A message from the dictator thanking Dr Lee for his efforts hangs on the living-room wall.

For the women who came to work in Germany, life was not easy. Often barely out of their teens, they had to sign contracts they could not read and to start work straight off the plane. The gulf between their home country, where rapid development was only just beginning, and West Germany, which was in the midst of "the miracle on the Rhine", was immense. "Nobody could find Korea on the map," says Park Hwa-ja, who arrived in Germany the year before Mrs Fliess. Some of the women could not cope with the alienation of being alone in a strange country. Dr Lee recalls once being called to the hospital in the middle of the night to identify the bodies of two nurses who had committed suicide.

Today Ms Park and Mrs Fliess stress how glad they are to have moved to Germany. But they still appear happier chatting to each other in Korean than in German. A certain unease lingers. Mrs Fliess says her son, though born in Germany and now a doctor, still finds it tricky to live there. "When he was young people used to call us 'Chinesen' (Chinese), and he'd get angry and say, 'I'm German'."

On the other side of the globe, in South Korea, Ryu Gil-ja is grappling with the opposite problem. "People here don't like strangers, and I've been away too long," she says. Like Mrs Fliess and Ms Park, Ms Ryu (whose German surname is Werner) moved from South Korea to Germany in the 1960s in response to a newspaper ad. Like Mrs Fliess, she married a German and ended up staying for decades. But unlike the other two women, she is happier today speaking German than Korean. Also unlike them, she eventually decided to go back to Korea.

Ms Ryu's return is part of an experiment initiated by Kim Doo-kwan, an MP who was born in Namhae, an island-county on the southern coast of the Korean peninsula, and used to be a local official there. In the 1990s, seeing the difficulties that his brother, a miner, and his sister-in-law, a nurse, met when they returned to Korea after long stints in Germany, he decided to create a place for people like them to return to. He advertised the idea among Koreans living in Germany, and lobbied the German and Korean governments to support it. The result is Namhae German Village.

The village was built on a hill overlook-

ing a tranquil bay. So long as visitors avoid glancing down at the Korean-looking fishing village on the shore below, the ersatz Germanness is rather successful. There are beer gardens and breweries (one serves a stout called "Miner's melody"), a square for Oktoberfest celebrations, plenty of adverts for *Wurst* and *Schnitzel* and a lot of the red rooftiles typical of suburbs in south-western Germany. The houses in the village are named after German cities and supposedly reflect regional building styles—or at least a kitschy imitation of them.

Ms Ryu's house, which she designed herself and built with help from the Korean government, is named "Villa Colonia" for Cologne, her longtime home in Germany. It sports a fairy-tale tower and an entrance with a portico. The hallway is decorated with photographs of Cologne's cathedral. In the living room, the dark-wood furniture and heavy oriental carpets are reminiscent of Dr Lee's house in Mainz. (There is a Mainz-themed house down the road.)

As a tourist attraction the village has become quite popular, much like other Korean-themed "folk villages" dotted around the country. Ms Ryu, like many of her neighbours, runs a B&B from her home. A small museum sponsored by the German government that tells the story of the emigrants draws around a quarter of a million visitors every year. They can admire old nursing uniforms, listen to the sounds of a coal mine and watch a rousing nationalist film glorifying the emigrants' contribution to Korea's economic growth. Many more people come just to take in the views of the bay or enjoy a beer and a meal, according to the county office.

Whether the village has been successful in convincing emigrants to return and helping them to resettle is less clear. It has only a few dozen inhabitants, and only a handful of those are former nurses or miners who responded to Mr Kim's initiative. The German government estimates that roughly half of the Korean women who came to work as nurses ended up returning home. But most moved to Seoul or went back to their hometowns. There was no systematic effort to track how hard they found it to reintegrate.

Ms Ryu is happy with her choice, despite the remoteness of the village and the dearth of neighbours. "I always wanted to build my dream home back here in Korea and live in it, and I have done that." Her German husband is less enthusiastic. He has stayed in Cologne and only occasionally visits. Her two grown-up children also remain in Germany. But Ms Ryu has ensured that her family will join her eventually. On a nearby hillside, above a German *Imbiss* (snack) stall, she has secured a plot in the village graveyard. A headstone already bears not only her name, but those of her husband and children. ■



Extradition

Back to the mainland

HONG KONG

A draft bill would allow Hong Kong to hand suspects to China's police

"TRUSTING CHINA is like trusting pigs can climb trees!" read one of the many sardonic placards held by protesters. Despite a chilly drizzle, thousands of Hong Kongers rallied at the headquarters of the territory's government on March 31st. Many chanted slogans denouncing Carrie Lam, Hong Kong's chief executive. Pro-democracy activists delivered rousing speeches. A little farther out, a gaggle of masked demonstrators waved banners calling for Hong Kong's independence.

The demonstration was about a bill that, for the first time since Hong Kong's return to Chinese rule in 1997, would allow the extradition of criminal suspects from the territory to China's mainland. On April 3rd a draft was presented to Hong Kong's legislature, which is all but certain to approve it. By China's design, pro-establishment lawmakers have a majority.

Under their "one country, two systems" arrangement, Hong Kong and the mainland are separate jurisdictions. The territory has concluded its own extradition deals

with 20 other countries, including America, Britain, Canada and Germany. But Hong Kong's law on the surrender of fugitives, which was passed shortly before the handover, in effect prohibited the handing over of suspects to the mainland by specifying that the legislation does not apply to "any part" (later amended to "any other part") of China. The new bill would scrap this exclusion. Johannes Chan of the University of Hong Kong said the omission of China had helped to reassure countries signing extradition deals with Hong Kong that people would not be re-extradited to the mainland. Countries that have done so have been assured that the new bill will not be applied retrospectively.

China believes that more than 300 fugitives from the mainland are lying low in

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36 A colossal new airport

— Chaguan is away

Hong Kong, a former senior Chinese police official recently told the territory's public broadcaster, RTHK. Most are suspected of economic crimes such as corruption. But some Hong Kongers worry that Hong Kong's government, which often bows to the Communist Party's demands, might use the bill to turn over dissidents and other political troublemakers at the central government's request. Unlike Hong Kong, the mainland offers the right to a fair trial only in name. The bill does not cover political crimes. Hong Kong may refuse an extradition request if a suspect faces execution. But the party often pursues its enemies by accusing them of non-political offences.

Anxieties about the bill have been fuelled by China's apparent frustration with the use of Hong Kong as a safe haven by those it dislikes politically. In 2017 Xiao Jianhua, a Chinese billionaire with close links to powerful families in China, was snatched from Hong Kong by plainclothes agents and taken to the mainland. In 2015 five Hong Kong booksellers mysteriously vanished, only to resurface on the mainland in custody. One of them was abducted from Thailand, another from Hong Kong itself. Their offence was selling gossip books about Chinese leaders. One of them, Lam Wing-kee, who was detained while crossing the mainland-Hong Kong border and released after months of interrogation, was at the forefront of the protest against the bill (he is pictured, wearing a baseball

▶ cap). Mr Lam says he plans to leave Hong Kong before the bill is enacted to avoid being ensnared by it.

Perhaps to avoid focusing on potentially controversial extraditions to the mainland, Hong Kong's government justifies the legal change in a roundabout way. In February last year a Hong Konger fled back to the territory after allegedly murdering his girlfriend in Taiwan. Officials in Taiwan want Hong Kong to hand him over. But Hong Kong says it is prevented from doing so by the law's inapplicability to other parts of China. Hong Kong's official stance is the same as China's: that Taiwan is part of the People's Republic. Alvin Yeung, the leader of the pro-democracy Civic Party, accepts that there is a strong case for extraditing the suspect to Taiwan. But he says there is no need for a legal revision as big as the one proposed; the law, he argues, should merely be tweaked to exclude extraditions to "mainland China." That would still allow suspects to be sent to Taiwan.

The proposed bill says that to be eligible for extradition, a suspect must be accused of committing at least one of 37 offences. They include murder, kidnapping and rape. A few relate to white-collar crime. Hong Kong's government insists that adequate measures are in place to guard against politically motivated extraditions. Holden Chow, a pro-establishment legislator, says that even if the mainland were to try to secure the extradition of a political offender by accusing that person of a non-political crime, Hong Kong's courts would be able to find the "disguised motive" and refuse the request. But Mr Chan, the academic, says the burden is on the defendant to prove political intent, which is hard.

After lobbying by businessmen, the local government agreed on March 26th that the bill would not cover nine crimes that are commonly covered by Hong Kong's extradition deals. These include tax violations and unlawful use of computers. The government also decided that extraditable offences should only involve those punishable by at least three years in prison instead of just one. That was a relief to some Hong Kongers who feared being handed over for trivial reasons. But many still worry that some extraditable offences are too sweeping, such as crimes "relating to bribery".

People in Hong Kong who worry about extraditions to a legal system so lacking in due process have company elsewhere. Only around 40 countries have ratified extradition treaties with China. Very few are rich democracies (France, Italy, Spain and South Korea are exceptions). *China Daily*, a mainland government mouthpiece, accused critics of the bill of "scaremongering" and said the law would "not be abused in any way". In a territory where many people have misgivings about Chinese justice, it will be hard to instil confidence. ■

Aviation

The sky's the limit

DAXING

Beijing is building a colossal new airport. Delays will still be common

OFFICIALS USE many superlatives to describe a massive new airport nearing completion in Daxing district on Beijing's southern edge. It deserves them all. The golden-roofed terminal (pictured) is a triumph of design by Zaha Hadid, an Iraqi-born British architect who died in 2016, a few days after work on the edifice began. At 180,000 square metres the building's steel roof, they say, is the largest of any airport terminal. The ground floor has the world's biggest seamless single slab of concrete. It covers nearly 250,000 square metres, roughly the area of 35 football pitches. The state-owned firm in charge of building the airport says construction has involved "unprecedented" difficulty.

It was only just over a decade ago that the capital was boasting the completion of what it then called the world's largest man-made structure—terminal three of the current main aviation hub, Beijing Capital international airport. That building (also designed by a British architect), along with a new runway, more than doubled the airport's capacity to 80m passengers per year. Last year, however, Capital airport handled more than 100m travellers, making it the world's second-busiest, after Atlanta in America. Beijing is "very ready for another new airport", says a foreign airline executive. Daxing airport will have four runways, compared with three at Capital.

In many other countries, a project on this scale would be beset with delays and

cost overruns. But as always with big projects in China, NIMBY-ish concerns have been ignored. Officials had a free hand to requisition land for the airport: 13 villages were demolished and about 20,000 people relocated to make way for it. The construction manager, Li Jianhua, says Daxing airport is on budget (it is costing 80bn yuan, or nearly \$12bn) and on time. It is due to open in September. Officials call it a gift for the communist country's 70th birthday, which will be celebrated on October 1st.

The airport is also intended as a gift for the relatively underdeveloped region south of the capital where it is located (67km from Capital airport in the north-east). It is roughly equidistant between the centre of Beijing and a new city, Xiongan, that is being built in Hebei province, south of Daxing, to relieve population pressure on the capital (Xiongan is a project cherished by China's leader, Xi Jinping, as is the airport). The cost of new infrastructure around Daxing, including road and high-speed rail links between the airport, Xiongan and downtown Beijing, is four times as much as the facility itself.

China needs many more new airports. The International Air Transport Association predicts that by the mid-2020s China will surpass America as the world's largest aviation market. By 2037 China will be serving 1.6bn air passengers yearly, 1bn more than in 2017, it reckons. But airlines also need more room in China's sky. The People's Liberation Army keeps rigid control of around 75% of Chinese airspace, a far greater share than most other countries reserve for defence purposes. It is reluctant to loosen its grip, say many in the industry. As a result, passengers often suffer long and unpredictable delays, especially in the corridor between Beijing and Shanghai, China's busiest. If traffic grows as projected, the congestion will get worse. ■



Plenty of space to stretch out while waiting, and waiting



Algeria

Bouteflika bows out

AMMAN

Will the president's resignation lead to real reform?

EVEN HIS critics found Abdelaziz Bouteflika's last moments as president difficult to watch. After two decades in power, the Algerian leader stepped down on April 2nd. Slumped in a wheelchair, dressed in a baggy *djellaba* robe instead of his usual three-piece suit, he looked like a doddering old man roused from bed in the middle of the night. He struggled even to hand his letter of resignation to the head of the constitutional committee (a stroke in 2013 left him an invalid). Mr Bouteflika styled himself a partisan and a politician who fought for Algeria's independence and led the country out of civil war. There was no glimpse of that man in his final public appearance as president, only a frail shell.

Algerians flooded into the streets to celebrate a moment that was unthinkable two months earlier. Mr Bouteflika was tipped to win a fifth term as president, the only viable candidate in a stage-managed election. But in near-daily protests since February 16th, hundreds of thousands of Algerians demanded his resignation. Years of corrup-

tion and mismanagement had left the oil- and gas-rich country with a big deficit and an unemployment rate of around 12%. Mr Bouteflika's subjects were unwilling to endure five more years under a president barely able to speak.

Le pouvoir (the power), as the officers and oligarchs who really call the shots are known, stalled for time. In March Mr Bouteflika, or whoever drafted the letter for him, promised not to stand for re-election and to oversee a transitional period. Then he offered to quit before the end of his term on April 28th. None of this appeased the street. Nor did it pass muster with the army chief, Ahmed Gaid Salah, who asked the

government to declare Mr Bouteflika unfit and remove him. In the end it was General Salah's threats that drove the president out of power: though described as a resignation, it looks more like a sacking.

Abdelkader Bensalah, the head of parliament's upper house, becomes interim president and must organise elections within 90 days. Mr Bensalah, a Bouteflika loyalist, is familiar with the duties, for he often stepped in when the ailing president was too ill to welcome foreign dignitaries and suchlike. He backed the president's plan to seek a fifth term and did not endorse the protests. His elevation may give succour to Mr Bouteflika's allies—except that many of them seem to be in custody.

It is hard to separate fact from rumour right now: Algeria's politics are opaque and it lets in few foreign journalists. But there are credible reports that Said Bouteflika, the president's powerful brother, is under house arrest. Ali Haddad, a construction magnate who grew rich off state contracts, was detained last month while trying to cross the Tunisian border, supposedly with a large sum of cash in his car. He served for years as the head of Algeria's main business federation and was a Bouteflika ally.

The regime is justifiably worried about capital flight. Within three months of the revolutions in Egypt and Libya in 2011, residents had withdrawn \$8.6bn, says the Bank for International Settlements, a Basel-based financial institution. Many of Mr

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39 Sexuality and gender in Iran

40 Uganda waits for its oil to flow

40 Political slang in Africa

► Bouteflika's allies made a fortune through corrupt contracts and want to protect their gains. Ahmed Ouyahia, four times prime minister, was barred from leaving the country (allegedly while trying to drive his Mercedes onto a ferry bound for Spain). He denies reports that he sold his home in Hydra, a wealthy district of Algiers. The villa is rumoured to be worth some \$4m, a princely sum on a civil servant's salary.

But the list of detainees looks rather like a purge orchestrated by General Salah. A former president, Liamine Zéroual—himself pushed out by the army in 1999—recently wove a tale of intrigue in a letter to an Algerian newspaper. He claimed that Mohamed Mediène, a retired spy chief who was the longtime *éminence grise* of Algerian politics, asked him to oversee a transitional period. Saïd Bouteflika reportedly blessed the scheme. If this story is true, or even if General Salah believed it to be, the army chief may have seen himself frozen out of Algeria's future and therefore made a pre-emptive strike.

After eight years of turmoil in the Arab world, it is tempting to search for parallels. Egyptians see a repeat of what happened to them in 2011. The army shunted Hosni Mubarak out of power, the opposition fractured, and the regime later returned with a vengeance. These are imperfect analogies. After the revolution Egypt's politics became a negotiation between the army and the Muslim Brotherhood. There is certainly an Islamist current in Algerian politics, but there is no equivalent to the Brotherhood, a monolithic group with deep popular support and a vast network of cadres.

Bye-bye, Bouteflika

The path to the president's departure

February 2019

- 16th Small protests break out in provincial cities
- 22nd First big protest in Algiers, the capital
- 24th President Abdelaziz Bouteflika arrives in Geneva for medical treatment

March

- 3rd Bouteflika's campaign director files paperwork for the president to stand for re-election on April 18th
- 10th A general strike is called, as Bouteflika returns from Geneva
- 11th Bouteflika postpones the election and says he will oversee a political transition
- 15th Largest protest to date
- 26th The army chief asks parliament to declare Bouteflika unfit for office
- 31st Bouteflika forms a new government

April

- 1st Bouteflika announces that he will step down before his term ends on April 28th

2nd Bouteflika resigns

Source: *The Economist*



What is clear, though, is that the demonstrators will not be satisfied with Mr Bouteflika's departure. After he quit, the private Ennahar channel aired footage of a middle-aged man wading into a crowd of protesters to shout praise for General Salah. "The army of liberation...freed the people," he said, likening it to when Algeria won independence from France. His audience was unmoved: "Down with the gang!" one man replied. From the start, the protesters have demanded the removal of not just the president, but the entire ruling clique. Activists are planning another rally for April 5th.

But Algeria's opposition is disorganised and leaderless; and, with an election now looming, it has precious little time to organise and field candidates. Last month activists announced an umbrella group

called the National Co-ordination for Change and called for free elections, social justice and civilian control of the army. Some members of the group immediately disavowed the platform. Liberal-minded members are uncomfortable sharing a stage with Islamists. Thankfully for them, *le pouvoir* looks increasingly disorganised as well. The clans who wielded power during Mr Bouteflika's long rule are now locked in a battle to survive.

Intrigue and uncertainty do not detract from the enormity of what Algerians have achieved. In less than two months their peaceful, popular protests dislodged a president who ruled almost unopposed for two decades. And they note, darkly, that the Arab spring gave them guidance on how not to proceed. Whether they can chart a happier course remains to be seen. ■

Jews among Arabs

Old ties, new interest

DUBAI

The Arab world is rethinking its relationship with its Jewish past

IT IS SIMPLY called "the villa". Its white walls have no markings and an official permit is pending. For its founders, though, the low-key opening of the Arab world's first new synagogue in generations signals the dawn of a Jewish revival. Standing near the beach-front in Dubai, the synagogue offers Hebrew classes and kosher catering and has just acquired a rabbi. "The promise of our community is the rekindling of a Judeo-Islamic tradition," says Ross Kriel, president of the new Jewish Council of the Emirates.

That may sound unduly hopeful in the Arab world, which uprooted its 800,000 Jews in the decades after the creation of Israel. But, surprisingly, Arab leaders from Morocco to Iraq are repeating the message. In February Egypt's president, Abdel-Fattah al-Sisi, said he would build new synagogues if the country's Jews returned. His government is restoring the Eliyahu Hanavi synagogue in Alexandria (pictured on next page), once the Middle East's largest. It is also cleaning up the vast Jewish cemetery, flooded with sewage, in southern Cairo. And for the second time under Mr Sisi, Egyptian television has scheduled a soap-opera about Jews to run during the Muslim fasting month of Ramadan. It tells of a soldier's steamy affair with a Jewish woman.

Others in the Gulf are following Dubai's lead. "I feel more comfortable wearing a kippa in Bahrain than Berlin," says Marc Schneier, an American rabbi working to "develop Jewish life" in five Gulf states. The

Muslim World League, Saudi Arabia's missionary arm and long a bullhorn of bigotry, marked Holocaust Day with a letter in Arabic condemning Holocaust denial. Muhammad al-Issa, its head, plans to lead a multi-faith delegation to Auschwitz. "Circumstances have changed," he says.

After decades of hate speech, cynics deride this *volte face* as a publicity stunt by Arab dictators seeking Western approval. But the Arab spring in 2011 swept away a host of taboos. People challenged long-standing state ideologies as never before. From Iraq to Libya, a swathe of politicians, film-makers and academics, from secular types to the Muslim Brotherhood, have been re-examining the past, including the post-1948 eviction of Jews.

Released from the fear of the censors, the internet has enabled Muslims and Jews to leapfrog borders and passport controls. Virtual communities have grown online. "I talk to friends in Baghdad all night," says an Iraqi Jew in London who left Baghdad in the 1960s. Last year a popular Arabic Facebook site ran a poll on whether to restore Iraqi citizenship and the right of return to Jews exiled 70 years ago. Over three-quarters of the 62,000 participants voted yes.

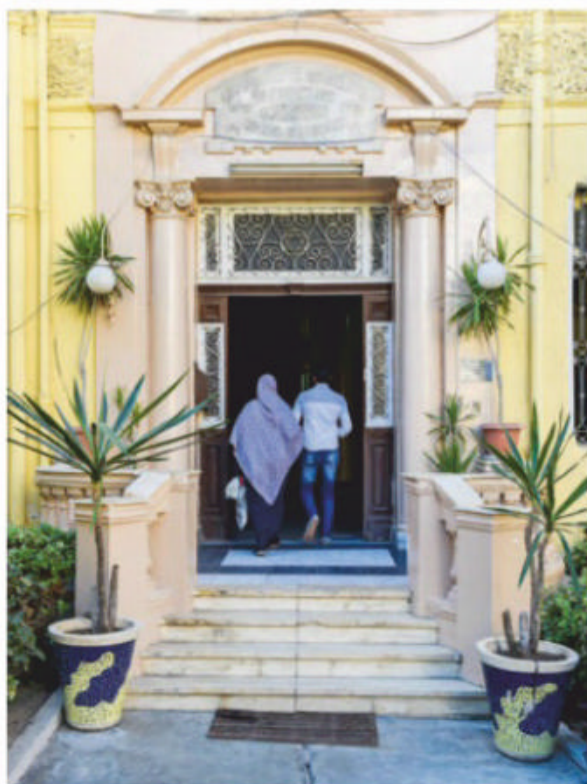
Television, books and student campuses reflect this cultural shift. Arab documentaries search for Jewish diasporas that once lived in Arab lands. A new generation of Arab novelists elevates Jews from bit-players to centre-stage. "I wrote it to show that Jews are part of our culture," says Amin ►►

► Zaoui, the Algerian author of “The Last Jew of Tamentit”. The Arabic translation of Luce Lagnado’s “The Man in the White Sharkskin Suit”, the memoir of an Egyptian Jew, has had multiple reprints.

Hebrew departments in Arab universities, once the preserve of would-be spooks, have mushroomed. Today 13 Egyptian universities teach Hebrew, up from four in 2004. Some 3,000 Egyptian students will finish their Hebrew studies this year, double the number five years ago. Even Syria’s state news agency has a Hebrew website.

For all this reappraisal, the Arab world today is a far cry from the early 1950s, when Egypt’s first president, Muhammad Naguib, went to synagogue on Yom Kippur and Muslims prayed next to Christians and Jews at the graveside of Moses Maimonides, a medieval rabbi, in Cairo. From Tlemcen in western Algeria to Qamishli in Syria’s north-eastern corner, ornate ancient synagogues rot away. “They’ll take everything when we die,” says one of the last Jews in Damascus. Under the guise of preserving Jewish heritage, some outfits backed by Arab governments plan to seize disused property. The old invective dies hard. “They don’t need a second homeland,” said a Salafist, after an Algerian minister suggested reopening the synagogues.

Still, spikes in tension over Israel no longer spark anti-Jewish pogroms. Some Palestinian politicians still whip up anti-Jewish feeling, but many speak Hebrew and have greater awareness and understanding than before. A surprising number of researchers uncovering the Middle East’s Jewish past are Palestinian. Some even speak of a common fate with dispossessed Arab Jews. “We’re entering an age of post-colonialism,” says a Christian cleric from Cairo. “We’re again learning how to see richness in others, not threats.” ■



Will any Jews follow?



Sexuality and gender in Iran

Pressure from above

Why Iran is a hub for sex-reassignment surgery

“I REALISED QUITE early on that I was gay,” says Soly, a 25-year-old chef from Tehran. As a young boy, he would strut about the house in his mother’s high heels and developed crushes on male cartoon characters. But after he was expelled from school for wearing eye-liner, his parents took him to a psychologist who offered a different explanation. “He told me I was transgender and had to change my sex.”

Attitudes towards sexuality can be rigid in Iran. A conservative former president, Mahmoud Ahmadinejad, once declared that the country didn’t have any gay people. So it seems an unlikely hub for sex-reassignment surgery. But the procedure has been permitted since the mid-1980s, when Ayatollah Ruhollah Khomeini met a trans woman called Maryam Khatoon Molkara, who had been thrown into a psychiatric institution and forcibly injected with male hormones. Moved by her story, he issued a *fatwa* allowing the procedure, which a cleric later compared to changing wheat into bread. Today the government even helps with the cost.

But the regime’s encouragement of sex-change surgery is related to its intolerance of homosexuality, which is a capital offence. Gay Iranians face pressure to change their sex regardless of whether they want to, say activists and psychologists in Iran. Therapists tell patients with same-sex desires that they may be transgender, not gay.

“I thought I was trans until I was 18, because the only information online and in newspapers was about transsexuals,” says a psychologist in Tehran who is a lesbian. “It is a system where homosexuals are not educated and the law does not protect them.”

Before going under the knife, patients must receive counselling to ensure that they have gender dysphoria and are prepared for the procedure. But often this process is rushed and standards are not properly observed. Shahryar Cohanzad, a urologist who performs the operation, received 75 referrals in 2017, but only operated on 12 people, having concluded that 63 were gay or confused due to a lack of information. Questions have also been raised about the quality of the procedure in Iran: the United Nations has detailed grisly stories of botched operations.

Even though the clerics allow it, those who transition say there is still a stigma associated with being transgender in Iran. Some tell of being disowned by their families and having to work as prostitutes, for lack of other choices. “For almost four years after my transition no theatre director hired me,” says Saman Arastoo, a well-known transgender actor and director. Soly’s father, by contrast, threatened to kill him after he refused to transition, so he fled to Canada, where he enjoys his new freedom. Sometimes he even walks to work in high heels. ■

Oil in Uganda

Sticky expectations

KAMPALA

Uganda tries to dodge the dreaded “resource curse”

“LIKE SHOE polish”, is how one oilman describes Uganda’s black stuff. It is waxy when heated and solid at room temperature. Some 6bn barrels lie in the western region around Lake Albert, of which 1.4bn may be recoverable. Commercial discoveries were first made in 2006—the biggest onshore oil finds in sub-Saharan Africa for two decades. But if the oil moves slowly, so too does oil development. Production is not expected to begin until 2022 at the earliest.

Waiting is hard. Researchers have long worried about a “resource curse”, as oil distorts economies, corrupts politics and fuels wars. Now some warn of a “resource curse”, which strikes even before the first drop is pumped. Ghana and Mozambique found large reserves, of oil and gas respectively, at around the time that Uganda did. Both lurched into economic crises. Uganda is trying to learn lessons.

The main one is patience. Ghana borrowed heavily, eager to cash in on future oil revenues. By 2012, even with the oil flowing, the government was racking up big deficits; in 2015 it needed the IMF to bail it out. Mozambique sold bonds and took out hidden loans, then plunged into a debt crisis when they were exposed. As part of a restructuring deal the government has promised bondholders a share of gas revenues, which are still four years away. Its former finance minister is now in a South African jail, fighting extradition to America.

Borrowing binges are often based on inflated expectations. In a paper from 2017, James Cust of the World Bank and David Mihalyi of the Natural Resource Governance Institute, a think-tank, analysed 236 oil discoveries around the world between 1988 and 2010. They looked at IMF growth forecasts made after oil was found, then checked to see if the predictions were right. On average, countries grew slower than anticipated, even before any oil was pumped: in the six years after a discovery, forecasts fell short by 0.8 percentage points per year. In places with especially weak institutions the gap was 1.4 percentage points.

That bodes ill for Uganda, where Yoweri Museveni, the president, keeps a tight grip on power. But when it comes to oil his political dominance has made it easier to plan long-term, argue Angelo Izama, a Ugandan analyst, and Sam Hickey of the University of Manchester. In Ghana, which is more democratic, leaders struggle to think be-

Political slang in Africa

The word on the kona

KAMPALA

A new dictionary captures how Africans talk about politics

THERE ARE TWO ways to talk about politics. One describes the dry mechanics of government. The language of bills and ballots, cabinets and coalitions, is similar the world over. The other is inventive, diverse and bleakly humorous—the idiom of the street, or what in Tanzania they call the *kona* (corner).

A new dictionary of African politics, published by Oxford University Press, tries to capture this richness. It describes people, institutions and events, and defines theoretical terms. More significant, the editors used social media to crowdsource the terminology of the *kona*, getting hundreds of responses.

In Benin, for example, switching parties is called “transhumance”, a term that normally describes the migration of

cattle-herders. In Ghana “skirt-and-blouse voting” means picking a president from one party and a member of parliament from another. The opposite is “three-piece-suit voting”, when Kenyans back the same side throughout.

Some terms describe tactics to challenge bigwigs: for instance, *toyi toyi*, a dance used in South Africa to protest against apartheid. A quieter method is the *ville morte*, where people in French-speaking Africa shut down the city by staying at home. During elections in 2016 some Zambians escaped a walloping by wearing the green of the ruling party, even while secretly backing the opposition, which wears red. Opposition leaders called it a “watermelon campaign”.

Corruption inspires a menu of euphemisms. Swahili-speakers might call a bribe *mchuzi* (sauce). In French-speaking Africa graft is *bouffer* (to gobble down); in parts of west Africa the verb is “chop”, from the pidgin for eat. This metaphor reached its apogee in 2014, during a governor’s race in Nigeria. One candidate promised “stomach infrastructure”, such as rice and chickens. He won.

Why so much talk of corruption? Partly because it is a real problem; partly because Africans, like outsiders, stereotype the continent, says Sa’eed Husaini, a Nigerian, one of the dictionary’s editors. But then America, with its gerrymandering and pork-barrel spending, has a rich political vocabulary. Maybe it is just that the sharpest practices all over the world inspire the most creative wordplay.



Actually, I was talking about your outfit

yond the next election. They rushed to the pumps before rules were in place. In Uganda, by contrast, the government held out for better deals from the oil companies. Technocrats were given space to work.

The Ugandan fields are being developed jointly by Total, a French oil major, CNOOC, a Chinese state-run giant, and Tullow, a British firm. They have tussled with the government over tax, a refinery, and the tariff charged to get oil to the Tanzanian coast, down what will be the longest heated pipeline in the world. Disagreements have delayed a final investment decision on the oil project, now expected later this year.

The worry is that Uganda’s patience will run out. The country has less oil than many Ugandans think. Shared out equally, each citizen would get about two barrels a year at peak production (against 39 in Angola and 261 in Norway). Within three decades it will

be gone. The government, prudently, has not issued dollar-denominated bonds. But public debt, which stands at 43% of GDP, has doubled in a decade. Some of it will need to be renegotiated if oil does not arrive on time, warns Adam Mugume, head of research at the central bank. The government has dipped into the Petroleum Fund, which holds tax revenues collected from the oil companies, to plug budget holes.

Mr Museveni is increasingly resorting to patronage politics as his popularity dwindles. He shields the oil sector from scrutiny. Lawyers in the western region report a spike in land conflicts; civil-society groups complain they have been blocked from visiting affected villages. Innocent Tumwebaze, one of 7,000 people displaced to make way for a refinery, is already disillusioned with oil. “Maybe it will benefit others,” he says, “but not me.” ■

TQ

The Economist
Technology Quarterly:
Synthetic biology

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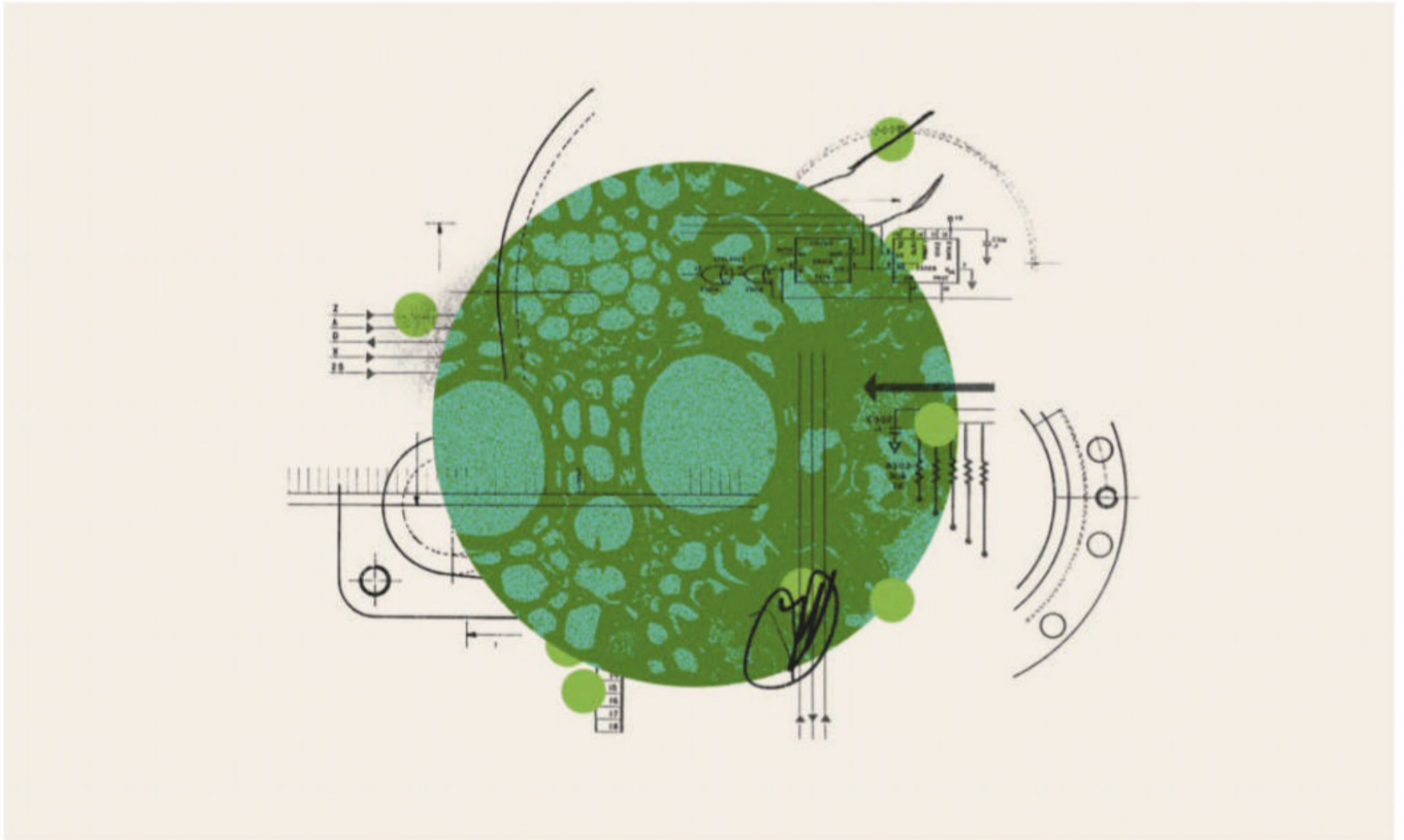
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A whole new world

The engineering of living organisms is not yet changing everything. Give it time, says Oliver Morton

BIOLOGY IS A way of structuring matter at a molecular scale by slotting each atom into its needful place. It is a way of controlling flows of energy on every scale from that of the smallest living cell to that of the whole living planet. It is a way of growing order and surprise in a universe that in all other respects tends towards entropic stagnation. And it is a thicket of limits on how long lives can last and how much life can accomplish.

It is also a way of packing 3,500 excited young people into the Hynes Convention Centre in Boston, Massachusetts. More than 300 teams from 42 countries took part in the annual International Genetically Engineered Machine (iGEM) competition there last October. By encouraging such teams to co-operate and compete in its Grand Jamboree, the iGEM foundation is hoping to create a framework for a synthetic-biology industry which combines molecular biology and engineering to achieve specific goals. Over the summer the young people went from an idea about something biological that might meet a human need, to designing new genes and seeing how well their ideas worked.

The projects presented to judges and peers at iGEM covered a remarkable range. There was an attempt to give bacteria a human sense of smell; there were fungi that could be used to build bases on Mars. The Great Bay team of Chinese high-school students won an award for synthesising the active ingredient of catnip in yeast and bacteria; they think it may help programmes which round up stray cats. Post graduates at the University of Marburg won an award for new genetic tools that will make a very fast-growing bac-

terium, *Vibrio natriegens*, easier for other engineers to use.

Not all iGEM projects pan out; one of the things teams learn is that, though engineering organisms is now possible, it is still difficult. Life can be very recalcitrant. Even so, there are already 32 startups around the world that began life as iGEM teams. Ginkgo Bioworks, a firm which grew out of teams from MIT that competed in 2004 and 2006, builds new organisms for clients in agriculture and the chemicals industry at an astonishing rate in its labs on the other side of Boston. It has attracted \$429m of investment.

However, the Grand Jamboree is not primarily a route to riches. It is a celebration, and an exploration, of technology that will, in time, change the living world far beyond the test tube. Human engineering of the inanimate has produced a range of wonders from cities of towering glass to the fused sand that sits at the heart of computers. It is entirely plausible that engineering the animate could produce wonders as great and as various—and as unimaginable today as skyscrapers and silicon chips were 200 years ago.

Shining, shimmering, splendid

Humans have been turning biology to their own purposes for more than 10,000 years. They have reshaped crops and livestock through selective breeding and changed the structure of ecosystems by moving species around—most notably in the “Columbian exchange” that mixed together the fauna and flora of the New World and the Old. Having learned, in the 1950s, that genes were written on long molecules of DNA like stock prices on tickertape, by the ▶

► 1970s scientists were able to start to move traits from organisms in which they evolved to organisms in which they could be useful by cutting and pasting pieces of that tickertape. That ability became the basis of the biotechnology industry.

The key enabling technology for synthetic biology is the ability to write new chemical messages on to fresh bits of tickertape, rather than just move nature's old messages from genome to genome. Machines capable of synthesising DNA letter by letter started to appear in the late 1980s. A decade later there were companies offering to write out almost any sequence of DNA letters you asked for and courier them straight to you. No longer limited by the genes they found in nature, biologists were able to get cells to work in whole new ways—to reprogram them.

That new ability underlay the three turn-of-the-century academic trends which came together to form synthetic biology. One of these was centred on engineers at MIT who had, from the 1960s to 1980s, pioneered the computer and internet revolutions. The plummeting price of DNA-sequencing technology—machines that have only to read, as opposed to write, the tickertape of life, and thus work a lot faster—made it obvious to them that biology, like computing, was based on digital code and capable of making progress at exponential speeds. From this they concluded that cells could, in principle, be engineered in the same way that circuits and software are.

Programming in nature is extremely convoluted, having evolved with no intention or guidance. And there is no helpful manual. But if you could synthesise genes that provided new, simpler ways of doing things, you would be liberated from having to understand the old ones. Life could be transformed into something more amenable to an engineering approach, with well-defined standardised parts. Tom Knight, one of the pioneers at MIT, and his colleagues saw in this sort of biological engineering something similarly world-changing to their work on the early internet and pre-PC computer workstations. And they found a generation of eager students whose first great “wow” moment in the cinema had been the re-engineered dinosaurs of “Jurassic Park”.

The second ingredient that went into synthetic biology came from academics who were thinking along similar lines in the opposite direction; instead of trying to work round natural mechanisms they wanted to work towards recreating them. They were particularly interested in the systems by which cells turn genes on and off. Only when a gene is on, or “expressed”, will a cell make the protein described by that gene's tickertape sequence. When it is turned off, or “repressed”, the protein's production stops. Because proteins are the molecules that carry out almost all the tasks that go on in a cell, which genes are expressed when is fundamental to

Amid all this revolutionary talk, young companies in the field made a fateful decision to plunge into biofuels



how cells work—and to how a brain cell, say, differs from a muscle cell, or a cancer cell from a healthy one.

In 2000 two teams published designs for novel genetic “circuits” with which they could control the expression of one gene with a protein made by another. In one of the gene circuits the carefully fashioned genetic switches flicked each other on and off over time. Genetic circuitry like this “repressilator” was child's play compared with the co-ordinated gene expression that evolution has programmed into leaves and eyes. But

as one of the creators of the repressilator suggested, perhaps with Richard Dawkins's metaphor of evolution as a blind watchmaker in mind, “at this stage one can learn more by putting together a simple if inaccurate pendulum clock than one can by disassembling the finest Swiss timepiece.”

The third ingredient was more practical: metabolic engineering. Life uses proteins called enzymes, which catalyse chemical reactions, to build all the other molecules it needs, with a different enzyme for each step of the construction. Sometimes the end product of such a metabolic pathway is something humans have a use for, such as a hormone, an antibiotic or a pesticide.

Being able to write DNA from scratch allowed metabolic engineers to bring together genes from a number of different organisms to build new pathways, thus offering the prospect of making molecules beyond the reach of chemistry for less than the cost of harvesting them from plants. The most striking project, led by Jay Keasling, a professor at the University of California, Berkeley, was a pathway which created a precursor to artemisinin, a molecule made by a plant called Chinese sweet wormwood that had been discovered to be a very good malaria drug. It was impossible to make the molecule by other means.

Unbelievable sights

As DNA synthesis became more widely available in the early 2000s, the various ways it could engineer new capabilities into organisms came together. By 2002 engineering undergraduates at MIT were using genes bought online to transform bacteria. In 2003 Dr Keasling and colleagues founded a company, Amyris, with an eye to making artemisinin and other useful stuff. The first international conference on synthetic biology took place at MIT the following year, a few months before the first iGEM Jamboree.

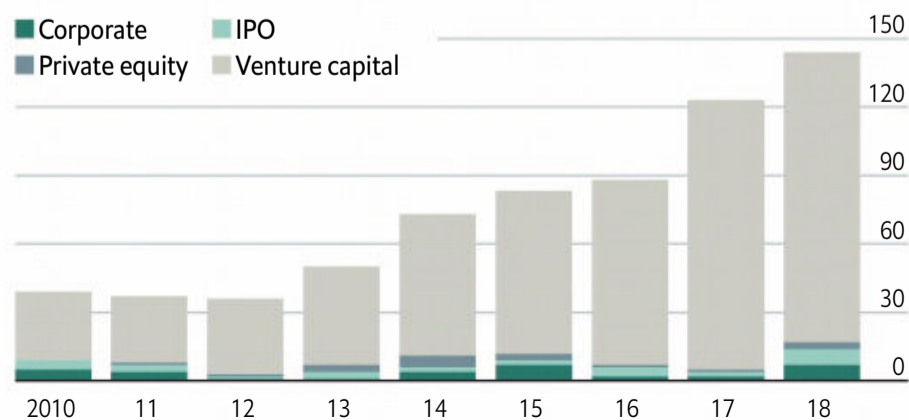
The media got wind of the excitement. It was not just that synthetic biology seemed like the sort of thing from which weapons could be made. Scientists playing God is always good copy, even if the creations were, as yet, mostly microbes. Rarely has science offered such a heady scent of Goddishness—with forbidden-fruit undertones of Frankenstein and Faust—and raised so many ethical dilemmas (see leader). Drew Endy, a charismatic young leader in the MIT group, talked of “reimplementing life in a manner of our choosing”. George Church of Harvard talked of synthesising not just genes but whole genomes, including, perhaps, those of creatures now extinct. The mammoth might return.

Amid all this revolutionary talk, young companies in the field made a fateful decision to plunge into biofuels. It seemed a noble undertaking: biofuels could usher in the new technology of life while making good the damage done by the old technology of industrial machines. And governments were keen to subsidise them. But scaling up the pathways that produced hydrocarbons by the gram in the lab to the scale of millions of litres proved even more difficult than expected. The capital expense was huge. Worse, the oil price fell steeply. The projects failed.

That made investors very cautious about synthetic biology. But the field attracted a bit of support from some governments, such as those of Britain and Singapore. In America the Pentagon's far-out-ideas department, DARPA, which had taken an early interest, ►►

Ratcheting up

United States, number of investment deals in synthetic biology, by type



Sources: DCVC; Pitchbook; Silicon Valley Bank; SynBioBeta

► created a new office of biology in 2013. Two years later it launched a programme that paid for leading laboratories in the field to put together pathways which could produce 1,000 molecules never created biologically before.

In January 2019 the 1,000th of those molecules was made. It seems an auspicious omen. In the past few years synthetic biology has shown signs of starting to live up to its promise. In part this is because of sustained academic effort and its cumulative gains; in part it is a matter of startup companies in the field finding their feet. But other factors are at play, too.

One was new gene-editing technologies—ways of doctoring existing tickertape a letter at a time. In 2000 there was none; now there is a whole range, and those based on a molecule called CRISPR have proved particularly powerful and easy to use (it was a big part of the Marburg team's victorious iGEM project). This has breathed new life into the idea of making precise changes to genomes, which is what synthetic biology is all about. It has opened new fields for biological research and new investors' wallets (see chart on previous page).

No one saw CRISPR coming. The falling cost of DNA synthesis, on the other hand, was widely foreseen. But it has still been a dramatic enabler. The price of a gene synthesised to order is about a thousandth of what it was in 2000; if you buy in bulk or have the technology in-house it can cost a lot less.

And then there is machine learning. Synthetic biology gets even greater benefits than most other industries from the recent growth in the capabilities of pattern-recognition programs. It is not just that laboratories produce reams of data with which to train such programs. In a paper in 2005 Dr Endy noted that “the designs of natural biological systems are not optimised by evolution for the purposes of human understanding.” That is a problem for humans interpreting data and asking questions. For machines, though, understanding is as unnecessary as it is impossible. They just find patterns and uncover rules. This is not science as scientists understand it. But, if rigorously tested, such rules can still be a basis for engineering. There were perfectly good rules for building bridges long before there was a theory of gravity.

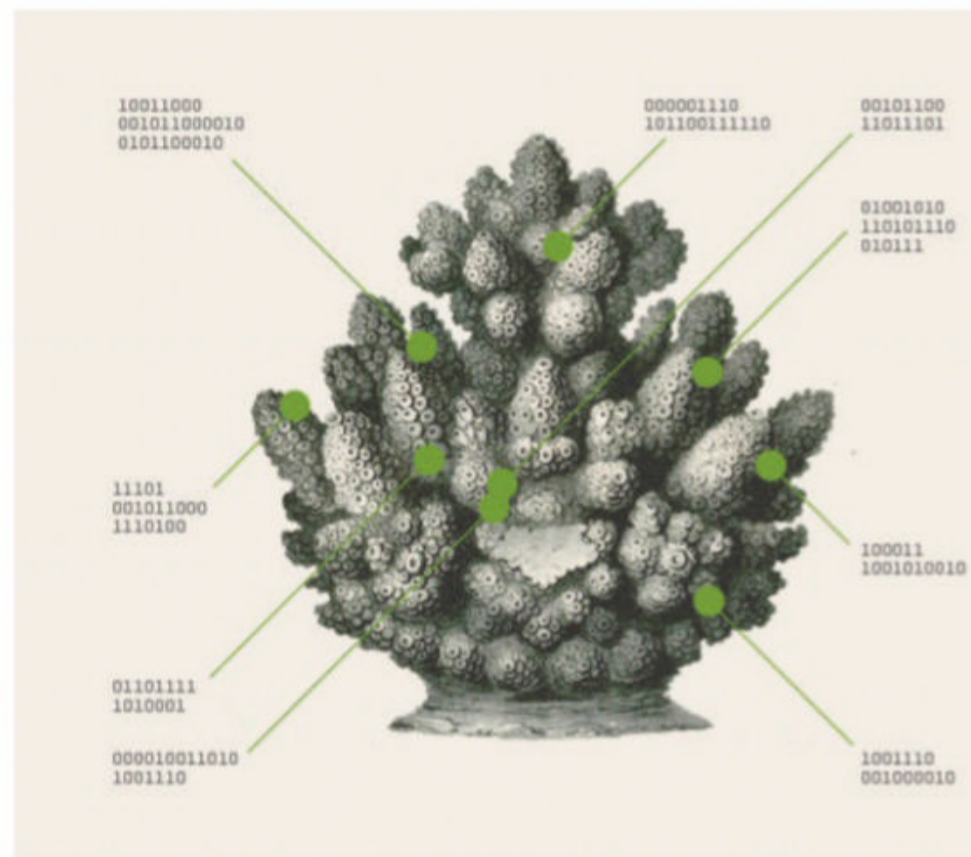
While synthetic biology has grown more capable, the promise of two older approaches to the improvement of life has diminished. One, the pharmaceutical industry, seems bound by Eroom's law (Moore's law backwards); the number of new drugs developed per billion dollars of R&D spending falls remorselessly. It was ten in 1970. It is well under one today, and still dropping.

This has excited interest in fundamentally new approaches to medicine. One is reprogramming cells to do helpful therapeutic things. Immune-system cells are the most obvious candidates. The cells of the microbiome—the interlinked bacterial ecosystems that thrive on skin and in guts—are another possibility.

A dazzling place I never knew

The second ailing improver of life is the petrochemical industry. Synthetic biology's push into biofuels was not fundamentally misguided; fossil hydrocarbons do have to be replaced. The mistake was rushing into a bulk market with low margins: petrol. Some companies are now using synthetic biology to replace more up-market molecules from the same crude oil which end up in fragrances and food additives with far more added value. Others are looking at making plastics environmentally friendly. As their technologies prove themselves at increasing scales, and as their technical prowess allows them to expand their repertoire to cheaper bulk products, these efforts could eat the petrochemical industry from within like some world-saving parasitic wasp.

Synthetic-biology executives say their worry is not money, but focus and time. Every firm has more revolutionary-looking projects than it can pursue. And no one knows how long it will take the projects to pay off. As the gnomish aphorism at the end of Mr Endy's emails has it: “Our victory inevitable. Our timing uncertain”. ■



How it works

Reprogramming life

Synthetic biology differs from everything that has come before

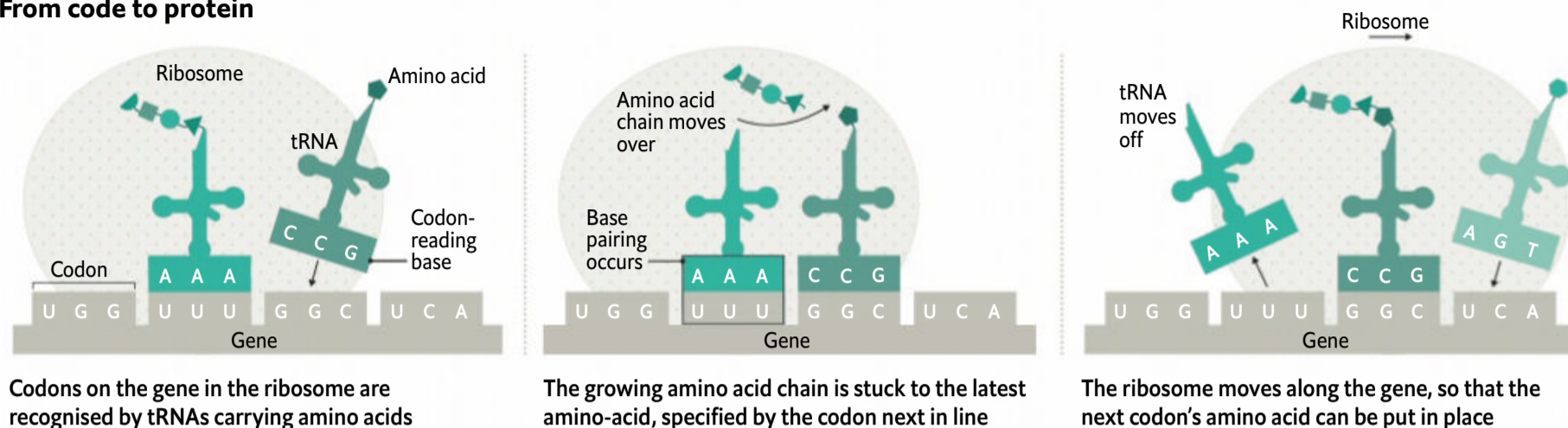
TO UNDERSTAND BIOLOGY, synthetic or otherwise, you have to understand how proteins are made. Proteins, which carry out almost all the basic functions of life, from respiration to reproduction, are all made of 20 smaller molecules strung together into a chain. The shapes those chains fold up into in order to fulfil different functions are complex and incredibly hard to predict. But they are almost all entirely determined by the order of these smaller molecules, which are called amino acids.

The gene for a given protein is simply the list, in order, of the amino acids needed to make it. This information is written down in the genome as a sequence of DNA bases—A, C, T and G, the letters on the ticker-tape—in the same way data in a computer are stored as a string of 1s and 0s. The program that turns these DNA sequences into sequences of amino acids is the genetic code. It assigns a fixed amino-acid meaning to each of the 64 different three-letter words (such as ACT or CTG), known as “codons”, that can be made using DNA's four bases.

Imagine a codebook with codons in one column and the names of the amino acids in another. To decode a gene, look up its codons one by one and write down their amino-acid meanings. It is a simple, rule-based undertaking—an algorithm. The cell carries out the same algorithm. But instead of a code book which matches codons to amino acids, it uses codon-recognising, amino-acid-carrying molecules called tRNAs and a mechanism called a ribosome which provides a place for those tRNAs to interact with a copy of the gene. The act of reading the gene, codon by codon, is the act of creating the protein, amino acid by amino acid (see diagram overleaf).

When it executes an algorithm this way, biology looks like computer science. But it is important to appreciate that biology does not deal with information the way humans do. In human programs, the logic and the machinery that acts on it are kept separate. Computer users can change a program in blithe ignorance of the ►

From code to protein



▶ physical principles and peculiarities built into the hardware that it runs on. But evolution cares nothing for such distinctions. All its processing is just a matter of molecules interacting—the way that tRNAs stick to codons as if to velcro, the way the shape of the ribosome forces amino-acids together, and so on. From the simple gene-to-protein translation of the ribosome to the extraordinary synchronised symphony which turns a fertilised egg into a whole human, biological information and its implementation are all but inseparable. Life runs not on software and hardware, but in allware. That makes it highly resistant to human reprogramming.

It can, though, be hacked. From the 51 amino acids of human insulin, which in 1978 became the first product made by the first biotech company, Genentech, to artificial antibodies containing more than a thousand of the things, biotechnology consists almost entirely of getting cells to produce proteins they would not normally make by cutting a gene out of one organism and dumping it, often unceremoniously, into another.

Most of these proteins have been natural ones. Nature is well stocked with proteins that do useful things—regulate blood sugar, kill pests or break down grime on laundry. Putting the genes for such proteins into the genomes of bacteria that will then secrete insulin, or of crops that need pest resistance, or fermentation tanks churning out supplements for detergent, was an obvious moneymaker. But the preference for the natural was, until recently, also driven by necessity. Designing a protein from scratch was impossibly hard. So was getting suites of proteins from different sources to work together.

That is no longer true. Protein design and DNA synthesis now make it possible to produce proteins that, separately or together, do things nature does not. They remain imperfect. But because DNA sequences are cheap it is possible to try out lots of variations to see which actually work.

Thus, for example, there are companies working on new metabolic pathways which combine enzymes freshly discovered through the sequencing of ever more genomes, enzymes long understood and enzymes significantly re-engineered. It is an exacting craft, or art; it requires not just finding the right enzymes but also bringing about the carefully balanced levels of gene expression needed if a dozen or more of them are to work together, not to mention tweaking the underlying metabolism to prevent things produced by the new pathway from disrupting those already there. But if the work is done well, it seems now to be the case that more or less any small molecule found in nature can be made by yeast or bacteria in a fermentation tank.

Two particularly interesting possibilities are the cannabinoids made by marijuana and the variations on opium and morphine made by poppies. Cannabinoids come in a remarkably wide number of forms, some psychoactive, some not, some therapeutic,

some not, many legal for some purposes in some jurisdictions, many illegal for all purposes elsewhere. A set of cannabinoid-synthesising pathways described by Dr Keasling and colleagues this February offers therapeutic and recreational possibilities along these lines which will be explored by a new company called Demetrix. A hugely ambitious 20-protein pathway capable of producing morphine and its relatives, developed by a former student of Dr Keasling's, Christina Smolke, offers perhaps more profound possibilities. Dr Smolke has founded a company, Antheia, which aims to use her new know-how to make opiates that are cheaper and so more accessible to the tens of millions around the world unable to get pain relief, and also to make opiates that are less addictive.

Breaking the code

A more radical possibility, at least in terms of chemistry, than remaking and improving natural compounds is to create enzymes to catalyse chemical reactions nature never carries out. Take the task of sticking a carbon atom to a silicon atom. Human chemists are pretty good at this, and the organo-silicon compounds they thus create are used in electronics, pharmaceuticals, building materials, breast implants and more. Nature, though, does not use carbon-silicon bonds, and so no natural enzymes make them.

In 2016 Frances Arnold, of Caltech, corrected nature's deficit, using evolution to create an enzyme which stuck silicon to carbon and opened up a whole new realm of chemistry to biology. She now guides her directed-evolution technique, which won her a Nobel prize in 2018, with machine learning, the better to alleviate the watchmaker's blindness. She believes that synthetic biology can in principle create enzymes for most of the reactions today's chemists bring about with rare catalysts, high temperatures and pressures, or environmentally unfriendly solvents.

As well as making new proteins, it is also possible to make new RNAs. This is how CRISPR gene-editing works. A molecule of RNA is created that velcros itself to a specific sequence in the genome; a companion protein then slices through the bit of DNA thus highlighted. Once the DNA is broken, a new gene, or gene fragment, can be inserted into the gap. If you put a gene describing the CRISPR RNA and its protein into a cell in such a way that it gets expressed only under certain conditions, you have a cell whose genome can be reprogrammed by remote control.

If you write an organism's genome from scratch you can make it easier to mess around with in a number of ways. A coalition of ten laboratories around the world is currently rewriting the entire genome of *Saccharomyces cerevisiae*, brewer's yeast, in order to make it an even better test bed for genetic research than it already is. To this end they are carefully stitching together the most appropriate versions of over 6,000 genes as well as most of the sometimes vital ▶▶

Protein design and DNA synthesis make it possible to produce proteins that do things nature does not

gubbins found between them—over 12m bases of DNA in all. One of the things the project is writing into the genome is a system that will make it cut itself up and reshuffle its genes when told to. This technology should provide a powerful new tool for the study of evolution, says Tom Ellis of Imperial College, London.

A deeper way in which what is known as “Sc2.0” differs from *Saccharomyces cerevisiae* proper is that it operates with a slightly different genetic code. Three of DNA’s 64 codons describe not an amino acid but an action: specifically, “stop”. These three codons—TAG, TAA and TGA—tell the ribosome and its tRNAs: “This is the end of the gene. Add no more amino acids, we’re done with this one.” In the re-engineered yeast, though, only two of these three stop codons are used. Wherever the natural, baseline yeast genome marks the end of a protein-coding sequence with a TAG codon, the scientists writing Sc2.0 use one of the other stop codons, TAA or TGA. This means that in Sc2.0 TAG means nothing—and so can be made to mean something new.

Nature uses 20 amino acids in its proteins. But there are hundreds of others that could be used, some of which would confer interesting new properties. In Sc2.0 it will be possible to make the TAG codon “mean” one of these other amino acids by designing a new tRNA molecule that recognises the codon and new enzymes to stick an amino acid to that molecule. Cells thus equipped will be able to use an amino acid no natural cell has ever used before.

Nor does the process have to stop there. The genetic code uses 61 codons to code for just 20 amino acids; in some cases there are six codon “synonyms” for a given amino acid. Writing an organism’s DNA in a form missing particular synonyms is a compositional task similar to choosing to avoid using a common linguistic symbol, such as “e”, in a short bit of writing; the upshot may look slightly ungainly, but you can do it. Rewrite the code with fewer synonyms, and you have more codons to devote to non-canonical amino acids. One therapeutic option this might open up is drugs that bacterial defences cannot cope with. Bacteria have evolved to counter everyday proteins; put in amino acids they have never seen before and some of those defences no longer work.

Bespoke genetic codes have attractions beyond a larger vocabulary. It is the universality of today’s genetic code that allows viruses to force the cells which they attack to do their bidding, making their viral proteins from their viral genes. A genome that uses a different genetic code would be impregnable to such attack; the virus’s genes would no longer describe the proteins it needs. Recoding could thus make cells immune to any viral attack; indeed, there is already work on achieving this in bacteria.

If it works, this sort of recoding could be very helpful to existing biotechnology. Fermentation tanks that never get wiped out by infections and antibody-producing cell lines that could not harbour viruses would be a great boon. It is possible to imagine changes in the way codons code for amino acids so radical that parts of synthetic biology become a separate creation, parallel biospheres based on the original but no longer in contact with it, populated by creatures which neither infect nor are infected, that are linked to the rest of life only through the intentionality of design.

A hint of such strangeness could be seen in a paper published in *Science*, a journal, this January by Stephen Benner of the Foundation for Applied Molecular Evolution in Florida and his colleagues. They have created double helices in which the existing bases, A, T, C and G, are supplemented by Z, P, S and B. This *hachimoji* (“eight letters”) DNA offers much denser data storage than evolution has had at its disposal for the past 4bn years. With eight letters to play with, for example, you could recode the genome to use doublets, rather than triplets, as codons, if you redesigned the ribosome, the tRNAs and a bunch of other stuff, too.

Would anyone want to? The potential of the existing code is enormous, the range of proteins it can, in principle, describe is barely yet explored; there might seem to be no need for such showing off. At the same time, engineers do like to tinker. ■

Automation

An industrial revolution

Remaking life means automating biology

ZACH SERBER worked at Amyris, a synthetic-biology pioneer, when the company was trying to crack the biofuel market. Seeing brilliant metabolic engineering fail to make a business led him and his co-founders at Zymergen, a company based in Emeryville, California, to take their new company in a different direction. They would not try to manufacture or sell things. They would offer their synthetic biology as a way of making businesses already using biotechnology more profitable. This is, at the moment, the model used by a number of leading synthetic-biology companies. At its heart is the automation of experiment.

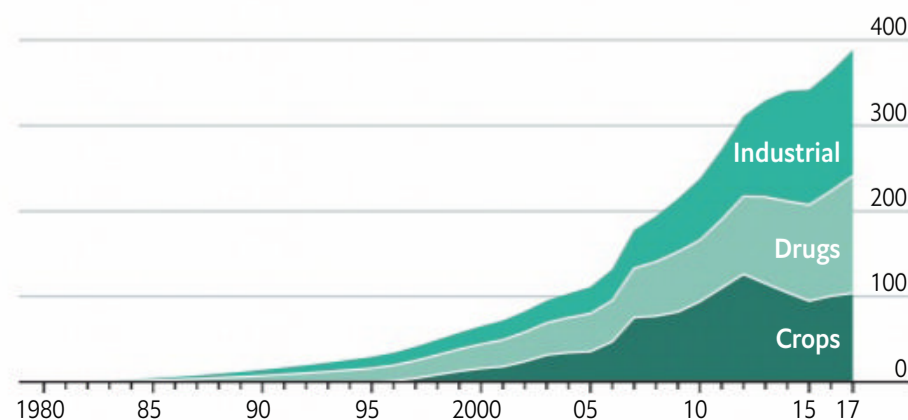
Biotechnology is already a bigger business than many people realise. Rob Carlson of Bioeconomy Capital, an investment company, calculates that money made from creatures which have been genetically engineered accounted for about 2% of American GDP in 2017. The contribution was split between three industries. Pharmaceuticals and crops, contributing \$137bn and \$104bn respectively, are the ones that the public knows about. The third sector, industrial biotechnology, is much less visible but even more lucrative, worth \$147bn or more (see chart). Chemicals used for many purposes—raw materials for plastics, food additives, some fragrances and biofuels—are already being churned out at scale by altered micro-organisms in fermentation tanks.

As well as being the biggest biotechnology market, this is also the one best suited to companies seeking to offer innovation as a service. Testing drugs and genetically modified crops is a long and costly business. Replacing one strain of industrial yeast with a better one can be done in a week. Industrial customers tend to know what they want and synthetic biology promises a lot of value. Tim Fell, the boss of Synthace, a synthetic-biology software company in London, says that in one project the company engineered a 200-fold increase in the rate at which bacteria produced something useful (he cannot say what) in just four weeks.

About 75% of Zymergen’s business, according to Dr Serber, is helping companies re-engineer, for industrial purposes, microbes they are already using, in order to increase production, reduce costs or both. The company is built around machine-learning programs that suggest changes to the genome which could produce an organism and setting—temperature, nutrient balance, and so on—that improves on the status quo. In this fiercely empirical process ▶▶

Growth industry

United States, estimated biotechnology revenues, \$bn



Source: Bioeconomy Capital

► Zymergen makes DNA tweaks of all sorts, most of them to sequences that regulate gene expression. These tweaks, says Dr Serber, have helped customers for its “molecular technology” make better margins on hundreds of thousands of tonnes of product.

Arzeda, based in the Interbay district of Seattle, has a similar business model and is based on similar technologies. But where Zymergen concentrates on empirically derived ways to improve productivity, the expertise of Arzeda’s machine-learning systems and scientists is in applying a theoretical understanding of how the shape into which proteins fold determines their function, thus making them better at what they do, or able to do something new. It brands itself “the protein design company”.

Ginkgo, the iGEM-born startup in Boston, is another variation on the business-to-business theme. Its focus is not on the specifics of genome-based machine-learning or protein design, though it does both, so much as on developing a broader expertise in the remaking of microbes. It calls itself “the organism company”.

Means of production

The three companies may differ in details of their approaches, but the big picture unites them. All of them see their current business-to-business approach as a stepping stone, a way of honing their techniques, teaching their machine-learning programs and bringing in cash as they develop products of their own. Arzeda talks of making tulipin, which among other things can greatly improve the qualities of perspex. That improvement is not so great as to justify harvesting it from its native tulips, but Arzeda’s proteins mean you do not need to. Ginkgo is spinning out joint ventures with clients to work in specific areas. In 2018 it created a business with Bayer, a chemical company, to develop microbes which would make fertiliser inside a plant’s root system. It has another spin-out working on cannabis, and has just announced a third one developing plant proteins for use in vegetarian foods, including meat substitutes. Zymergen is looking at materials for electronics.

They are also united in their zeal for high-throughput experiments. Their use of massive amounts of synthesised DNA is producing a new way of doing biology on an industrial scale

During the five years that Jason Kelly, Ginkgo’s chief executive, spent in Dr Endy’s lab at MIT in the 2000s he reckons he may have ordered 50,000 bases of commercially synthesised DNA—a pretty profligate amount at the time. Today Ginkgo orders synthetic DNA sequences at 50,000 times that rate, using them to change the genomes of thousands of organisms a day. In 2017 it bought a DNA-synthesis company, Gen9, bringing all its production capacity in-house. That has not sated its appetite. It has a contract with Twist Bioscience, the world’s biggest DNA-synthesis company, for a billion base pairs over the coming years.

Arzeda is smaller, but Alexandre Zanghellini, its boss, says it still manages to order around 10,000 new DNA sequences a week, each of which is then put into a particular microbe so that its computers’ assumptions about how changes in the sequence change the function of proteins can be tested. Often these DNA sequences are not even looked at by humans before they arrive by courier.

Drinking from such a firehose of DNA increasingly requires experiments designed and managed by computers. Ginkgo spent years programming computers to supervise experiments and robots to carry them out and then finding and removing the innumerable bugs with which those programs were afflicted. For ten years, according to Dr Kelly, doing lab work using the partially automated foundries thus created was considerably slower for the company’s designers than doing it themselves would have been. But having to use the automated systems meant having to improve them. A couple of years ago, Dr Kelly says, Ginkgo reached a point

Their use of massive amounts of synthesised DNA is producing a new way of doing biology on an industrial scale



where its foundries were as productive, in terms of person hours for work done, as an expert researcher. Now he pegs them as ten times more productive, and says the margin is growing.

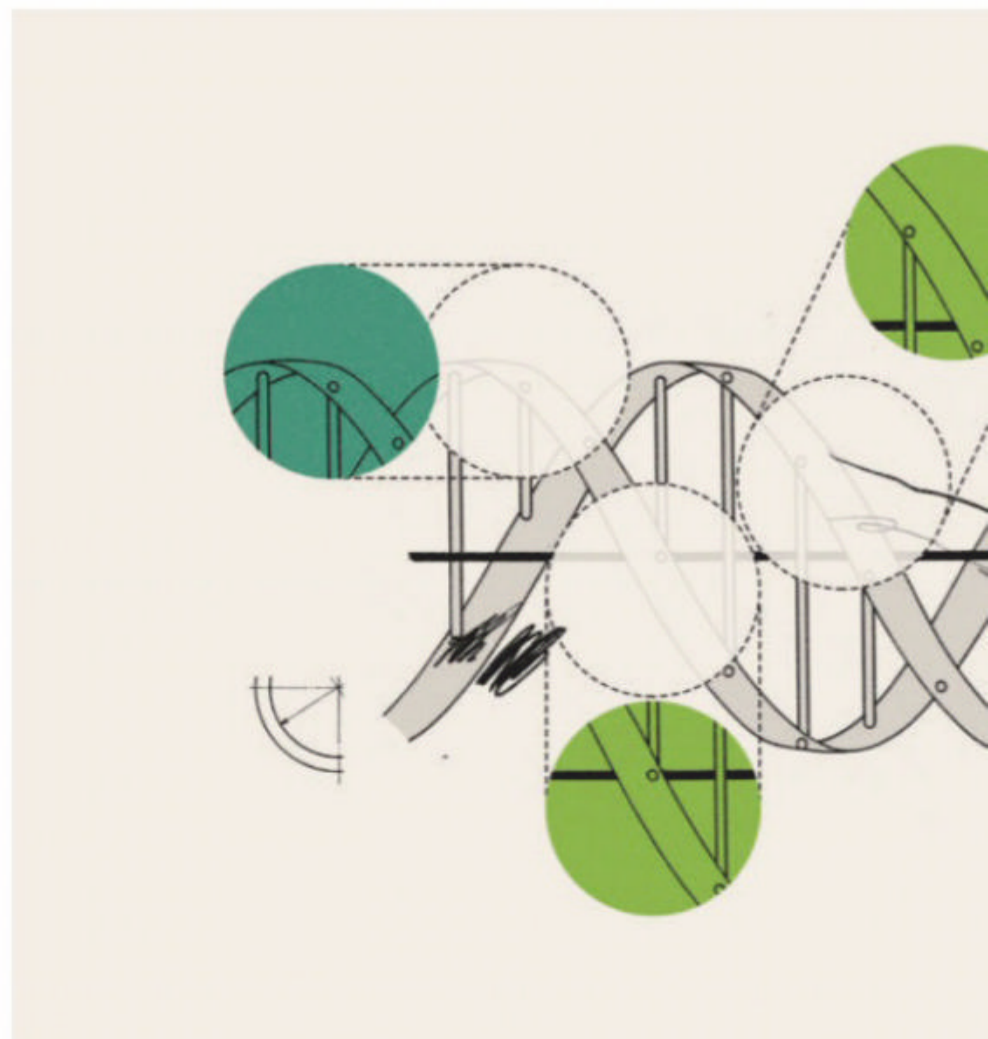
Automation increases not just the amount of research that can be done, but also its complexity. Much biological experimentation takes place in trays of 96 “microwells”, or miniature test tubes. Humans tend to design experiments using these wells quite simply; do A to one subset, B to another, and so on. A computer can design experimental strategies that are much more complex,

picking a wider range of hypotheses to test, and then testing many more hypotheses per tray. For properly programmed robot flunkies, the most recondite experimental schemes are a doddle. According to Markus Gershater, the chief scientific officer at Synthace, the gains software and automation offer experimental design can be just as important as gains in speed and throughput.

The role of machine learning in these labs means they have an enormous appetite for data. Most biology labs do without mass spectrometers, analytic tools which rapidly sort through samples molecule by molecule and characterise every one of them. They are expensive and produce more data than most people need. Synthetic-biology companies love them.

More data offer computers a clearer idea of what is going on; they also show what is going wrong. Most biologists at the bench have a sense that the living material they work with is not really to be trusted. Biology, they say, unlike physics, is unreliable. The “noise” in experiments can often swamp the signal you are looking for. Getting an experiment to work pretty regularly is good enough. In part this may be true. But it is hard not to think that much of the unreliability is with the biologists, not the biology. How else to explain why studies repeatedly find that many results reported in research papers cannot be replicated in other labs?

The problem is not just human error. It is also human neuroscience. There are things going on in a lab that experimenters do ►►



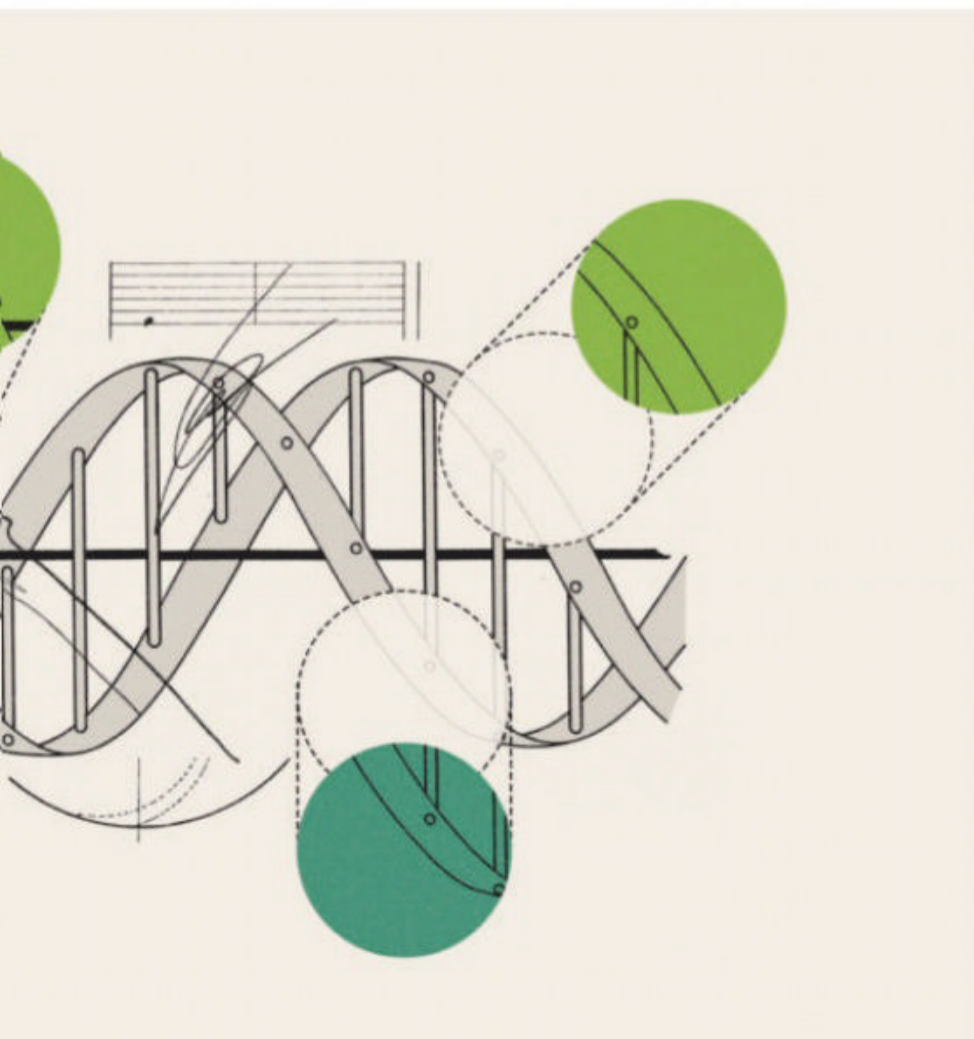
▶ not notice, but the creatures they experiment on do. The more data a system gathers, the more can be discovered, if necessary, about what actually happened, and that will surely help replicability.

Industrialisation helps in other ways, too. One piece of kit popular in labs that can afford it is the Echo 655, built by Labcyte. Like a pipetting system it moves drops of fluid from one set of wells to another. But by creating those drops with tightly focused ultrasound rather than suction it does so in much smaller amounts, much more accurately and with no contaminating contact. Smaller wells—up to 1,536 on a tray—mean more throughput and less spent on the chemical reagents the experiments use up. At the far end of this trend towards the tiny and precise is a system made by a startup called Berkeley Lights which has wells which contain but a single cell, manipulated entirely with laser beams.

So powerful is this new automation that it has drawn Synthace away from its original intention of making organisms to providing software as a service instead. The company has developed a computing environment called Antha, where researchers can say what they want done in relatively high-level terms, confident that machines will optimise the experiment's design for the client's instruments and tell the instruments what to do.

A startup called Transcriptic wants to go even further, operating “labs in the cloud” where an experimenter at a terminal anywhere in the world can get a set of experiments done in an automated facility they never even see. Mr Kelly thinks that, at least for the sort of work Ginkgo does, the time is not yet right for such radical approaches—having the people designing the organisms and the foundries that make them under one roof matters a lot. But it is clear that the trend to automation is not yet played out.

From the ratcheting of the ribosome on up, there is something mechanical about life. In foundries like Ginkgo's it is hard to avoid the sense of that mechanistic model moving out from the cells embodying it and into the sparsely inhabited systems studying, manipulating and redesigning them. There is an uncanny feedback loop between the machineries of cell and laboratory which is eating away at the gap in between them. ■



Applications

The new stuff

The uses of intelligent design

LIFE ON EARTH uses perhaps 5m different proteins. It is by no means clear what each of them does. In even the simplest bacterium there are proteins with jobs that scientists cannot identify—but which the bacterium clearly considers vital, since without the genes for those proteins it dies.

But if many specifics are still hazy, the cumulative capability of all the things that natural proteins can do is well known: it is the living world. All the chemical and physical cleverness that life is capable of, from dandelion seeds to coral reefs, jellyfish to brains, is there because proteins did stuff.

Proteins create the materials of wood and leaf, flesh and bone. A couple of blocks away from Zymogen a startup called Bolt Threads supplies the rag trade, and its own clothing subsidiary, with threads made of proteins from spider silk, and leather from fungal mycelia. As well as being able to explore new physical properties for such materials and, in principle, make them more cheaply, it is also able to offer them to people who object to having silk worms boiled and cattle skinned for their finery. Stella McCartney, a designer, is working with the firm to turn its materials into vegan-friendly fashions.

Many companies are developing products that seek to mimic the taste or texture of meat. Impossible Foods, based across San Francisco Bay in Redwood City, relies on engineered microbes for bulk supplies of the leghemoglobin protein, normally found in the roots of some plants, that makes its completely plant-based “impossible burgers” bloody without the blood. Others, including Ginkgo, are working on similar products. Meat without livestock could, in principle, be a very climate-friendly technology. But for consumers who prize the environment and yet distrust genetic engineering, the technology may raise concerns.

Some investors worry, too. Vijay Pande, who runs a biological-engineering fund at Andreesen Horowitz, a venture-capital firm, sees in some plant-based foods echoes of the rush into biofuels that blighted synthetic biology's early days. He hears of company founders who are basically trying to make mince, he says, which is a cheap product with which to compete. To earn money they will have to make a lot of hamburgers. That said, at least one company is working on synthetic *foie gras*, which might reduce the suffering of geese and sell at a luxurious price.

With food and fabric already covered, and many of the existing 5m proteins still unexplored, it may be hard to imagine why anyone should want more proteins. But there is much more to investigate. Consider the class of all proteins containing 66 amino acids. Because there are 20 different amino-acid possibilities for each of the links in the chain, there are in principle 20^{66} such proteins. That is roughly the same as the number of subatomic particles in the visible universe. And a 66-amino-acid protein is a tiddler.

It is into the cosmically vast sea of proteins nature has never made that David Baker of the University of Washington has set his course. In the 2000s Dr Baker was a world leader in the field of predicting what the structure of a natural protein would be on the basis of the order of its amino acids. This is a fiendishly difficult problem; the way the chains fold up is subject to incredibly subtle chemical forces that have very large effects. But the Baker lab got pretty good at it—good enough to spin out Arzeda, the protein-design company. Five years ago Dr Baker decided it was time to use what he had learned not to understand old proteins, but to design ▶



▶ absolutely new ones in shapes of his choosing which nature has never explored.

One use for such shapes might be to encourage particular types of crystal lattice to grow. Some bacteria which live on plants have evolved proteins which produce a lattice similar enough to that in ice crystals to “seed” the growth of ice, making frost more likely. (Ski resorts now use such proteins to help make snow.) Proteins designed to seed the growth of other crystals could help in the formation of things more interesting than frost, like the atomic lattices of semiconductors used for computers. Another use might be to build molecular motors. Alexis Courbet in Dr Baker’s lab has created a protein wheel which can spin on an axle. There are already markets for such tiny pieces of machinery; \$20bn a year is spent on the micro-electro-mechanical devices used in things such as mobile-phone motion sensors, car components and switches for optical circuits. Protein-based mechanisms could allow far higher levels of complexity, though probably not soon.

Perhaps the most striking recent design in Dr Baker’s lab, though, is a set of proteins created by Zibo Chen. Like DNA molecules in their double helices, these proteins can stick to each other by means of molecular velcro (which is actually, as it is in DNA and RNA, a process called hydrogen bonding). But, also like DNA molecules, they will stick together only if the velcro on the two molecules is complementary. In DNA complementarity is about the sequence of bases. In proteins it is there in the shapes Dr Chen has given his proteins. He has made a family of 64 proteins each of which stick only to one other, making 32 pairs.

Such designs could be used to make a protein’s function conditional—for example by designing a protein which cannot do its job unless an extra module is velcroed to it. Conditionality like this might provide a way to reprogram cells that does not need to engage with the mechanisms nature uses and so can be designed with the clear certainty of human software and hardware design. Reprogrammed cells are already influencing cancer therapy.

The most striking recent development in cancer treatment re-engineers the immune system’s T-cells—cells which prowl through the body looking for proteins they don’t like on the surfaces of other cells. What is called CAR-T therapy starts with the

gene for a chimeric antigen receptor (CAR), a protein which sits on the surface of a cell. It is possible to tailor this gene to decide what the protein it describes will recognise; for therapy the chosen target will be a protein specific to the patient’s cancer cells. Doctors take T-cells from the body, equip them with the gene for the cancer-recognising receptor, and then put them back in. When the CAR protein recognises a cancer cell from its telltale protein, it orders the T-cell to kill it.

One of the problems that has dogged the development of CAR-T therapies is that the CARs’ recognition of cancers is not perfect, which means the T-cells can attack innocent bystander cells, causing severe, sometimes lethal, side-effects in some patients. This is where a system developed by Wendell Lim and his colleagues at the University of California, San Francisco, comes in. They improved the reliability of CAR-T cells using a synthetic version of a protein called Notch, which, like the CARs, generates a signal inside the cell when it recognises a protein outside it.

Dr Lim and his team built a simple two-gene circuit (see diagram overleaf). One gene causes the cells to produce a Notch protein that recognises a specific molecule on the surface of cancer cells. The other produces a CAR which recognises a second such tell-

tale. But the CAR gene will produce its protein only if it is switched on—and the signal that switches it on comes via the Notch protein. This means that the cell goes on its programmed rampage only if both the telltale signs are seen; the first activates the Notch which produces the CAR that recognises the second. Electrical engineers will recognise this as an AND gate: you need both of two inputs to be present if you want the output.

Getting this seemingly straightforward system to work reliably in cells was hard. But once it was done, the value was obvious. In late 2017 the company Dr Lim had founded two years earlier to work on the problem, Cell Design Labs, was bought by Gilead, a therapeutics company, in a deal worth \$567m—more than 16 times what had been invested in Cell Design Labs up to that point.

Dr Lim is now investigating the possibility of slightly more complex circuits, for example one that requires three simultaneous stimuli (in circuit speak, two AND gates) or one stimulus and either one of two others, but not both (an AND and an OR). Even very simple circuits might make cells into much more discriminating therapists. Cancer is not the only application. Diseases of the immune system might be treatable by cells taken out of the body, reprogrammed and put back in. “Regenerative therapies” which use stem cells—cells

that can give rise to a number of different types of cell—to repair damaged tissue and organs might also benefit from programming which would tell the cells when and where to do their stuff.

Michael Elowitz of Caltech, one of the inventors of the “repressilator” that was one of the first ever artificial genetic circuits, imagines a more radical system that needs no T-cells. Imagine putting the short-lived copies of the genes for a small genetic circuit into every cell in the body. One protein described would be lethal to the cell. A second protein might velcro itself to this first protein, perhaps using some of Dr Chen’s highly specific hydrogen bonding, in a way that usually stops the first protein from doing anything awful. But under some particular circumstances—if, for example, the cell were making a protein typical of cancer—the velcro would not stick, and the lethal protein would become active, killing the cell.

A circuit that simple would be ludicrously dangerous; it would be like having a gun pointed at every cell in the body. But safeguards could be added, making the lethality conditional on more ▶▶

**Reprogrammed cells
are already influencing
cancer therapy**



▶ than one factor—just as the Notch system provides an extra level of control for CAR-T therapy for cancer. Dr Elowitz thinks it likely there is a whole new field of medicine to be built from such systems, one that cures not through small drugs that get everywhere, or more sophisticated proteins, such as antibodies, that target specific cells, but through cells that become medicines, or surgeons, themselves.

New molecules developed by synthetic biology can in principle be turned to all the purposes—food, fabric, medicine, recreation, even, if applied to wood or coral, shelter—for which humans use the non-synthetic kind. But as Dr Courbet's little nanomotors suggest, they might do even more. One of the most impressive possibilities is to use them to deal with the global glut of information.

The world currently produces many exabytes (billions of gigabytes) of data a day, and it could produce a great deal more. One estimate suggests that driverless cars may produce 4,000 gigabytes each every day. Those are data that could be learned from, or used forensically after mishaps.

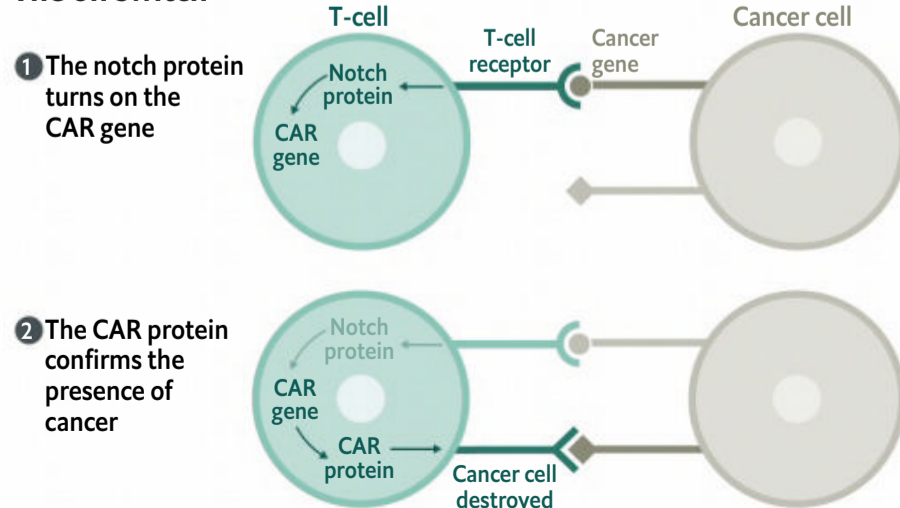
But storage is an issue. Storing a day's worth of the world's data using the most high-density storage medium in current use would require enough very expensive magnetic tape to cover dozens of basketball courts. Alternatively, you could store all those trillions of ones and zeros in just 20 grams of DNA. You could put everything that happened in a century into a single warehouse and expect it to last fundamentally uncorrupted for thousands of years. No other memory system comes close. And that is before you start to factor in adding *hachimoji* bases to increase the density.

Get it all onto one disc

Last year Dr Carlson of BioEconomy worked with Microsoft on a project that showed how data could be coded into DNA and retrieved from it using a scheme like that employed by memory chips. Other researchers have suggested that some simple forms of data processing could even be carried out on data while they are stored in DNA form.

The problem, Dr Carlson points out, is that DNA synthesis currently costs a million times too much for this to be an affordable way of storing data. But being a million times too expensive is not necessarily the hurdle it used to be. Machines that sequence DNA got much more than a million times cheaper between 1995 and 2015; sequencing is now so cheap that in 2020, two decades after the first announcement of a human genome being sequenced, people at the J. Craig Venter Institute in San Diego talk of sequencing a million of them. And big computer companies have a record of getting technologies to improve exponentially for as long as that improvement is physically possible: that is how they managed to live by Moore's law for so long. It is not a coincidence that, after Ginkgo and their billion-base contract, the second-biggest customer at Twist, a leading DNA-synthesis firm, is Microsoft. ■

The on switch



The future

Liberation biology

What is life for?

THOSE GIVEN to grand statements about the future often claim this to be the century of biology in the same way that the 20th century was that of physics and the 19th was the century of chemistry. Synthetic biology's potential provides a basis for such boosterism; life reprogrammed to produce useful new products, take new forms and act in helpful ways.

Honouring that promise will not be easy. Understanding biology's capacity to process information, and thus control itself, is a much more challenging puzzle than mastering the parcelled world of software and hardware. Taking years to create a working AND gate is therapeutically very promising. But it is a very small step on the way to controlling life as a coder controls a computer.

Still, the fact that synthetic biology recapitulates some early aspects of the computer revolution should not lead people to ignore crucial differences. One is that those who created the modern world of computers did not have powerful computers to help them in their task. Today's synthetic biologists do. Their work builds on, and grows out of, the computer revolution, and this may speed it up a lot. Frances Arnold of Caltech compares life's programming to a symphony composed by evolution, and today's biology by design as being roughly at the level of learning to hold the composer's pencil. That is why she likes to harness evolution to remake things, rather than design from scratch. But it is evolution that is guided with machine learning and directed by human creativity to write songs that humans want.

People have imagined such things before. In the early 20th century scientists and writers inspired by the new power of genetics described "biotopias" eerily reminiscent of the dreams of synthetic biology. In H.G. Wells's "Men Like Gods" (1923) plants "had been trained and bred to make new and unprecedented secretions, waxes, gums, essential oils and the like, of the most desirable quality", which could serve as a slightly flowery mission statement for half the companies in this TQ. In Charlotte Perkins Gilman's "Herland" (1915), a race of parthenogenetic women live in a cornucopian Eden they have fashioned through science to meet their every need.

As Jim Endersby, a historian, points out, some aspects of these biotopias shock modern sensibilities. For one thing, their inhabitants engineer themselves, as well as their environments, in a way that eugenicists like Wells saw as entirely unproblematic. It was the treatment of people as means not ends in this way that Aldous Huxley rebelled against in his own contribution to the genre, "Brave New World" (1932). Synthetic biology will certainly get caught up in the post-eugenic discussions of such matters that CRISPR has brought to the fore today.

Other now-alien attitudes in those early biotopias also throw light on today's arguments. Wells and Gilman saw no problem with deliberately exterminating species; it was a reasonable, even natural, imposition of beneficial order. Today such possibilities are being discussed for real, but with a lot less equanimity. "Gene drives"—genetic systems which, seemingly paradoxically, use sexual transmission to spread sterility—offer a way that CRISPR-technologies might be used to try to wipe out disease vectors, such as the species of mosquito that spread malaria.

Some look at a death toll of hundreds of thousands of people a year and see in this an elegant solution; there are plenty of non-malarial species of mosquito around to pick up any ecological slack. Others ask by what right they might bring an extinction ▶▶



▶ about, what risks they would expose other less dispensable insects to and what sort of informed consent they might possibly get. Steered by this discussion, research on gene drives—funded by, among others, the Bill and Melinda Gates Foundation—is increasingly, and wisely, focused on ways to break chains of transmission by crashing mosquito populations locally and temporarily, rather than globally, for ever. Insect populations so depleted that there are no longer enough to feed the summer swallows—a feature of Wells’s biotopia—is the sort of problem synthetic biologists talk of putting right by cutting back on the need for pesticides, not something they would seek to engineer.

Really, auks

It is not just that today’s biotopians are averse to extinctions. Some talk of reversing them—of using the tools of their trade to bring back the passenger pigeon, the great auk, the woolly mammoth, the American chestnut and others. Genomes preserved in museums or permafrost can be sequenced, and the genomes found in related species reprogrammed to produce something similar. In a small gesture in this direction, Ginkgo has made a scent that smells of a type of hibiscus that is now extinct.

This idea, too, meets with scepticism, even repugnance. Some feel that the results would be a Potemkin creation—new creatures that preserve a mere semblance of what has been lost, rather than restoring its essence. Some environmentalists also see it as a grotesque caricature of a problem that their movement has long suffered from: concentrating on a few high-profile species while ignoring the wholesale destruction of others that are less glamorous. But a recent report commissioned by the International Union for the Conservation of Nature found that conservation does need new tools, and synthetic biology offers opportunities in that respect—while also bringing with it risks, both direct and indirect, that need to be assessed on a case-by-case basis and in a precautionary way. Some conservationists are keen to see how well gene drives can wipe out invasive species on islands.

That tools so radical might be used to conserve or preserve, not disrupt, might seem a bit of a contradiction—even perverse. But it is worth considering that the changes wrought by synthetic biology could refashion humankind’s relationship with the natural world at a technical and conceptual level and at the same time bring little dislocation to everyday life. As Kelly and Zach Weinersmith put it in their book “Soonish”, synthetic biology may be “like

Frankenstein, except the monster spends the whole book dutifully making medicine and industrial inputs”.

At a “Build-a-Cell” workshop in San Diego this February the assembled researchers noted how hard it was to communicate to the public the remarkable scope of their ambitions: creating genomes and the cells to house them from almost first principles. If you appreciate the conceptual bravura of an organism with no ancestors, or that even discussing such a thing would have seemed insane just 25 years ago, this is staggering. If you do not, such synthetic life seems just to be, well, more life. And life is both already a miracle and the most everyday one. Cell is a cell is a cell.

It may be that the public is on to something. The application of genetic technology to human health and enhancement will be hotly debated. So will worries about how such technologies can be kept out of dangerous hands. But the fundamental change in the relation of the human and the natural may not seem so dramatic.

Consider the Colombian exchange. Shuffling together the ecosystems of the New World and the Old was a huge event in terms of both biology and human history. It wiped out populations and overhauled ways of life. But today an Indian cooking with chilli, or a German smoking a pipe of tobacco, or a Mexican admiring a mustang running free give little thought to the alien biology they are using and appreciating. Synthetic biology’s innovations may be similarly woven into the background of the world, but without the concomitant suffering.

Even the most gentle transformation in the relationship between people and nature, though, may bring harm to some. Interacting with nature is often something the poorest depend on most. If synthetic biology replaces prized natural products with cheaper artificial ones, it will break ties to nature that are both meaningful and economically important, particularly in the developing world.

Take vanilla pods. The key flavour molecule in vanilla is already synthesised by chemists. Vanilla pods, though, contain a range of related molecules which provides something richer and consumers value them for that reason. Now synthetic biology might match or surpass nature’s subtlety. So Dr Endy, now at Stanford, expected remonstrance when he met a Mexican vanilla farmer at a synthetic-biology discussion. Instead, he found a man enthused. Vanilla was not just his livelihood but also a cause for ceremony, a provider of solace, a source of stories. And synthetic biology used properly, he thought, would not replace it as such, but could instead enhance it. It could bring new subtleties to valued scents, welcome strangeness to a well-loved story. The connection between people and plant might be deepened, not displaced.

It is easy to assume that reprogrammed life is a lesser life, innately commercial and desecrated—that as the machineries of cell and laboratory become ever more tightly bound, they will squeeze out something that is human, or natural, or both, which ought to sit in the space between them. But it is also possible that a new appreciation can grow out of that space, a sense of what life is and could be, extended and enriched by new understanding. Think of it as a tune not yet composed, or the catnip scent of a lost flower reimaged and smelled, as if blooming for the first time. ■

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Turkey's local elections

Revolt of the cities

ISTANBUL

Istanbul, Ankara and most other big cities turn against the president

OVER THE past few years President Recep Tayyip Erdogan and his government have throttled dissent, taken control of the judiciary and defanged the press, confining what remains of Turkey's democracy to the ballot box. In local elections on March 31st, the ballot box struck back. Despite taking a plurality of the national vote, Mr Erdogan's ruling Justice and Development (AK) party suffered defeats in five of Turkey's six biggest cities, including Istanbul, the country's economic engine, and the capital, Ankara.

The loss that must have stung Mr Erdogan the most came in Istanbul, where he grew up and made his name as mayor over two decades ago. The AK's mayoral candidate, Binali Yildirim, a former prime minister and parliamentary speaker, had the support of media run by pro-government tycoons, his party's seemingly unstoppable electoral machine and the president, who stumped for his candidates as if his own political future were on the line. The opposition's pick, Ekrem Imamoglu, had the backing of a hapless, squabbling party, a fraction of his opponent's resources and

only a few years of experience as district mayor under his belt. But it was Mr Imamoglu, the relative unknown, who prevailed by the thinnest of margins.

Controversy cast a cloud over the vote. As soon as Mr Yildirim's lead over Mr Imamoglu dwindled to a mere fraction of a percentage point, the state news agency, true to its reputation as a government mouthpiece, stopped updating results from the race. It was only the next day that the head of Turkey's electoral board confirmed that Mr Imamoglu had come out ahead by fewer than 30,000 votes. AK promptly challenged the outcome. Billboards and banners proclaiming the party's supposed victory sud-

denly began to appear across the city. As *The Economist* went to press, the board had authorised a partial recount in several districts. Early indications were that the result of the Istanbul vote was unlikely to change.

Mr Erdogan has been able to claim overall victory. AK and its coalition partner, the Nationalist Movement Party, won in most of the country's 81 provinces, securing a combined 52% of the popular vote in the process (AK alone received 44%). The main opposition bloc, led by the Republican People's Party (CHP), won 38%. "We have come out of this election as the leading party," Mr Erdogan said, but conceded that AK had underperformed. He also promised to take measures to boost the economy, which recently dipped into recession, and to abide by free-market rules. The free markets did not seem reassured. Even though the preceding week had been one of its worst weeks since last summer's currency crisis, the Turkish lira weakened immediately after the vote on fears that Mr Erdogan would continue to sacrifice economic orthodoxy for political gains. It then regained some ground.

The election is hardly a fatal blow to Mr Erdogan. Turkey's strongman continues to enjoy sweeping executive powers. His coalition commands a parliamentary majority. But losses in the big cities hurt both symbolically and practically. Istanbul and Ankara account for a quarter of the country's population and 40% of its GDP. Opposition mayors threaten not only to dismantle or appropriate the vast networks of

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▶ patronage in municipalities run by the AK for over a decade, but also to unearth one corruption scandal after another. “Obviously this makes Erdogan weaker,” says Soli Ozel, an academic and columnist, “because the money and rent-churning machines have been captured by rivals.”

The results also place Mr Erdogan in an uncomfortable spot, squeezed between Kurdish voters, many of whom sided with the opposition alliance, and his nationalist allies. Any attempt to relaunch peace talks with the Kurdistan Workers’ Party (PKK), an armed and outlawed separatist group, could end up costing AK its majority in parliament. The nationalists “can dissolve parliament and force early general elections whenever they want”, says Emre Erdogan (no relation), an academic at Bilgi University. “This makes a Kurdish opening so much more difficult.”

A more immediate worry about the country’s political stability is whether Mr Erdogan will make good on his threats to boot some of his opponents from office, starting with Mansur Yavas of the CHP, who won the Ankara race, and ending with mayors from the Peoples’ Democratic Party (HDP), who prevailed in most of the Kurdish south-east. A week before the election, Turkey’s interior minister announced that 231 opposition candidates were being investigated on terrorism charges. Prosecutors launched a probe against Mr Yavas on the basis of old claims connecting him to a forged cheque. Such threats are not taken lightly in Turkey. In the previous local elections, voters in the south-east elected 102 HDP mayors. At least 94 of them have since been sacked or arrested on suspicion of links to the PKK, and replaced by government trustees.

There is cause for some optimism, however. The vote showed that Turks still have faith in elections. Turnout reached 85%, higher than in most countries in Europe. The electoral board stood its ground, especially when it came to the Istanbul vote. At least some institutions in Turkey appear to be functioning properly.

Yet there is also considerable cause for anxiety. Throughout the election campaign Mr Erdogan accused the opposition of taking orders from terrorists, and warned HDP politicians that they had no place in Turkey. The morning after the vote, newspapers run by the president’s cronies proclaimed Mr Yildirim the victor in Istanbul. The next day, they accused the opposition of fraud. One accused it of staging a coup. Many AK supporters have accepted the results, but some seem bent on reversing the outcome of the elections by hook or by crook. Mr Erdogan appears not to have made up his mind yet. He has already divided the country. He is no longer the person to heal it—but he might want to avoid making things worse. ■

Ukraine

Send in the clown

KIEV

A tv comedian wins the first round of the presidential election

FEW COUNTRIES are as disposed to spectacle and phantasmagoria as Ukraine, the birthplace of Mikhail Bulgakov and Nikolai Gogol. Their shadows, surely, enveloped springtime Kiev on March 31st as a comedian who plays the president in a popular tv show “Servant of the People” emerged as the likely next president of Ukraine. Ukrainian politics have often resembled a reality show. Now a show is turning into reality.

In the first round of presidential elections Volodymyr Zelensky, an actor who plays a history teacher accidentally propelled into the presidency, won 30% of the votes, as many as the incumbent president, Petro Poroshenko, and a former prime minister, Yulia Tymoshenko, put together. This was not only a verdict on Mr Poroshenko’s five-year presidency, much of it tainted by persistent corruption scandals, but a resounding slap in the face for the entire Ukrainian class of politicians who have misruled the country for most of its post-Soviet history.

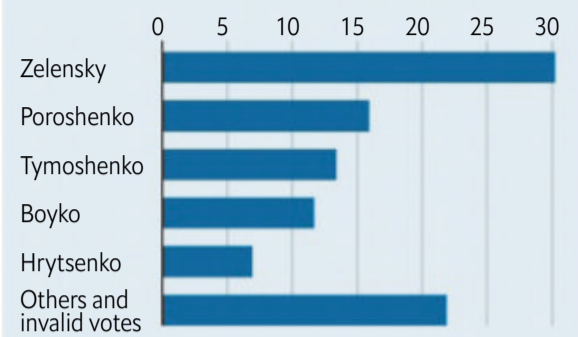
Mr Zelensky, a man of huge name-recognition and no political experience, took centre-stage to attack the failures of established Ukrainian politicians, who have played different roles in different costumes but have generally acted in their own interests and the interests of the oli-



Zelensky goes from fiction to fact

Hard to beat

Ukraine presidential election, first-round results
March 31st 2019, % of vote



Source: Central Election Commission of Ukraine

garchs who stood behind them. The Maidan revolution of 2013-14 was supposed to mark a break with that system, but instead was hijacked by old-style politicians and oligarchs, including Mr Poroshenko.

Mr Zelensky’s turn to politics seemed as accidental as that of his character. The idea of stepping from the tv screen into a race emerged two years ago, after Mr Poroshenko’s analysts measured the actor’s ratings only to discover that he was the most popular choice. He was seen, at the time, as a perfect spoiler for Slava Vakarchuk, a well-known rock-singer who tantalised Ukrainians with the idea of a run for the presidency only to back down. He will now face Mr Poroshenko in the second round, scheduled for April 21st.

Mr Poroshenko, a confectionery magnate, also came to the presidency almost by accident. He was elected to stop the war in the east of the country and improve the country’s dire economic situation, and for this election wrapped himself in the flag and campaigned under the slogan of “Army. Language. Faith”. He chose Vladimir Putin, Russia’s president, as his real election opponent and appealed to more nationalist-minded western Ukraine, leaving the Russian-speaking east and south of the country to Yury Boyko, a Kremlin-backed former energy minister.

Mr Zelensky, not wishing to divide opinions and votes, said almost nothing about his politics. He did not hold political rallies or take part in television debates. Instead he toured the country giving two shows a day—one free, one paid. Unlike his rivals, who had to work hard to get people to come to their rallies, Mr Zelensky actually made money from ticket sales. But those who voted for him have little idea about the man behind the screen.

He is 41, of a Jewish background, and comes from a rough industrial city, Krivoy Rog. His team consists of cool-headed lawyers, close friends and business partners who run a tight ship. His business dealings with Ihor Kolomoisky, a controversial oligarch whose tv channel hosts Mr Zelensky’s show and whose top lawyer is on his campaign team, raised questions that were ▶▶

Spain

Rural requiem or revival

MADRID

An election where the countryside matters

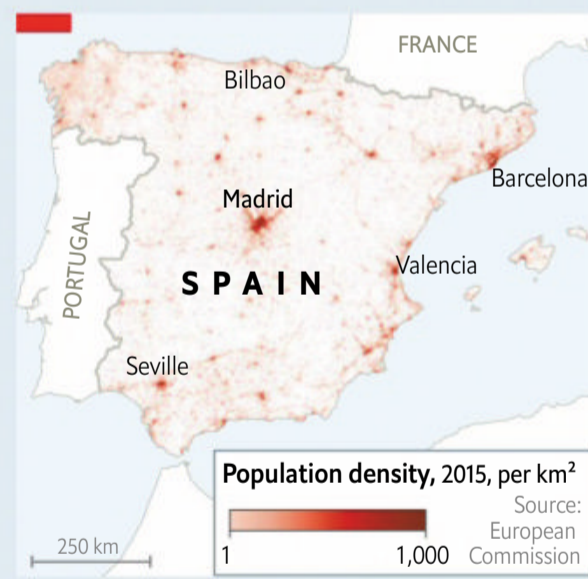
THEY COME from medieval villages the colour of the harsh surrounding land, from the Spain of transhumant shepherds, lonely sierras and forests of oak and elm. And they are quietly angry. On March 31st some 50,000 of them marched through the centre of Madrid in what they called “the rebellion of emptied-out Spain”. Their placards and banners displayed the poetry of place names; their demands were prosaic. Villamayor del Rio wants a pharmacy, Orihuela del Tremedal needs faster internet, Aranda del Duero demands better infrastructure, “Almanza resists”, while “Fuentes de Béjar exists” as do Arévalo de la Sierra and El Royo. “We feel a bit abandoned, we need doctors,” said Paula Siles, a social-care worker from Las Parras de Castellote (population 57, down from 86 in 2004) in the Maestrazgo mountains of Teruel.

Spain urbanised late but abruptly. As Spaniards have clustered in Madrid and on the coasts, a huge swathe of the central plateau now has some of the lowest population densities in Europe, comparable only to Lapland and the Scottish highlands. Countless villages are deserted, or home to a handful of the elderly. Many country towns are emptying too.

The countryside was long a reliable source of seats for the conservative People’s Party (PP). But in the election on April 28th the right is split three ways. This means that many of the 99 seats (out of 350) in “empty Spain” are up for grabs. Politicians have developed a sudden interest in rural affairs. The Socialist government of Pedro Sánchez last month rolled out 70 proposals to halt depop-

ulation, ranging from siting military installations to better internet connections. Albert Rivera of the centre-right Ciudadanos (cs) proposes income-tax breaks; he was seen mounting a tractor. Pablo Casado of the PP inspected some tomatoes in Almería. The PP echoes Vox, a new hard-right group, in promising to protect bullfighting and hunting.

Will any of this work? In a bestselling book of 2016, “La España Vacía” (Empty Spain), which popularised the term, Sergio del Molino argued that “it was never full” and that the demographic imbalance is ancient. Those who leave for the cities do so in search of opportunities that village life can never offer. Providing public services to thinly spread populations is expensive. But if nothing is done, the festive atmosphere of the Madrid demo might turn into something closer to France’s aggressive *gilets jaunes*.



► quickly exploited by Mr Poroshenko. But Mr Zelensky is also surrounded by reformers, including Oleksandr Danyliuk, a respected former finance minister who clashed with Mr Kolomoisky, helping to nationalise his bank and then securing a freeze of his worldwide assets.

The eccentricity of Ukrainian politics should not obscure some important achievements. Thanks to free media and genuine political competition, “this has been the freest and most peaceful election in Ukraine’s history,” says Alexander Martynenko, a commentator and the head of Interfax Ukraine, a news agency. Most important, the vote averted a split along linguistic, historical and ethnic lines long exploited both by the country’s own politicians and by the Kremlin, and has

brought it closer together than it had been for years. Being Russian-speaking and pro-Ukrainian, Mr Zelensky covered most of the country, with the exception of the eastern and western peripheries.

He lacks a core electorate, but managed to mobilise the urban lower-middle class—traders, taxi-drivers, craftsmen—who rarely vote. Many of these people stayed at home watching tv during the Maidan “revolution of dignity”. But although Mr Zelensky himself is no revolutionary and even made jokes about it, he is the latest manifestation of a historic process that Maidan set off. He and his team are very different from the political class that has milked Soviet-era resources over past decades. Now they have a second round to win, and a lot of expectations to live up to. ■

Daylight-saving time

Summertime ruse

BAD BELZIG, GERMANY

Should Europe’s clocks spring forward, or fall back?

IT IS A bright, cold day in April, and the clocks have sprung forward. The morning sun gleams alluringly as pupils arrive at the Fläming Gymnasium (high school) in Bad Belzig, a small town in the east German state of Brandenburg. But on this particular Monday, a day after the start of daylight saving, many of these children are accident-prone, easily distracted and tired, victims of the rich world’s biannual ritual of tampering with time.

That is if the research on daylight-saving time (DST) is to be believed. Disrupting adolescents’ sleep can play havoc with their bodies. Katrin Stachen says losing an hour’s sleep leaves her teenage daughter, whom she has just dropped off at school, tired for days. Adults suffer, too: one German study found a 25% growth in reported heart problems in the three days after the spring time change.

So time may soon be up for Europe’s 23-year experiment with harmonised daylight saving. On March 26th the European Parliament voted to end DST by 2021. By next April the EU’s governments must decide what to do. None is more gripped than Germany, the first country to introduce DST, in 1916 (dismissed by the *New York Times* as “the Kaiser’s Trick-Hour”). Germans accounted for 67% of the replies to a (self-selecting) European Commission “consultation” last year. The vast bulk of them wanted to ditch DST.

Even beyond the effect on health, the scrappers’ case is strong. Under DST, energy savings from lighter evenings are cancelled out by extra heating bills in the morning. Steffen Kampeter of Germany’s Federal Employers’ Association says business would welcome an end to disruptive clock changes. Yet he also, rightly, fears a temporal “patchwork” across Europe if some countries shift to permanent summertime and others to wintertime. To avoid such chaos, the EU institutions are now urging governments to co-ordinate their approaches. But views vary: Portugal, for example, prefers the status quo. If compromise proves impossible, the proposal could be ditched.

Perhaps spooked by the prospect of truncated summer evenings in the *Biergärten*, most Germans say they prefer year-round summertime. But Alfred Wiater, a somnologist, says that longer daylight in the evening can indirectly delay sleep by disrupting the metabolism of sleep-induc- ►

ing melatonin. In some people that raises the risk of heart problems, depression and neurodegenerative disorders.

The German Teachers' Association (DL), is also opposed. In December northern German towns would not see the sun until after 9.30am (the same applies for Spain, which is stuck in the same time zone as Germany thanks to General Franco's genuflection towards Hitler). Dark mornings delay serotonin secretion, which, says Mr Wiater, is especially bad for teenage brains. Katrin Wienczek, headteacher at the school in Bad Belzig and head of the local DL branch, frets about parents on dark school runs crashing into the deer and boar that stalk the forests around the town. In Germany and elsewhere, the debate has only just begun. Who will prevail? Only time will tell. ■

Russia

The uses of fear

Vladimir Putin turns to attacking the elite, an ancient tactic

EVERY TIME a high-powered Russian official, oligarch or governor gets arrested, the same questions surface: why him, why now, who's next? In recent months these questions have become more frequent as former and current ministers, governors, high officials and an American investor have ended up in Moscow's high-security Lefortovo jail.

So when Mikhail Abyzov, a former minister in the government of Dmitry Medvedev, was arrested on March 26th, the conspiracy theories mushroomed: it was a swipe at Mr Medvedev, Russia's prime minister, by the security services; it was a plot by the Alfa Group, a well-connected business that wanted to recover an overdue loan; it was the result of a conflict with Viktor Vekselberg, an oligarch.

The allegation levelled against him—that Mr Abyzov had set up a criminal group and embezzled 4bn roubles (\$61m) by selling an energy firm for an inflated price—seemed almost incidental. Few people believe he is innocent or feel much sympathy for a former minister who enjoyed life in a vast Italian villa among acres of vineyards, as first exposed by Alexei Navalny, an anti-corruption blogger and opposition leader. But equally, few people believe that this is part of a genuine crackdown on corruption rather than an intra-regime redistribution of assets.

The nature of Mr Putin's rule fuels this suspicion. The regime is both obsessed with the letter of the law and totally disre-

spectful of its spirit. Corruption holds the system together. Courts rubber-stamp decisions made by the Kremlin or its security services. An investigation almost always results in a charge, and the percentage of jury acquittals is less than 2%. All this creates the conditions for the use of repression as an instrument of government.

In the early 2000s arrests among the *no-menklatura* were rare, and almost never touched top officials. Outside the elite they tended to involve relatively insignificant groups, such as left-wing radicals and ultra-nationalists. The Kremlin preferred to co-opt the powerful by allowing them access to rents, and to placate any public discontent with cash and foreign conquests, most notably the annexation of Crimea in 2014. But as Kirill Rogov, a political analyst in Moscow, writes: "soft authoritarian regimes that rely on economic growth start looking for new sources of legitimacy and broaden repressive practices when economic conditions worsen."

A year ago Mr Putin secured an election victory with 77% of the vote, confirming his position as a populist authoritarian leader able to appeal to the people over the heads of the various Russian elites. Since then, however, his rating has fallen to 64% and discontent is mounting. The economy is showing no sign of improvement, real incomes have been falling for five years, foreign adventures cause irritation rather than pride and the effect of television propaganda is wearing thin.

It is hardly surprising, therefore, that Mr Putin's regime is increasingly reliant on fear and coercion, morphing into what Mr Rogov calls "repressive populism". So far,



Abyzov, the latest victim

the aim of the current wave of repression is not to put down protest, since it does not yet threaten the system, but to forestall its growth by boosting the waning legitimacy of the regime. This is why repression against the opposition, though it has been gradually increasing since 2012, remains fairly mild. Instead it is the use of attacks against insiders that is expanding. These are meant to please the crowds, but also to keep the elite in a state of fear, discouraging dissent from its members.

Between 2001 and 2005 only three senior officials were prosecuted. The number of cases against senior members of the government and the Duma reached 35 in 2018 alone. The actions have targeted high-profile figures across many walks of life. An economics minister, a famous theatre director, a police general, a prominent investor, a rich and powerful senator, not to mention mayors and governors—all are either in jail or under house arrest. Most of them were detained in spectacular, made-for-TV busts, which were then hyped on social media. Rauf Arashukov, a senator from the Caucasus region, was nabbed during a parliamentary session.

Given Russia's tragic history, any such repression inevitably triggers memories of Stalin's purges and show trials. But unlike those great terrors of the 1930s, which liquidated entire social classes and most of the old Bolshevik party, the current moves are limited in scale. Another difference, says Ekaterina Schulmann, a political scientist based in Moscow, is that today's campaign, unlike Stalin's, is neither underpinned by an ideology nor accompanied by overt propaganda.

Most of the current cases against the elite are based on money and involve redistribution of assets from one group to another. But whether or not the arrests are centrally co-ordinated, they are part of a broader political process. As Ivan Tkachev, a senior general of the FSB, Russia's internal security service, told a regional boss, Alexander Shestun, shortly before putting him in jail last year: "I see who will get steamrollered in one month, who in two, who in three, who will get replaced, who is scared. It is a big one [campaign]."

This strategy for appealing to the people while keeping the elite fearful is hardly new. Throwing a *boyar* (an aristocratic official) off the porch to a restive crowd was a standard means of placating discontent until Peter the Great's time. Yet so far, although fear is spreading, popularity is not returning. Recent research conducted by Sergei Belanovsky, a sociologist who predicted the protests of 2011, paints a striking picture: the appetite for a "strong hand" is waning, and more people want democratic rule and an open parliament. The sight of another body being thrown off the porch is unlikely to satisfy them. ■

Charlemagne | Europe's other migration crisis

Emigration towards the continent's core takes internationalists from the places that need them most



POROSHENKO, ZELENSKY, Poroshenko, Zelensky..." chants the teller, sing-song, over the flutter of papers. It is shortly before midnight on Sunday in the Ukrainian embassy in Warsaw. Representatives of the country's presidential candidates are gathered around a conference table to count first-round votes from citizens living here in neighbouring Poland. From a pile in the centre a staffer peels out the long ballot slips—there were 39 candidates—and hands each to his boss who reads out the vote and passes it to the appropriate delegate, who adds it to his or her stack. The piles for Petro Poroshenko, the incumbent, and Volodymyr Zelensky, his comedian-turned-politician challenger, are the largest.

The scene captures something of Ukraine's resilience. Unlike some former Soviet states it is a democracy, albeit a deeply flawed one. It remains keen on the Europeanist course set during the pro-EU, Maidan protests in 2013-2014, despite Russian military incursions and the annexation of Crimea since then. Ukrainians enjoy the freedom, boosted by a visa liberalisation in 2017, to travel to the EU and hundreds of thousands have exercised this right in the past five years. Most went to Poland, attracted by its proximity, its cultural-linguistic similarities and its booming economy. On March 31st thousands of them queued up at the embassy in Warsaw, and consulates in Gdansk and Krakow, to cast their votes: a paragon of trans-European democracy.

Yet democracy and European convergence demand more than five-yearly elections. They also require the rule of law, transparency and strong institutions. And here Ukraine is struggling. Corruption is endemic and oligarchs still dominate politics. Disappointment at the slow pace of progress has driven much of the emigration. From about 220,000 in 2013, the number of Ukrainians living in Poland is now around 1.5m, though estimates vary. Compared with previous waves of Ukrainian emigrants, this one is less seasonal but also younger, more multilingual and better-educated. More than a third of recent leavers have university degrees.

Anhelina Prymak moved to Poland in 2013 to study European affairs. Corruption in universities is a major factor for emigrant students like her; bribes-for-grades are so rife in Ukraine that the overall cost of studying can be similar on both sides of the border. Now she works for a Polish think-tank. Likewise Sasha Iwaniuk, a

political scientist and novelist from Kiev, found her university in Ukraine parochial and corrupt, so moved her PhD studies to Lublin. Many entrepreneurs have moved to Poland, along with thousands of IT professionals who often see it as a stepping stone to Germany or beyond. "Students and businesspeople are leaving," despairs Ms Iwaniuk. "It's a catastrophe in terms of demography. The country is losing the people who can change it."

Natalia Panchenko, a Maidan protester now living in Warsaw, agrees: "The ones leaving are those who could push for changes." But precisely those people—often young and without partners, children or homes anchoring them to Ukraine—say they do not intend to return until the situation there improves. At least they can invest some of their reformist energies in their adoptive country. For example, a number of Ukrainians attended protests against the constitutional abuses of Poland's governing Law and Justice (Pis) party. Igor Isajew, a Ukrainian journalist, was propelled into Citizens of Poland, an anti-Pis movement, in 2016 by government restrictions on the media. "I'm optimistic that Poland will vote out Pis," he says. Others contribute outside of party politics. As part of BETA Polska, a pro-EU campaign, Ms Prymak is helping to run educational simulations of the European Parliament for pupils and voters around Poland. "People really engage!" she enthuses, recalling a teacher who overheard her discussing the initiative in a café and invited BETA to her school on the spot.

For Ukrainians in Poland, read also Romanians in Spain, Poles in Britain and Lithuanians in Germany. Free movement, cheap flights, the rise of English and the internationalisation of universities have made it easier than ever for Europeans to up sticks. Those who do so tend to be disproportionately young and well-educated, and are becoming more so. They are by definition mobile and thus alive to the benefits of European integration. They tend to gravitate from Europe's eastern and southern periphery towards its core. Brussels, the EU's capital, is the supreme example; the destination of choice for many who know and care the most about the EU. On sunny evenings café terraces outside the European Parliament teem with bright young officials, politicians and advisers from across the continent, mingling with others who (predominantly) share their European expertise and enthusiasms. "One of the unintended consequences of building up European institutions is that many of the best-informed, most pro-European people have left national capitals for Brussels," observes Timothy Garton Ash, a historian at Oxford University.

The lure of the centre

EU politicians at least travel home to their constituencies. And social media sites make it easier than ever for emigrants to remain active in the politics and societies of their countries of origin; they can vote in national elections, though most of them do not. But it is plain that their centripetal movement carries with it some of the modernising vim that, staying put, might propel those countries faster in the same direction. An IMF study in 2016 found a "significant negative association" between the rate of high-skill emigration from eastern European countries in 2000 and improvements in their quality of government 14 years later.

The knock-on effects of recent waves of emigration will take at least as long to be felt fully. But they are already visible in some places. Mr Garton Ash points to countries like Poland, where the departure of highly informed, pro-European natives can be felt in the tone of national debates. "The Europeans have, as it were, gone to Europe." ■



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Brexit and Parliament

In search of lost compromises

Brexit has always required some compromise. But can Theresa May and Jeremy Corbyn ever make one?

IT WAS PERHAPS fitting that this week's Commons debates on Brexit were interrupted by a protest by 12 semi-naked people. MPs tried hard to ignore the invaders even as several glued their bottoms against the glass barrier above the chamber. In line with a surreal atmosphere of repetitious argument, the protest was not even about Brexit, but climate change.

This was far from the high point of the week's drama. That came a day later when Theresa May emerged from a seven-hour cabinet meeting to announce that, to break the Brexit logjam, she would now try to agree a plan with the Labour leader, Jeremy Corbyn. Even more important, she added that, if this effort failed, she would bind herself to implement whatever Brexit proposal MPs agreed upon in their next round of voting.

The prime minister's volte-face comes at a crucial moment. For months she has been advised that, because she would never get all hardline Brexiteers in the Tory European Research Group (ERG) and the Northern Irish Democratic Unionist Party (DUP) to back the Brexit deal she has done

with the European Union, she must reach out to the opposition. Now she has belatedly accepted this advice. In doing so, she has tilted firmly against a no-deal Brexit. To invert her mantra, she now seems to think any deal is better than no-deal. Tory hardliners are furious with her (see Bagehot).

Even so, it is not obvious that her move will bear fruit. The two leaders, who met on the afternoon of April 3rd, are not just far apart politically but also notoriously intransigent. Mrs May might soften some Brexit "red lines", but she is still opposed to both the customs union and the single market. Mr Corbyn wants to pursue the first, and many elements of the second. He is also under pressure from his party to press for a second referendum, but she has been determinedly against this. Any Brexit deal must also espouse the current withdrawal agreement, including the contentious Irish backstop that implicitly relies on a customs union and regulatory alignment as insurance against a hard border.

It does not help that MPs keep showing what they are against, not what they are for. On March 29th, when Brexit was originally

due to happen, MPs rejected Mrs May's deal for a third time, albeit by the margin of 58 votes, down from the record previous defeats by 230 and 149. Then on April 1st MPs again rejected all Brexit options before them in a second round of "indicative votes"—though by less than before. A customs-union motion was rejected by just three votes; a confirmatory referendum by 12; and a "Norway-plus" option redubbed "Common Market 2.0" by 21 votes.

The main reason why nothing gets through is that there is so little mood for compromise on any side. Hardliners in the ERG and the DUP voted against every option because they do not want in any way to soften the hard Brexit they favour. But firm Remainers were almost equally obdurate. They refused to back Common Market 2.0 because it would weaken their campaign for a second referendum. Deadlock in the Commons was symbolised by a tie in a procedural vote about more Brexit voting next week, though it is in practice still likely.

Nick Boles, who sponsored Common Market 2.0, accused fellow Tories of refusing to compromise and announced his resignation from the party whip. He is right that the Tories were, along with the DUP, the most intransigent of all. Barely a sixth of Tory MPs backed any option in the indicative votes. He won over the Scottish Nationalists, yet the Liberal Democrats and the new Change UK party were also hostile to his plan.

This aversion to compromise can only make Mrs May's attempt to find one even ►►

► harder. That is unfortunate for two big reasons. One is that Brexit requires trade-offs: between the health of the economy and the desire for greater sovereignty, and between unfettered access to the EU market and the wish to control free movement of people. Compromises are often unsatisfactory to all. A customs union, for example, would only reduce not eliminate border frictions (including in Northern Ireland). By making it impossible to offer third countries lower tariffs on their goods exports, it would also make it far harder to strike free-trade deals, though they could in theory be done for services alone.

The second reason is the looming deadline, now April 12th. Usually when compromise fails, the status quo prevails. For Brexit, however, the default is leaving without a deal. This week the cabinet secretary, Sir Mark Sedwill, spelt out the consequences for ministers in gory detail. Prices would jump, the economy tip into recession and the nation's security be imperilled. That is why MPs this week were trying to push through a law requiring Mrs May to seek another extension to the deadline.

She has in fact promised to do just that at the European Council in Brussels on April 10th. But it is not a given that EU leaders, whose unanimous approval is needed for an extension, will agree. Several are fed up with Mrs May's indecision and with British MPs' failure to agree upon anything. Charles Grant of the Centre for European Reform, a think-tank, says the leaders are split, with France's Emmanuel Macron inclined to be tougher on Mrs May than Germany's Angela Merkel.

Mr Grant adds that EU leaders will insist that, if Britain is still a member after May 22nd, which is likely even if Mrs May and Mr Corbyn miraculously compromise in the next few days, it must take part in the European Parliament elections due on May 23rd-26th. Mrs May is keen not to do this so as to avoid explaining to voters why such an election is happening almost three years after the Brexit referendum. But she was careful this week not to rule out the possibility, so in a crunch she will surely give way. The government is already making contingency plans to hold the election.

However the next few days go, Mrs May once again faces torrid negotiations in Brussels next week. EU leaders are aware that she has lost control of her party and of Parliament. They know she has promised to quit as prime minister, and they are fearful of who might succeed her. Returning to that Commons protest, Aneurin Bevan famously warned the Labour Party that scrapping nuclear weapons would mean its foreign secretary walking naked into the conference chamber. Mrs May will not have to do that. But she has few weapons and even less credibility with which to lever more concessions from the EU. ■

Prisons in Northern Ireland

Irish porridge

HMP MAGHABERRY

Why Northern Ireland's prisons are relatively empty

NORTHERN IRELAND'S prisons were once notorious. They were battlegrounds of the "Troubles" of 1968-98, as the government experimented with internment without trial and prisoners demanded recognition of their political status with "dirty protests", during which some smeared excrement on cell walls. The gaunt features of Bobby Sands, a Republican inmate, became well known as he starved himself to death in 1981. The Irish Republican Army targeted warders. "People had assumptions about who we were," says Austin Treacy, the province's director of prisons. "And during the Troubles, we didn't want them to know who we were."

Yet Mr Treacy and his colleagues now have something to boast about. A much smaller share of the population serves time than in England, Wales or Scotland (see chart). Its incarceration rate is closer to that of countries championed by penal reformers such as Norway and Sweden than it is to the rest of the UK. English prisons are crammed but there is plenty of room to spare in jails across the Irish Sea. The disparity seems counterintuitive, given the relatively recent conflict and evidence suggesting that the province's judges are no less likely to impose custodial sentences than those elsewhere in the UK.

Three factors help explain the gap. The first is a gulf in crime rates. Surveys suggest Northern Irish people are a little more than half as likely to fall victim to crime as those in England and Wales. Some think the higher number of cops relative to population in the province has a deterrent effect. Others, including Mr Treacy, point to the lack of big cities, which tend to have con-

centrations of crime.

Second, the Northern Irish system is better at deterring prisoners from reoffending once they are released. On March 28th Dame Glenys Stacey, the chief inspector of probation in England and Wales, concluded that the part-privatisation of its system in 2014 was "irredeemably flawed". All of the 10 private probation firms inspected last year were given the lowest two of four grades. By contrast Northern Ireland kept its unified, public-sector system. Olwen Lyner of NIACRO, a criminal-justice charity, adds that having one probation agency and a single police force (rather than the 43 in England and Wales) makes it easier to coordinate support for ex-prisoners.

Even the much-criticised prisons are beginning to play a part. After inspectors rebuked HMP Maghaberry in 2015 partly for failing to provide enough activities for inmates, officers opened a recycling plant to train inmates and a café where prisoners do the serving. They rebranded the only jail for young offenders as a "secure college", where staff call prisoners, who study educational and vocational courses, "students". It is too early to judge the lasting effects of the changes, but Mr Treacy claims they are bearing fruit. Prisoners are becoming less likely to reoffend, and the overall recidivism rate is ten percentage points lower than in England and Wales.

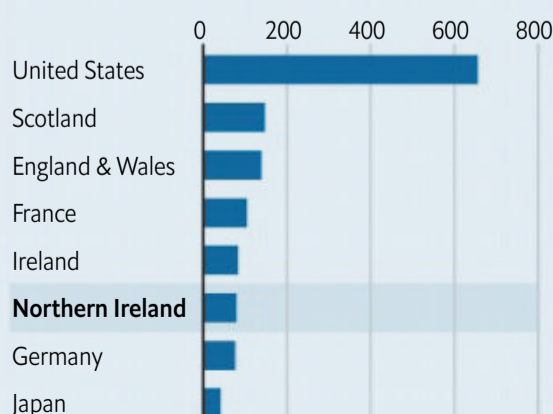
The final explanation is historical—and disturbing. During the Troubles, paramilitaries ran a shadow justice system to police their neighbourhoods. Their influence is waning but they still enforce a strict "moral code" in some working-class districts, says John Topping of Queen's University Belfast. Several dozen "punishment assaults" are recorded by police every year, to enforce drug debts but also for suspected criminal offences that may otherwise be reported to the police. Victims are shot in the knees or roughed up with baseball bats.

In an attempt to end this violence, the state licenses grassroots alternatives to the justice system. One group, Community Restorative Justice Ireland, is run by Harry Maguire, a Republican who served ten years in jail for his part in the murder of two British soldiers. It claims to handle 1,700 or so disputes a year, mostly between Republicans. It refers serious crimes to the police, but otherwise mediates between parties involved in low-level wrongdoing or to prevent family feuds escalating.

The groups break cycles of offending and keep young people in particular out of prison, says Phil Scraton, also of Queen's. As they are subject to inspection, they offer a more legitimate form of informal justice, argues David Ford, a former justice minister at Stormont. But their sectarian nature means they are hardly ideal models. "Would you do it in England and Wales? Probably not," Mr Ford admits. ■

Lock-down

Prisoners per 100,000 population
2019 or latest



Source: Institute for Criminal Policy Research

Bagehot | Metamorphosis

The Conservative Party has transformed into a party of populist nationalism



A PRIME MINISTER with a well-deserved reputation for dullness and dithering has finally done something dramatic and bold. This week she broke with the Brexit-right of her party and decided to put national interest above party unity. In a lengthy cabinet meeting on April 2nd Theresa May forged a radically new policy—working with the leader of the opposition Labour Party, Jeremy Corbyn, to produce a compromise Brexit and, if that doesn't work, holding another round of indicative votes in the House of Commons and going with the winner.

Her move has left the hard Brexiteers in her party even more apoplectic than usual. Boris Johnson pronounced that “Brexit is now soft to the point of disintegration.” Jacob Rees-Mogg accused Mrs May of being keener to work with a Marxist than with her fellow Tories. Iain Duncan Smith opined that “the spectre of Corbyn lording it over us in a prime-ministerial way as he wrecks Brexit makes my blood run cold and fear for my party and my country.” So far a couple of junior ministers have resigned.

The hard-core Brexiteers have nobody to blame but themselves. Mrs May did everything in her power to give them what they wanted, from “red lines” on Brexit to seats at the cabinet table. But they behaved like ravening crocodiles who, having consumed an arm, immediately demanded a leg for dessert. Reasonable people would moderate their demands when they are confronted with intractable problems such as a hung parliament and a sensitive border. The Brexiteers flew into a rage. Steve Baker told fellow members of the European Research Group that “I could tear this place down and bulldoze it into the river”—referring to the House of Commons. Mark Francois announced on the radio that his message to his own chancellor, Philip Hammond, was “up yours”. The result of this foaming intransigence was that Mrs May had no choice but to look elsewhere for compromise. A woman who has devoted her life to the Conservative Party—who stuffed envelopes as a teenager and who met her husband at a meeting of the Oxford University Conservative Association—found it easier to deal with a crypto-communist than with the fanatics in her own party.

Does this mean that the headbangers have finally had their day? They are undoubtedly at risk of losing the Brexit war. The chances of a no-deal Brexit fell on Tuesday while the chances of a softer one

rose. But that does not mean that they have lost the battle for the future of the Conservative Party. The prime minister, who has said that she plans to resign once Britain has formally left the EU, may have given them just the stab-in-the-back myth that they need to complete their long coup.

The Brexiteers have numbers on their side. The Tory left's recent attempts to revive “compassionate conservatism” merely advertise its weakness. The group only has 40 members and its figurehead, Amber Rudd, sits on a majority of fewer than 400 in her constituency of Hastings and Rye. By contrast more than 170 Tory MPs wrote to Mrs May demanding that Britain should leave the EU on April 12th, deal or no-deal, as is the current legal default. The numbers are even more lopsided in the constituencies: more than 70% of Tory party members support a no-deal Brexit. MPs who have peddled a softer line on Brexit, such as Sir Oliver Letwin and Dominic Grieve, have faced deselection threats from their local parties. Nick Boles, who dramatically resigned from his party on the floor of the House of Commons on Monday, had already resigned from his local association.

The Brexiteers also have passion on their side. It is easy to mock MPs such as Mr Baker, who told a tv interviewer that “everyone knows I'm Brexit hard man Steve Baker”, or Mr Francois, who barrels around the House of Commons like a character out of “Dad's Army”, but the country is full of people like this. The Brexiteers after all have a powerful argument on their side: the British people voted to leave the EU in what they were told was a definitive referendum and yet Mrs May continues to delay the date for leaving as well as softening the terms. They also have a powerful ideology, one that is contemptuous of metropolitan elites, suspicious of hoity-toity institutions and proud of British national identity.

He found himself changed into a monstrous pest

All of which means that competing theories about what is happening to Britain's ruling party—that it is undergoing a process of collective nervous breakdown; that it is splitting asunder; or that it is being misled by UKIP infiltrators—are wrong. The truth is more dramatic than this. The party that was once the instrument of the British establishment is in the process of metamorphosing into a full-scale nationalist-populist party. That may involve a certain amount of splintering as the likes of Mr Boles decide that they cannot stand it any longer, but that is rather different from a split down the middle.

The 2016 referendum provided the trigger for this metamorphosis by allowing the Brexiteers to claim that they represented “the will of the people”. The post-referendum traumas hastened the transformation by confronting the will of the people with innumerable practical difficulties, from the opposition of Remainers to the cunning of the Eurocrats. Mrs May's offer to work with Mr Corbyn has now provided the creature with the perfect growth hormone: the idea that Brexit has been betrayed by a Remainer prime minister who preferred to work with a Marxist leader of the opposition than with true-blue Tories.

Mrs May's decision to sit down with Mr Corbyn is undoubtedly a welcome move in the short term because it is the only way to break the Brexit logjam. But in the longer term it will make it more likely that Britain's political system will continue down the road to disaster—and that in the next election the country will be faced with a choice between a populist left championing the “many” against the “few” and a nationalist right championing ordinary people against cosmopolitan elites. ■



Public administration

Capital flight

FORDE AND TLAXCALA

Many governments dream of moving civil servants out of the capital. Making a success of it is harder than it looks

IN AN OLD music classroom in the Culture Palace in Tlaxcala, two hours' drive east of Mexico City, sits Alejandra Frausto, Mexico's culture minister. She hopes her new office's bare walls will soon sport a screen for video-conferencing with Mexico City and beyond. Hers is one of the first two ministries to move under a policy of President Andrés Manuel López Obrador, usually known as AMLO, elected last year. Resurrecting an idea first mooted in the 1980s, he wants to move a big central-government body to each of 30 Mexican states. Tlaxcala's state capital has 85,000 people, only eight times more than the culture ministry's staff in Mexico City. Ms Frausto dreams of one day having thousands of workers in the state.

Revolutionary as AMLO's plan sounds, it is part of a global trend. Around the world, capital cities are disgorging bureaucrats.

In the post-colonial fervour of the 20th century, coastal capitals picked by trade-focused empires were spurned for "regionally neutral" new ones, such as Brasilia (Brazil), Islamabad (Pakistan) and Dodoma (Tanzania); more recently, Kazakhstan

built Nursultan (née Astana) and Myanmar Naypyidaw. But decamping wholesale is costly and unpopular; governments these days prefer piecemeal dispersal.

Take Norway, which since 2006 has shifted 1,600 civil-service jobs out of Oslo. The competition authority is in Bergen, the second city. The polar institute was packed off to a town not far short of the North Pole. And last year the Norwegian peace corps, Norec, an agency that oversees programmes in 25 poorer countries, moved to Forde, a settlement of 13,000 people nestled between mountains, rivers and fjords.

Mexico and Norway are just two of many. South Korea has moved two-thirds of its government agencies away from Seoul, many of them to the newly built Sejong City. Since 2015 Denmark has moved thousands of government jobs to scores of cities. Malaysia shifted many of its paper-pushers in 1999 from Kuala Lumpur to a new city called Putrajaya. Indonesia is mulling moving its capital from Jakarta.

The trend reflects how the world has changed. In past eras, when information travelled at a snail's pace, civil servants had

to cluster together. But now desk-workers can ping emails and video-chat around the world. Travel for face-to-face meetings may be unavoidable, but transport links, too, have improved. Forde, Norec's new base, is 400km from Oslo but offers five hour-long flights to the capital a day.

Proponents of moving civil servants around promise countless benefits. It disperses the risk that a terrorist attack or natural disaster will cripple an entire government. Wonks in the sticks will be inspired by new ideas that walled-off capitals cannot conjure up. Autonomous regulators perform best far from the pressure and lobbying of the big city. Some even hail a cure for ascendant cynicism and populism. The unloved bureaucrats of faraway capitals will become as popular as firefighters once they mix with regular folk.

Beyond these sunny visions, dispersing central-government functions usually has three specific aims: to improve the lives of both civil servants and those living in clogged capitals; to save money; and to redress regional imbalances. The trouble is that these goals are not always realised.

The first aim—improving living condi- ▶▶

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tions—has a long pedigree. After the second world war Britain moved thousands of civil servants to “agreeable English country towns” as London was rebuilt. But swapping the capital for somewhere smaller is not always agreeable. Attrition rates can exceed 80%. Even the footloose youngsters Norec tends to employ bridled. One, Magnhild Bogseth, recalls: “When I moved to Paraguay or Nicaragua, my friends never asked: ‘Are you sure you want to do this?’ But when I came to Forde, they all said: ‘Will you really be happy there? Your social life will be destroyed!’” Many locals also struggle to adjust. When a Norec worker convinced her Colombian boyfriend to move with her from Oslo, the town newspaper reported his arrival on its front page.

As for those left living in the capital, a review in 1962 in Britain urged further dispersal to improve their “health and welfare”. Similarly, the Netherlands pointed to congestion and a housing shortage when moving government jobs in the late 1960s. Egypt’s generals cite congestion and pollution in Cairo to justify building a new, still unnamed capital in the desert.

The second reason to pack bureaucrats off is to save money. Office space costs far more in capitals. When London’s property market stagnated in the late 1970s the government lost enthusiasm for relocation. Agencies that are moved elsewhere can often recruit better workers on lower salaries than in capitals, where well-paying multinationals mop up talent.

Balancing act

The third reason to shift is to rebalance regional inequality. In Mexico AMLO laments the “tragedy” of those who have to move to big cities to make a living. The day the culture ministry opened in Tlaxcala, 70 locals turned up with their cvs. When Britain moved 20% of London’s civil servants between 2003 and 2010, it often picked areas with high unemployment, such as Newport, a Welsh city hit by industrial decline that now houses the headquarters of the Office for National Statistics (ONS). Norway treats federal jobs as a resource every region deserves to enjoy, like profits from oil.

Where government jobs go, private ones follow. A study of Berlin after Germany’s federal workforce was moved from Bonn in 1999 found that the arrival of 100 government jobs in an area helped create 55 private-sector jobs. A review of Britain’s relocations in the 2000s found the same ratio. The jobs created tend to be in services, often the law or consultancy.

Sometimes the aim is to fulfil the potential of a country’s second-tier cities. Unlike poor, remote places, bigger cities can make the most of relocated government agencies, linking them to local universities and businesses and supplying a better-educated workforce. The decision in 1946 to set up

America’s Centres for Disease Control in Atlanta rather than Washington, DC, has transformed the city into a hub for health-sector research and business.

The dilemma is obvious. Pick small, poor towns, and areas of high unemployment get new jobs, but it is hard to attract the most qualified workers; opt for larger cities with infrastructure and better-qualified residents, and the country’s most deprived areas see little benefit.

Whatever the motives, relocations are difficult. Norec’s move to Forde prompted 34 of its 42 staff to resign—and that 20% stayed was, boasts its director, a record high for Norway. When the civil-aviation authority moved to the Arctic Circle, almost all its flight inspectors quit. The loss of expertise took years to replace. Similarly, Denmark’s 465-strong environmental protection agency is moving from Copenhagen to Odense, Denmark’s third city. Of its 16 toxicologists, 12 intend to resign.

Staff disgruntlement is not the only problem. Places are often chosen for political reasons. Forde scored worst on a three-town shortlist for hosting Norec. A local politician is credited with swaying the final call. In 2016 Australia’s then deputy prime minister, Barnaby Joyce, helped move the pesticides and veterinary authority to a town in his own constituency. More brazen still was Augusto Pinochet’s displacement of Chile’s congress from Santiago to his hometown of Valparaíso, where it remains.

Others contend that decentralisation begets corruption by making government agencies less accountable. Egypt’s new capital will be far from the residents of Cairo, whose protests overthrew a dictator in 2011. A study in America found that state-government corruption is worse when the state capital is isolated—journalists, who tend to live in the bigger cities, become less

watchful of those in power.

But resistance can be formidable and relocation plans are often aborted. Workers and unions oppose them. Ministers incur the short-term costs of disruption and unpopularity but rarely reap the benefits of greater regional equality. In Japan in 2014 Shinzo Abe, the prime minister, proposed a relocation drive to free up space in Tokyo, which has faced concerted opposition.

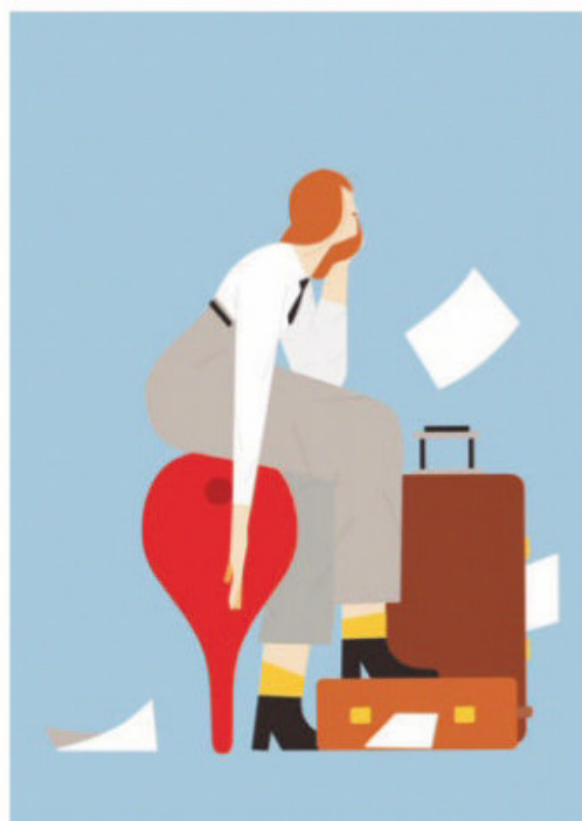
Stuck in the swamp

Washington, DC, a town designed as a humble alternative to bigger cities that has since become America’s sixth-largest economic area, is another stage for this battle. Two cabinet secretaries, Ryan Zinke at Interior (who resigned in December) and Sonny Perdue at Agriculture, proposed moving agencies from the capital. Mr Zinke eventually backed down. Mr Perdue, who did not, faces acrimony from his own staff. Three bills that order the moving of agencies from the capital are stuck in congressional committees.

Norway once saw similar lethargy. Piecemeal proposals floated in the 1970s were never implemented. But in the early 2000s politicians, hoping for new jobs in their own backyard, all mobilised behind a single policy, says Rune Dahl Fitjar of the University of Stavanger. The government hid its plans from public-sector unions, who had little time to oppose it and no right to strike against it, says John Leirvaag, a union leader. Most vital was political leadership—a prime minister determined to make it happen.

In Mexico AMLO should in theory find decentralisation less arduous. He was elected with a huge mandate on a promise to fix the country’s regional disparities, the widest in the OECD, a club of mostly rich countries. But his dream of moving all or even most government workers is a long way off, if it is even to happen at all. Unlike their Norwegian counterparts, Mexican bureaucrats have no obligation to leave the capital. A promise to move several offices on his first day was dropped. Each dispersed ministry will begin as a kind of satellite office for the main one in Mexico City. The ministers will show up once a week. “We cannot stop having a base in the capital,” says Victor Manuel Villalobos, whose agriculture ministry opened an office in Sonora, in Mexico’s north, last month.

Tlaxcala offers a reasonably reassuring precedent. Life there is quiet. In 2017 journalists sardonically reported the installation of the state’s first escalator. But it also lacks the capital’s traffic, pollution and violence, and boasts the best corn tortillas in Mexico. One of the few new arrivals says she is happier working here. “We used to live in an apartment in Mexico City. No flowers, nothing green,” she says. “Now my daughter has a garden.” ■





Corporate crises

The new age of corporate scandals

Boeing, Goldman Sachs, Facebook. A rash of accidents and misconduct claims suggest that standards have slipped at America Inc. Time for a reset

TWO THINGS stand out about business in America today. One is how successful American firms are: they account for 57 of the world's 100 most valuable listed firms. The other is the bad smell hanging over a number of powerful companies.

Boeing faces claims that it sold 737 MAX planes with dangerous software. It says it is "taking actions to fully ensure the safety of the 737 MAX". Criminal charges have been filed against Goldman Sachs in Malaysia for its role in arranging \$6.5bn of debt for a state-run fund that engaged in fraud. Goldman says it is co-operating with investigators. A jury in California has just found that Monsanto failed to warn a customer that its weedkiller could, allegedly, cause cancer. Bayer, a German firm which bought Monsanto in June, says it will appeal the verdict.

Wells Fargo, one of America's biggest banks, has admitted creating 3.5m unauthorised bank accounts. It says it is working to "rebuild trust with our stakeholders". Facebook is ensnared in scandals; its data

practices have come under scrutiny in several countries. The firm says "we need a more active role for governments and regulators" (see next story). Some 146m customers of Equifax, a credit-scoring firm, had their personal details stolen in 2017. It is being sued for negligence, according to its annual report. A recent document for its investors says protecting information is "our highest priority".

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Then there is the opioid epidemic, which involves not only Purdue Pharma, the maker of OxyContin, but also, according to a lawsuit by New York's attorney-general, other firms including McKesson and Johnson & Johnson. Purdue says it is "deeply concerned" about opioid addiction. Last year McKesson also said it is "deeply concerned" by the epidemic and that its board has "enhanced oversight procedures related to opioid distribution". Johnson & Johnson says it is "committed to ensuring its medicines are used correctly".

It is tempting to view these cases as unrelated events caused by factors ranging from bad luck and human error to negligence and criminality. That would be a mistake. American firms seem to be more scandal-prone than their peers across the pond. The total market value of American firms involved in big incidents that have become public since 2016 is \$1.54trn. At least 200m consumers have been affected. The figures are only \$600bn and under 30m for European firms, including car-makers that faked emissions tests and Nordic banks involved in money-laundering.

America is no stranger to corporate scandals. In the 19th century abattoirs sold rotten meat. In the 1960s Detroit made cars that were "unsafe at any speed", in the words of Ralph Nader, a consumer-rights crusader. In the 1990s tobacco and asbestos claims led to legal settlements that have ▶

▶ cost shareholders over \$150bn. Accounting scandals erupted at WorldCom, Enron and Tyco in the early 2000s, and by the mid-2000s mortgage fraud was endemic.

Today's crises are diverse but have common elements. The firms tend to be established, with dominant market positions. Outrage infuses social media and Congress. And yet the financial cost has been limited. Take a sample of ten big American listed firms involved in controversial episodes: their median share price has lagged behind the stockmarket by a bearable 11% since the event, after adjusting for divi-

dends. Although Boeing's shares have lost 8% since the crash in Ethiopia, they are above their level in January.

The crises have caused bosses to stand down in only two of the ten cases: Wells Fargo and Equifax. Some adjustments to bosses' pay have been made. Goldman says that some ex-executives' share awards could be clawed back depending on the probe into the Malaysia incident. Equifax says cyber-security is now factored into its pay schemes. Nonetheless, for the ten firms the total pool of senior executive pay has risen over the four most recent years, to

almost \$600m, according to Bloomberg.

For critics of capitalism none of this will be a surprise. They argue that firms controlled by private shareholders are especially unethical. Yet it is easy to poke holes in this. Volkswagen cheated on emissions tests even though it is part-owned by the German state and has workers on its board. Despite Sweden's cuddly "stakeholder" capitalism, Swedbank faces a criminal investigation for money-laundering.

An alternative explanation is that American capitalism has got out of kilter. It has always been restless and dynamic. ▶▶

Bartleby The loan arrangers

An idea that appeals to employers and workers

THE MONTHLY pay cycle is something that professionals quickly get used to. But for employees with low-paid, or irregular, jobs it can involve real hardship. All too often, the bills arrive before the wages do.

The temptation for workers is to turn to payday lenders. But the costs are high. In Britain, even after the Financial Conduct Authority imposed a cap in 2015, the annualised interest rates for such loans average 1,250%.

Now there is an alternative. Wagestream is a British financial-services company which will advance part of a worker's salary in return for a flat £1.75 (\$2.30) fee. The money is then deducted from the final pay packet. This has a number of advantages for workers. They can deal with a cash shortfall while avoiding the vicious spiral of escalating charges and ever-bigger debts.

An app tells each worker how much they have earned so far this month, and allows them to borrow up to 40% of it. The average advance is £83 and is typically tapped twice a month. Clients include Rentokil Initial, a pest control company, and Stonegate Pubs, which operates nearly 700 establishments in Britain.

The scheme works for Wagestream because it is exposed to the credit risk of the employer, not the workers. As well as the charge on employees, Wagestream also earns a fee from the companies involved. Why would employers accept this? In part, it is because they recognise workers face cashflow problems, and they are more likely to retain their services if those issues can be dealt with.

But the evidence also suggests that employees work harder when they have quicker access to their money. Wagestream says clients that hire workers on an hourly basis find that they work 22%

more hours after loans are made available. One client, a security firm, was struggling to fill its overtime rotas. By allowing employees to tap the extra cash immediately after a shift through Wagestream, the company found many more overtime volunteers. In effect, these cash advances are a way to bridge the desire of workers to be paid on a weekly basis with the preference of employers to pay them monthly.

Wagestream's innovative approach has attracted investors with a social focus. One of its backers is the Fair By Design fund, run by Emma Steele of Ascension Ventures, a venture-capital firm. The fund has £10m of assets and a ten-year investment horizon that, Ms Steele says, Wagestream fitted neatly into. Among the other companies in the portfolio are Credit Kudos, which aims to measure creditworthiness in a way that is fairer to low earners, and We Are Digital, which gives consumers financial training and helps the poor get access to the internet.

Fair By Design is also the name of a campaign that aims to eradicate the "poverty premium" which results from poor

people paying more for many goods and services. Research by Bristol University suggests that the poverty premium in Britain averages £490 a year, of which around £55 reflects the use of higher-cost credit. However, this average disguises a deep split: most families do not use expensive credit but those who do can pay £540 a year for it.

The Joseph Rowntree Foundation (JRF), a long-standing anti-poverty group, backs the campaign and has invested in the fund. Tanya Seeley of JRF says that tackling in-work poverty is one of the campaign's most important aims. The charity estimates that 72% of children who live in poverty in Britain have one or more parents in work. That compares with just 50% in the late 1990s.

Of course, allowing workers to get a salary advance is not a panacea. If their wages are not high enough to cover their living expenses, they will still struggle. But many workers can run into trouble when they face an unexpected bill, for instance to replace a domestic appliance. Eliminating the need to depend on pricey payday lenders is an important advance. Although the service is confined to Britain at present, there is no reason why other companies cannot offer something similar in other countries.

Wagestream's example is also a useful antidote for those who are overly cynical about either capitalism or socially conscious investing. Sometimes financial innovation can tackle social problems, as well as hopefully make a return for ethical investors—who are not, after all, charities. Asset managers seeking at once to do good and do well might back ideas shunned by rivals obsessed with finding the next Facebook.



► Companies test the boundaries of what is possible—and permissible. Tech firms are just the latest to “move fast and break things”, to use Facebook’s unofficial slogan. But three forces have long constrained corporate conduct: regulation, litigation and competition. The aftermath of the financial crisis saw a storm of lawsuits and fines on banks. But since then each of the three forces may have weakened, increasing the incentive for firms to take risks.

Take regulation first. The system is a strange blend: there are pockets of *laissez-faire* attitudes here, thickets of rules there and lobbying everywhere. It is variously prone to laxity, capture and incompetence. The Federal Drug Administration allowed opioids to be sold to the masses. The Federal Aviation Administration delegated part of its inspection process to Boeing employees. The Federal Trade Commission has struggled to police Facebook. The fines imposed by some regulators can be small relative to market values of giant firms.

Second, litigation may no longer be quite the deterrent it once was. Criminal cases leading to jail terms for top executives are as rare as socialists at Goldman Sachs. And civil law has lost its bite. America has long used class-action suits to punish firms and compensate consumers. Tort costs born by firms are equivalent to about 2% of GDP a year, higher than in other countries. Nonetheless, life has got easier for firms. Arbitration clauses, in which customers and staff forfeit the right to pursue class actions, have become more common. Firms are more likely to extend cases to appeal, which can take up to a decade. One veteran class-action lawyer says that financial penalties have shrunk relative to the value of many firms, which in turn have risen as a result of a takeover wave. She complains that for the top 50 firms, the threat of a multi-billion-dollar legal settlement “doesn’t move the needle any more”.

The final constraint is competition. It can drive firms to cut corners but in the long run should act to discipline careless or badly behaved firms, because customers shun them. Kraft and Heinz boomed in the 20th century, thanks in part to a reputation for safety. Japanese car firms forced Detroit to raise its game in the 1980s. And today Netflix trounces the traditional cable TV firms which love to bamboozle customers.

But across the economy incumbent firms have got more powerful over the past 20 years, making it harder for customers to switch. There is one alternative to Boeing, Airbus, but it lacks spare capacity. Users find it hard to leave Facebook. Pesticides and herbicides, credit-checking, drug distribution and drug retailing have grown more concentrated, too. Perhaps the rash of crises will prompt corporate soul-searching. If not, public confidence in capitalism may suffer another blow. ■

Facebook

Careful what you wish for

The social network says that it wants to move slowly and repair things

ON MARCH 30TH Mark Zuckerberg, Facebook’s boss, wrote about his company’s future for the second time in a month. His first note, published March 6th, covered a range of planned technical changes to Facebook, WhatsApp and Instagram. Then, in an article in the *Washington Post*, he urged the world’s governments to regulate social networks. Specifically, he wants them to protect the public from harmful content (such as videos of massacres), ensure the integrity of elections, guarantee that users can move their data between services, and underwrite users’ privacy.

Rich, you may think, coming from the boss of a firm accused of falling foul of all four precepts; on April 3rd it emerged that some user data had been stored on unsecured third-party servers. Mr Zuckerberg’s plea looks like an attempt to get ahead of tougher rules which could crimp Facebook’s earnings from selling targeted ads—just as its model faces fresh challenges.

On March 28th America’s Department of Housing and Urban Development (HUD) accused Facebook of allowing advertisers to target property buyers by race, religion and other factors in what amounts to discrimination. This week a team led by researchers from Northeastern University in Boston presented work suggesting that Facebook’s algorithms may discriminate inadvertently, by optimising engagement. In the algorithmic search for users who will respond most eagerly to a given advert, Facebook may automatically exclude some users from minority groups.

Finely tailored ads are the source of the company’s fat profits; making them less precise could hurt margins. The HUD accusation came a week after Facebook settled a similar suit with the National Fair Housing Alliance and the American Civil Liberties Union. Facebook said it was surprised by HUD’s charges, as it had been working with the department to prevent discrimination.

Instead, the company is talking up its own efforts to tackle Mr Zuckerberg’s four gripes. Last year he suggested creating an independent arbiter at arm’s length from the company to make hard decisions about what content is unacceptable. In the past nine months a dedicated team of Facebook employees has jetted around the world discussing how this might work. On April 1st the firm opened a public consultation on the matter. Principles are likely to include giving the board’s members (who would



I have a few ideas

probably number 40 or so) fixed compensation and shielding them from being sacked by Facebook.

Now it apparently wants to go further. “It would be good for the Internet if more countries adopted regulation such as GDPR as a common framework,” Mr Zuckerberg mused in his op-ed, referring to Europe’s General Data Protection Regulation. He wants America to make internet firms including his own more accountable, “by imposing sanctions when we make mistakes”. Mr Zuckerberg added that he was ready to discuss new regulations with lawmakers around the world.

What counts as a mistake is, of course, open to interpretation. So, apparently, is readiness to talk. Facebook is currently appealing a ruling by Elizabeth Denham, Britain’s top privacy and data-protection regulator, about its handling of user data in the lead-up to the Brexit referendum in 2016. Mr Zuckerberg has repeatedly ignored requests from British MPs to give evidence at committee hearings on Facebook’s role in the referendum. On April 1st Ms Denham called on the company to drop its appeal in light of Mr Zuckerberg’s new openness to regulation and accountability. There are no signs that Facebook plans to drop the appeal. Asked why its boss had not engaged with British lawmakers, the firm declined to comment.

It will take more than an article to make governments trust Mr Zuckerberg and his company. Politicians of all stripes in Europe and America are falling over themselves to sound tough on all internet giants. For the time being, though, investors’ confidence in Facebook remains resolute. Despite HUD’s discrimination claims, the company’s share price is buoyant. ■

Industrial cannabis in China

A budding trade

KUNMING

Hemp stocks reach an all-time high

THE HEMP plant has a storied history in China. It was probably twisted into the world's first rope there around 2,800BC. In the West you find it in cigarette paper and Bible pages. In the East, it is woven into uniforms of the People's Liberation Army (PLA). Since its cooler sister, marijuana, became legal for recreational use in Canada and many American states last year, industrial-use hemp—a variety of cannabis that contains trivial amounts of weed's mind-altering substance, THC—is flourishing in a country that until a few years ago banned its cultivation outright and where cannabis traffickers can face the death penalty.

China grows nearly half the world's legal hemp. In 2018 sales, mostly of textile fibre made from the plant's stalk, totalled \$1.2bn. Now global demand for its seeds, leaves and flowers is surging. Packed with fulsome fatty acids, seeds go into snacks and oil. Leaves and flowers contain cannabidiol (CBD), a non-intoxicating compound that reduces anxiety and inflammation. It is being added as a supplement to food, drinks and cosmetics across the West. In June America approved the first CBD medicine, for epilepsy.

China's first licence to extract CBD went to Hanma Investment Group, owner of its largest hemp planter and processor, in January 2017. By next year, estimates New Frontier Data, a cannabis consultancy, Chinese sales of CBD will more than quadruple to \$228m. Investors are rushing into the field. A Chinese hemp index tracked since 2018 by Wind Information, a data provider, has more than doubled in value this year. Shares in Shanghai Shunho New Materials Technology, a packaging firm, rose three-fold after it received a licence to plant hemp in south-western Yunnan, the first province to lift a national ban in 2010. Shinco, a biotech company whose market capitalisation on New York's Nasdaq exchange has nearly doubled to \$25m since it unveiled a hemp subsidiary last month, plans China's largest industrial-cannabis project in frosty Heilongjiang.

That north-eastern province became the second to legalise hemp-growing in 2017, issuing a three-year plan to become the biggest cannabis base in the world by 2020. In its inaugural year, Heilongjiang harvested 30,000 hectares (74,000 acres) of hemp—nearly one-third the size of European and Canadian fields combined. Neighbouring Jilin province, too, will soon

earn a licence.

Chinese growers are already setting their sights farther afield. In December America legalised industrial hemp nationwide for the first time since the second world war. Hanma ships more than half its domestic output there. Tan Xin, chairman of Hanma, says he will begin to grow and process hemp in Nevada later this year. American hemp has higher CBD levels than China permits.

On March 27th the anti-drugs squad declared that China had never approved industrial cannabis as a medical or food additive; the hemp index briefly drooped. Mr

Tan expects China's government to tighten monitoring, while gradually allowing wider application of the plant's by-products. Factories in China are also closely monitored with CCTV cameras and workers are subjected to daily urine tests. But Hanma has teamed up with the PLA to develop a CBD-based drug to treat post-traumatic stress. That will be the next chapter in the plant's long history in China. During the long years of the hemp ban Yunnan's ethnic minorities continued in secret to harvest leaves, stalks and seeds. Today they can earn farmers 50,000 yuan (\$7,400) per hectare, at least twice as much as corn. ■

Saudi Aramco

Open Sesame

A glimpse into the finances of the world's most profitable company

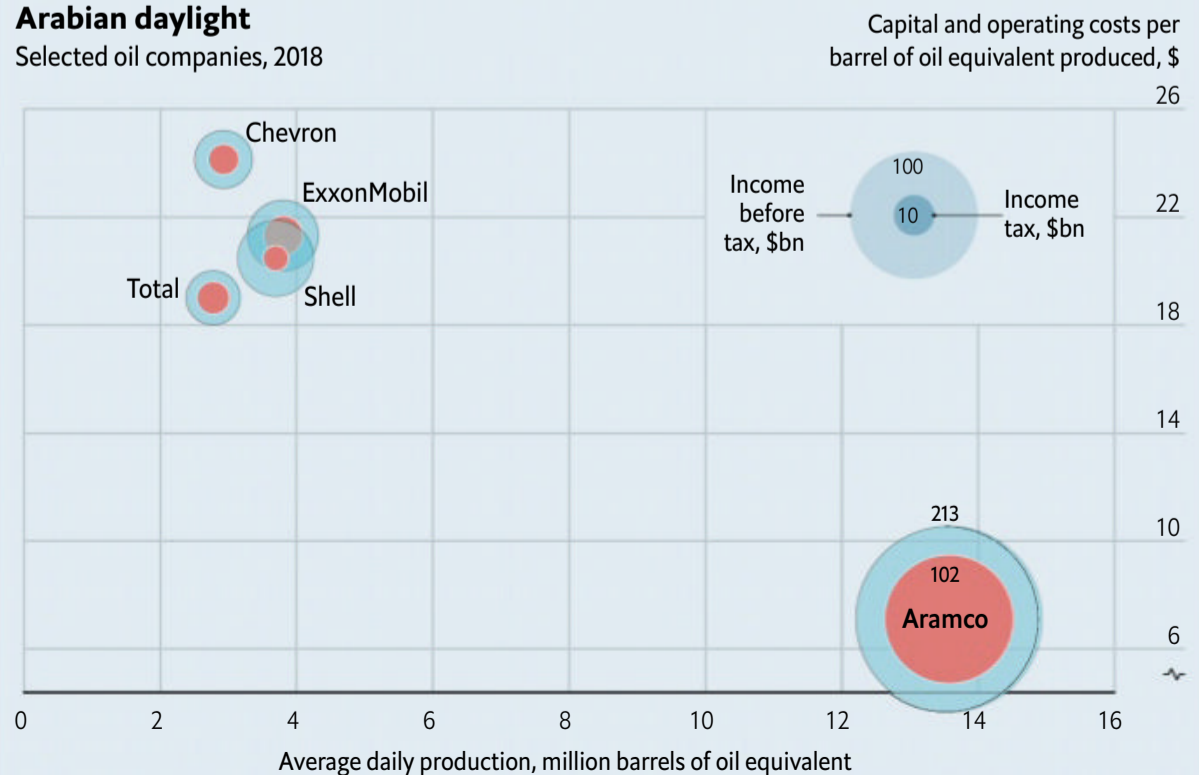
FOR YEARS investors dreamed of peering into the books of Saudi Aramco, the oil colossus wholly owned by Saudi Arabia. On April 1st they got their wish. A 469-page bond prospectus revealed \$111bn in net income last year, more than the five oil majors—Royal Dutch Shell, ExxonMobil, Chevron, Total and BP—managed combined. The document also highlighted Aramco's constraints.

Like rivals, it faces swinging oil prices and uncertain long-term demand. The bond will help finance the acquisition of 70% of SABIC, a petrochemical company, from the kingdom's sovereign wealth fund, for \$69bn. This will diversify Aramco's revenues—and give the state cash to invest in sectors beyond oil (especially now that a planned listing of 5% of Aramco's shares has been postponed).

Aramco looks better prepared than rivals for a less fossil-hungry future. It is less indebted and produces roughly four times as much oil, at about one-third the cost per barrel (see chart). Yet Aramco also bears an unusual burden. In 2018 it paid Saudi income tax of \$102bn, more than the combined profits of Apple and Samsung, the world's most profitable listed firms. That is on top of royalties of \$56bn and a dividend of \$58bn. Credit raters at Fitch note that taxes limit Aramco's funds flow from operations, a measure of profitability, to \$26 a barrel, less than Shell's \$38 or Total's \$31. Ghawar, a giant field, was believed by some to pump 5m barrels a day, but only manages 3.8m. Fitch and Moody's, another agency, rated Aramco A+ and A1, respectively—below ExxonMobil, Shell or Total.

Arabian daylight

Selected oil companies, 2018



Sources: Bloomberg; Wood Mackenzie; company reports

Mobile video-streaming

Hotstar wars

MUMBAI

Hollywood meets Bollywood as the global streaming wars reach India

ON A TYPICAL night in India the family television set might be tuned to one of countless dowdy soap operas. The dramas play out over hundreds of episodes; strict broadcast standards on sex and violence mean they rarely sizzle. It is either that, or reality TV and game shows. “Mind-numbing” is how one entertainment executive describes it.

Flipping channels is no longer Indian TV-lovers’ only option, however. Hundreds of millions watch videos on their phones, on crowded commutes, at home in the evening, or (whisper it) at work—often free of charge. Netflix, Amazon and Disney, as well as local streaming rivals, now want to get Indians to pay to watch shows that look a lot like those in America and Europe—edgier, sexier, funnier.

Until 2016 widespread mobile streaming seemed as outlandish as a Bollywood script. No one but the wealthiest Indians could afford that much mobile data. Then Reliance Jio, an upstart telecoms firm, started a price war, which rages on. The 300m smartphones on which Indians watch video today outnumber India’s 200m TV-owning households. As Sanjay Gupta, who runs Disney’s direct-to-consumer operations in India puts it, “there’s a second and third TV in every home.”

The boom in cheap mobile broadband has fuelled another in Hollywood-style programming. Netflix, Amazon and Disney (which owns Hotstar, India’s leading streaming platform) are investing hundreds of millions of dollars. Production budgets have swelled, luring Bollywood stars, as well as consultants from Hollywood, Tel Aviv and other entertainment hubs. Hotstar is putting out Indian reprises of hit British programmes such as “Criminal Justice” and “The Office” at an estimated production cost of \$100,000-300,000 an hour, compared with less than \$30,000 for those dowdy soaps. Netflix, which last year released its first Indian original show, “Sacred Games”, and Amazon have splurged closer to \$1m for an hour.

India’s allure is understandable. Besides being populous and fast-growing, it lacks quality home-grown cable television like HBO or Showtime against which new content providers must compete. “We never made our ‘Sopranos’,” says Sameer Nair, boss of Applause Entertainment, which produces “The Office” and “Criminal Justice” (scheduled to debut on April 5th).

Digital literature

Yearning to be touched

TORONTO

An online reading room wants to get into the printing business

WHEN WATTPAD opened its online reading room in 2006, its catalogue contained chiefly public-domain tear-jerkers like “Sense and Sensibility”. It also invited budding Jane Austens to post their own oeuvres. Readers, particularly young women, flocked to the site. It now draws 70m monthly active users. Include poems, novellas and serial chapters, and its virtual shelves buckle under 565m texts in over 50 languages. Now it wants to turn some of them into print.

Online book-reading spaces are proliferating. They include Tor (for science fiction and fantasy), Tapas (comics) and Radish (serialised novels). Wattpad has cornered romance—with an estimated \$1bn in annual book sales in America alone not counting self-published ones, as much as sci-fi and crime combined, a popular genre. Along the way, says Porter Anderson, editor of *Publishing Perspectives*, an online trade journal, it has also

tried to solve an age-old problem in the publishing business: how to foretell hits.

Books are costly to promote and, in print, to distribute. Publishers try to predict which manuscripts will succeed. For every bestseller, they still plug plenty of duds. This is especially true for debut novels by unknown authors. Wattpad’s algorithm skims its uploads, as well as user comments and other data, to work out what appeals to readers. The site lets authors and fans interact—and writers fine-tune their work to please the audience. High-scoring page-turners get promoted to advertisers (who pay some authors to weave brands into their narrative) and publishers. “After”, a book which was viewed 1.5bn times on the site, was snapped up by Simon & Schuster and made the *New York Times* bestseller list. In 2018 Netflix released “The Kissing Booth”, based on a Wattpad book by an American author who wrote it when she was 15. It is planning a sequel.

Wattpad, which makes most texts available free of charge, takes a cut of any book or film deal struck, as a literary agent does. It wants to emulate traditional publishers, too. It is toying with paywalls, and in January said it will churn out print runs of its algorithm’s top picks. Nearly three in four Americans aged 18 to 29 say they read a print book in the previous year; only two-thirds of their grandparents did. And a physical book is a “trophy” for readers who helped craft the narrative, says Ashleigh Gardner, Wattpad’s head of publishing.

Last year Wattpad raised \$51m from venture capitalists, reportedly valuing it at \$400m. Its boss recently insisted revenues were “growing nicely”. The firm will not say if it is spilling red ink. Rapt investors are hoping for a happy ending.



Wattpad classics

However, in America \$10 a month for Netflix is a steal next to an \$80 monthly cable bill. India, where households can already enjoy 300 TV channels for \$3-4 a month, is the other way around. Netflix costs twice as much. Media Partners Asia, a research firm, estimates the American streaming giant has just 1m subscribers in India out of its 139m subscribers worldwide. To boost that count it recently introduced half-price mobile-only offers for 250 rupees (\$3.65) per month.

That may not be cheap enough. Amazon charges just 999 rupees a year for its Prime subscriptions, which include free shipping

for purchases with the e-commerce behemoth as well as films and TV shows. Hotstar VIP, Disney’s new service which bundles sports and programmes like “Criminal Justice”, costs 365 rupees a year. Mr Gupta says he hopes to spend close to \$300m on original programming within a year. He would love to convert some of the 150m monthly viewers who tune in to such fare as big cricket matches, which Jio throws in with its mobile service at no additional cost, into fully fledged subscribers. Hotstar is eyeing 100m or more subscribers, not just 5m or 10m, he says. Stay tuned for a sequel to Jio’s price war. ■

Schumpeter | Chinese burn

Google and other big American firms walk an ethical tightrope in China



ANYONE WHO has suffered a Chinese burn as a child will remember the pain when two hands grip the forearm and twist the skin in opposite directions. Americans doing business in China know the feeling well. The growing strategic rivalry between the two superpowers is putting pressure on American businesses and investors in two ways. One grip on the forearm is that of the American government, which is increasing scrutiny of American firms operating in China on national-security and human-rights grounds. The other is that of China's Communist regime, which is attempting to force companies in China, including foreign ones, to bend to its rules. At worst, this means pushing them to assist China's armed forces and its police state. That presents firms with a big ethical quandary.

The predicament is unprecedented. During the cold war business was largely untroubled by superpower rivalry because the Soviet Union was an unwelcoming, closed economy. China, by contrast, is America's biggest trading partner. Americans have invested more than \$250bn in the country since 1990. The weight that Chinese firms listed on the mainland have in equity benchmarks such as the MSCI index is rising. Whatever the outcome of trade talks between President Donald Trump and his Chinese counterpart, Xi Jinping, heightened attention to security-related matters has made life uncomfortable for Chinese firms like Huawei. American companies are smarting, too.

Google is the most prominent example. It pulled out of China in 2010 after refusing to permit censorship on its platform. Aspects of its recent return have been lambasted by Mr Trump and General Joseph Dunford, chairman of America's joint chiefs of staff. General Dunford's concerns revolve around an artificial-intelligence (AI) centre that Google set up in Beijing in 2017. He says development of AI in China supports an authoritarian government, and ultimately its army. Google's boss, Sundar Pichai, met both men recently and offered reassurances that the centre creates innocuous open-source tools available to everyone, not just the Chinese. Meanwhile, protests from outraged Googlers last August forced Mr Pichai to suspend a project, code-named "Dragonfly", for a Chinese search engine that may have let censors in.

Another source of concern for companies and investors is Xin-

jiang. Authorities in the western Chinese province have sent up to 1m members of the Uighur Muslim minority to "re-education camps". This year two American firms have been forced by unflattering media reports to sever ties with the state. Thermo Fisher Scientific, a medical-technology firm, stopped selling gene-sequencing instruments that were used to trace Uighurs' DNA. Badger Sportswear, a big American clothing company, cut links with a Chinese supplier suspected of using Uighur forced labour.

Attention is moving to Chinese firms linked to Xinjiang that are part of the MSCI index. For instance, American fund managers have flocked to buy Hikvision, a China-based supplier of surveillance cameras with a booming global business. It has now been put on a blacklist by the American government. Some investors are dropping it like a stone. Their reputations are also on the line.

Doing business with unsavoury regimes is always fraught with risk. But in China the stakes are rising. Two decades ago, as the Communist state was opening up to trade, Western governments blithely assumed that foreign investment would help democratise it. Instead, the lure of its huge market led some firms to compromise their integrity. For a long time foreign corporations there worried more about business risks, such as intellectual-property theft, than reputational ones. This is changing as Mr Xi strengthens party control over business at home and turns more belligerent abroad. Last year some American airlines, and the Marriott hotel chain, had to change how they referred to Taiwan, which China regards as a renegade province.

The growing importance of technology makes the minefield trickier to negotiate. It is ludicrous to think that American tech firms will stop doing business in China. It is a hub of innovation, with legions of coders and endless fields of data. Amazon Web Services and Microsoft are setting up their own AI centres in Shanghai. But just as Western politicians and voters fear that such technologies, as well as improving people's lives, will destroy privacy, so in China the line between their use for civilian benefit and for repression may blur. The risk of missteps is high.

I spy with my AI

Scrutiny is coming from many directions. The Trump administration, though loth to condemn human-rights abuses among allies like Saudi Arabia, is paying more attention to Xinjiang, not least because of pressure from Congress. On April 3rd a bipartisan group of lawmakers urged the administration to impose tougher restrictions on security firms like Hikvision, investigate their role in global financial markets and ensure that American firms do not assist in the "vast civilian surveillance or big-data predictive policing" in Xinjiang.

Employees and human-rights groups are also watching carefully, as Google has discovered. That said, American companies also have many Chinese employees, who may be more tolerant of state meddling. Companies are going to find that they have to reveal uncomfortable details about the risks of operating in an authoritarian state. Roger Robinson, head of RWR Advisory, a risk-management consultancy, says the momentum in Washington to demand more openness from Chinese and Western firms on such matters is growing. Those in the West can seize the moral high ground, refusing to sacrifice their principles to satisfy the demands of the Chinese state. That may seem like a high-risk strategy. But in the long run people respect firms that stand up for their values—just as they would a person enduring a Chinese burn without begging for mercy. ■

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European banks

Reaching for the elusive 10%

The continent's lenders try to claw their way back to financial respectability. Good luck

IT'S NOT all bad. In 2008 Lloyds, a large British bank, took over HBOS, a rival that was being sucked beneath the rising waters of the global financial crisis. HBOS nearly dragged Lloyds under with it; £20.3bn (then about \$30bn) of public money was needed to keep the combined group afloat. But these days Lloyds is doing all right.

Under António Horta-Osório, its chief executive since 2011, Lloyds has ditched almost all its foreign operations, narrowed its product range and (like many other banks) poured money into digitisation. The state sold its last shares in 2017. Last year the bank's return on tangible equity (ROTE), a measure of profitability, was a decent 11.7%. This year Mr Horta-Osório is aiming for 14-15%, Brexit notwithstanding.

Some other European banks also have good stories to tell. The Netherlands' ING is also a refurbished state-aid case. Its online German bank, ING-DiBa, claims to return over 20%. Spain's Santander, the euro area's biggest bank by market capitalisation, sailed through its homeland's financial storm without a single loss-making quarter. On April 3rd it set out plans to lift its ROTE from 11.7% last year to 13-15% by

cutting costs and exploiting digitisation. Nordic banks make bonny returns—although both Danske Bank and Swedbank, beset by money-laundering scandals, have sacked their chief executives recently.

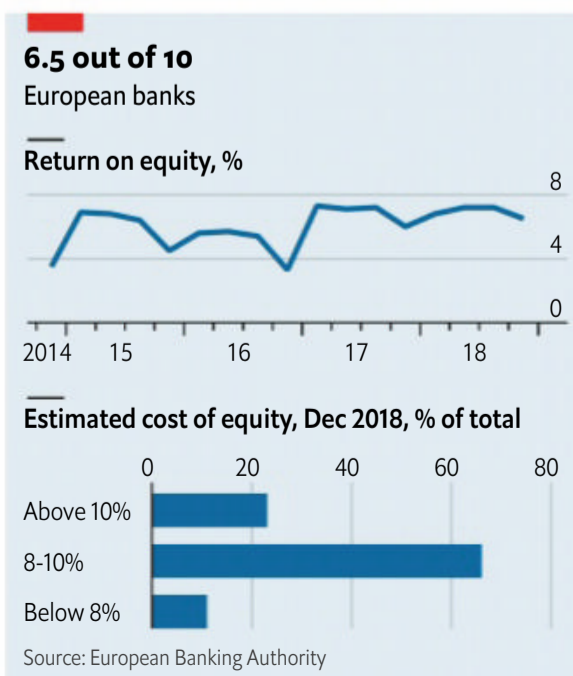
But the overall picture is glum. In a quarterly survey published on March 29th, the European Banking Authority (EBA), a supervisor, found that in the last three months of 2018 the weighted average return on equity (ROE) of 190 European Union banks was 6.5%. (ROE is a little lower than ROTE because goodwill and other intangible assets are deducted from the denominator of the latter.) Over the past four years the average ROE in the EBA's report has fluctuated between 3.3% and 7.3% (see chart).

That is not enough to keep shareholders happy. They want 10% or so. At a recent conference hosted by Morgan Stanley, 70% of attendees estimated European banks' cost of equity (COE)—the minimum ROE shareholders consider acceptable—to be between 9% and 11%. Twice a year the EBA also asks banks to estimate their COEs. Last December two-thirds put their benchmarks at 8-10% and another one-sixth said 10-12%. Only 55% said that they were earn-

ing more than their COE.

That 6.5% is also well below the returns enjoyed by investors on the other side of the Atlantic. Among America's biggest banks, only Citigroup reported an ROE of below 10% last year, and, at 9.4%, not by much. US Bancorp, the seventh-biggest by assets, weighed in with 15.4%. The Europeans underperform on whatever measure you care to choose—for example, ROTE or return on assets (ROA), which strips out the effect of gearing (the share of assets funded by equity). Figures supplied by Stuart Graham of Autonomous Research indicate that the average ROA of nine big American banks was double that of 24 leading European lenders.

All this is reflected in stockmarkets' as- ▶▶



► assessment of the relative worth of European banks. Markets value most big American banks at more than the net book value of their equity; but the shares of most leading European lenders trade below that mark. The price-to-book ratio of Deutsche Bank, Germany's largest bank, which squeaked into profit in 2018 (with an ROE of 0.4%) after three years of losses, languishes at a feeble 25%. Deutsche is in merger talks with its neighbour, Commerzbank, which is rated little better, with a ratio of 31%. Unicredit, Italy's biggest bank, is rumoured to be considering a bid for Commerzbank if

the talks with Deutsche stall.

Explanations for European banks' poor performance start with the aftermath of the financial crisis of 2007-08. American banks were swiftly and forcibly recapitalised through the Troubled Asset Relief Programme, whether they needed it or not ("They got TARPed," in the words of one European banker). Most European countries (though not Britain, the Netherlands and Switzerland) were slow to act. The euro area lacked a single supervisor and a common authority for resolving failed banks. Both were established several years later—

and only after the euro area's sovereign-debt crises had compounded the troubles of many lenders.

Banks complain that policymakers have since made their lives hard. In the euro area net interest income, which makes up the bulk of banks' revenues, has been ground down by slow growth and years of ultra-low, even negative, interest rates—banks must pay the European Central Bank (ECB) 0.4% a year to deposit money. In the past three years, reports the EBA, net interest margins have fallen from 1.57% to 1.47%. Mario Draghi, the president of the ECB, said ►►

Buttonwood Oil filter

How betting in the futures markets greases the oil industry's wheels

OF ALL THE lines of all the characters in all the scenes in "Casablanca", the ones that resonate most are spoken not by Humphrey Bogart, the leading man, but by Claude Rains, who plays Louis Renault, a cynical police captain. Needing a pretext to shut down Rick's, the nightclub owned by Bogart's character, he declares that he is "shocked, shocked to find that gambling is going on in here".

Renault's line captures the fake distaste for gambling that lives on in polite circles. It finds expression even in impolite circles, such as finance. Take the market for oil futures. Only the gauche would describe it as anything other than a system for transferring risk. Oil producers sell futures to insure themselves against a price rout that would threaten solvency. Investors earn a risk premium by buying them.

There is something to this characterisation. Producers are indeed short futures much of the time. But often, they are long. Perhaps the real reason for a thriving futures market is that people both inside and outside of the oil business enjoy a punt on the price of crude. If so, that is all to the good. The prices that wash out of these wagers are an invaluable guide to decision-making about production, storage and investment.

The benefits hinge on the relationship between spot prices, futures prices and inventories. The spot price is what you pay if you need a barrel of oil immediately. The futures price is more like a wager on a sporting match. If the spot price of Brent crude in a year's time proves to be higher than \$67, the current 12-month futures price, the buyer wins the bet; if it is lower, the seller wins. If oil prices are hard to predict, futures prices should be lower than spot prices. This theory assumes there is excess demand

to hedge against falling prices. Speculators are needed to take the other side of the bet. Low futures prices are the inducement they in turn require.

In practice, periodic gluts and shortages mean that oil prices are prone to wild swings. The oil market switches between "backwardation" (where futures prices are below spot) and "contango" (where they are above it). The volatility of prices makes it difficult to detect a reward for speculation, or risk premium, in any single commodity market. But studies by Gary Gorton and Geert Rouwenhorst of Yale University find that a buyer of a varied basket of commodity futures would earn a hefty risk premium.

What links the spot and futures prices is the level of stocks held by the oil industry. Storage is costly, but so is running out of supply. As a rule, the lower stocks are, the higher the premium speculators should demand. Just as ample stocks tend to dampen price volatility, skimpy stocks tend to amplify it, making speculation riskier. Backwardation gives speculators a compensating reward.

What is today's oil market telling us?

Backwards to the future

Brent crude oil, \$ per barrel



Source: Bloomberg

OPEC agreed in December to cut production. Demand is picking up. The spot price has risen from \$53 to \$70 a barrel since the start of the year. The market may well tighten further in the short term. Saudi Arabia, OPEC's largest producer, is pumping less than its quota; it seems keen on higher prices. Meanwhile foreign-policy hawks in America want to tighten the screws on Iran's oil exports. Power cuts in oil-rich but inflation-ravaged Venezuela have further reduced its capacity to pump oil.

Futures prices are below spot prices (see chart). This backwardated curve is a signal to run down stocks while prices are high. And inventories have indeed been falling, according to an analysis by Martijn Rats of Morgan Stanley, suggesting that the market is undersupplied. If stocks fall further, backwardation is likely to become more extreme. And the more futures prices fall relative to spot prices, the more tempting is the risk premium they offer to investors.

The other message from the oil curve is that high spot prices will not last. In this regard, OPEC faces a dilemma. Higher prices solve short-term problems: Saudi Arabia needs an oil price of around \$80 to balance its budget, for instance. But they are a spur to non-OPEC sources of oil and to non-oil sources of energy. The long-run result is an oversupplied market and lower oil prices.

"Casablanca" is full of such dilemmas. Rick is forced to choose between love and honour, and judges that dishonour would spoil love. For Renault, having Rick arrested for the murder of a German major would be a feather in his cap. Instead he plays the long game and orders his squad to "round up the usual suspects". As time goes by, an alliance with Rick might prove more profitable.

▶ on March 27th that “low bank profitability is not an inevitable consequence of negative rates”, although he admitted that the central bank would consider “mitigating the side-effects”. In March the ECB announced further operations to provide banks with cheap long-term finance.

Bankers also complain about capital requirements. Not only have these been tightened since the financial crisis, but the new rules, known as Basel 3, were finalised only at the end of 2017. Banks are having to raise billions in debt that would be able to absorb losses, should some catastrophe wipe out their equity. Magdalena Stoklosa of Morgan Stanley says that resolution regulation is obliging banks to finance themselves by fairly expensive means when deposits cost them nothing and margins are wafer-thin.

European banks also lack the scale of America’s biggest. Differences among national markets and the EU’s failure to complete its “banking union” thwart cross-border mergers that might create continent-spanning giants. Peer more closely at specific countries, and further burdens on profitability become visible. Banks in Cyprus, Greece, Italy and Portugal are still weighed down by bad loans, even if the load is getting lighter. Overcrowding is common; so is competition from publicly owned and co-operative banks, which have other goals besides profit. Germany is the harshest environment on both counts. Even combined, Deutsche and Commerzbank would struggle for elbow room.

But struggling banks cannot simply blame history, officialdom and market structure for their troubles. They could do a lot more to help themselves. The EBA’s new survey finds, for instance, that at almost three-quarters of European banks, costs consume more than 60% of income. The average cost-income ratio, 64.6%, is higher than it was four years ago.

Europe’s most successful banks show what can be done. A study by five ECB economists published last November—and commended to banks by Mr Draghi—found that euro-zone banks which have cut costs, spent heavily on information technology, are geographically diverse (like ING, Santander and BBVA, another Spanish bank) and rely less on interest income tend to be more profitable. Banks that carry lower credit risks (ie, that are safer) also do better.

None of this will transform European banking into a magic money tree. Banking everywhere is less lucrative than it was before the crisis. Banks can take some comfort from evidence in the ECB economists’ study and the EBA’s survey that COEs are coming down, largely as a by-product of persistently low official rates. But bank bosses would be foolish to rely on that—or to suppose that they are not ultimately responsible for their own fates. ■

Market power

On the mark

The IMF adds to a chorus of concern about falling levels of competition

PHYSICISTS’ QUEST for a “theory of everything” is well-known. The equivalent in economics is the hunt for common causes for the rich-world macroeconomic trends of the past decade or so: a shrinking share of the economic pie for workers, disappointing investment and lacklustre productivity growth. These must be reconciled with low interest rates, pockets of technological advance and juicy returns for investors willing to take risks.

The leading economic theory of everything is that competition has weakened as markets have become more concentrated. Unlike firms in competitive markets, monopolies limit production in order to keep prices and profits high. They can therefore

risen notably in America and by a smaller amount in Europe, and largely affected industries other than manufacturing (kept fiercely competitive by trade).

Case closed? Not so fast. Those who doubt that competition has weakened attribute such findings to the rise of “superstar” firms. They argue that economic activity is becoming concentrated in the best firms because of technology, network effects and globalisation. This “winner-takes-most” pattern could explain rising average markups, if pricey but brilliant products are capturing more market share, or if superstar firms are unusually reliant on spending on intangible assets that is not included as a cost in gross margins. Given the growing importance of intellectual property and brand value to obvious superstars such as Apple and Google, this objection is worth taking seriously.

The IMF study confirms that in most places a small share of firms are responsible for rising markups, which have soared among the best and are flat among the rest (see chart). The 10% of firms with the highest markups are 50% more profitable than their peers, more than 30% more productive and rely more on intangibles. The fund did not find that rising markups slowed innovation, at least using the (admittedly dubious) proxy of patent registrations.

Yet market power that grows organically is still market power. The fund found evidence of some of the pernicious consequences of less competition. Higher markups are associated with less investment in physical capital—enough to have lopped a percentage point off GDP in the average advanced economy, it estimates. Top firms with higher markups pay a smaller share of the economic value they create to workers. And the fund warns that market power could yet put a brake on innovation, should incumbent firms get too cosy.

That might happen if regulators are slow to respond to structural shifts in the economy, or too lax in policing mergers that allow incumbents to pick off potential competitors. The fund found that mergers and acquisitions were, on average, followed by significantly higher markups by the firms involved. Economists are sometimes accused of having “physics envy”—that is, of coveting the precision of the hard sciences. But if economics has a law worthy of the name, it is that firms prefer to merge than to compete. ■

A winner’s world

Markup over marginal cost*, 2000=100



be expected to restrain their investment, too. They might still be innovative—with monopoly profits up for grabs, why not be?—but market power usually makes economies less productive overall. And monopolies have many opportunities to take bites out of labour’s share of the pie. Their high profits typically flow to investors, not workers. Their high prices eat into the purchasing power of wages. Their bargaining clout may even allow them to suppress pay directly.

On April 3rd the IMF provided the latest evidence for parts of this theory. In a new study the fund’s economists examined the markups over marginal cost—one proxy for market power—charged by over 900,000 firms in 27 countries. They found that markups rose by 8% on average between 2000 and 2015. In findings consistent with earlier analyses by *The Economist*, the fund concluded that market power has

US-China trade

Entrenched

WASHINGTON, DC

To China's disgruntlement, any deal is likely to involve tariffs

LESS THAN a week after the White House described trade talks in Beijing as “candid and constructive”, American and Chinese negotiators met again on April 3rd in Washington, DC. There is talk of a summit between the two countries' presidents. But amid the upbeat noises are a few discordant notes. Without a deadline, the discussions could drag on, or even stall. Although the contours of a deal seem clear, the final items are always the trickiest. And even if a deal is struck, it may not be a good one.

The two sides have already agreed on provisions relating to currency manipulation, and are hashing out how much more American goods the Chinese will commit to buying. Rules on technology transfer and American companies' access to the Chinese market are still being discussed. Also on the table will be American demands that China relaxes its attitude to trade in data, which it sees as a threat to national security.

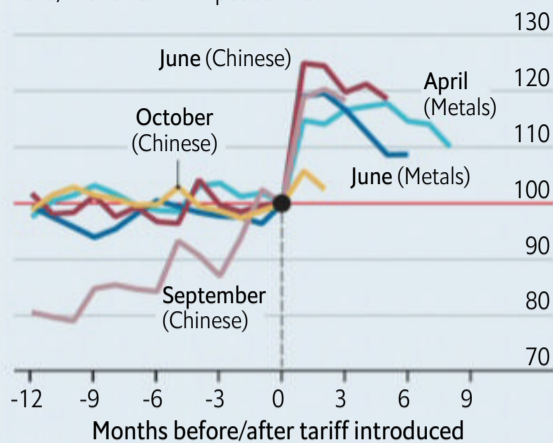
Some in the Trump administration see the negotiations as an opportunity to demand reforms that would also benefit China, such as a more stringent intellectual-property regime or trimmed subsidies. The main objective of the Chinese delegation, led by Liu He, a vice-premier, is simpler: the lifting of the tariffs imposed since last July, which currently cover just over 44% of Chinese exports to America, or goods worth \$250bn in 2017.

According to Myron Brilliant of the US Chamber of Commerce, a lobby group, the talks starting on April 3rd focused on two of the thorniest topics. The first was which, if any, of the tariffs will be dropped upon reaching a deal. The Trump administration sees tariffs as leverage, useful to make sure that the Chinese stick to what is agreed. The second related to enforcement. The Americans want to be able to decide unilaterally if China has broken the terms of any deal and punish it with fresh tariffs, without risking retaliation. But that would be humiliating for the Chinese.

The Americans argue that such tough enforcement mechanisms are needed, given China's history of failing to keep its promises. They think that only by offering tariff reductions for good behaviour, and threatening new tariffs for backsliding, can they ensure that the Chinese keep their side of the bargain. But the Americans may have to give some ground, since the Chinese also have grounds for mistrust. One of

Heavy duty

United States, import prices on products
2018, month tariff imposed=100



Source: Amiti, Redding and Weinstein, “The impact of the 2018 trade war on US prices and welfare”, Centre for Economic Policy Research

the reasons Mexican and Canadians agreed to rewrite their trade deal with America last year was the prospect of tariffs on steel and aluminium thereby being lifted. Months later, those tariffs are still in place.

Business lobbyists in Washington seem resigned to tariffs being phased out only gradually as agreed-upon milestones are passed. Recent evidence on the effects of the Trump administration's tariffs im-

posed in 2018 suggests that Americans will pay the price. A study by Mary Amiti of the Federal Reserve Bank of New York, Stephen Redding of Princeton University and David Weinstein of Columbia University found that American importers were swallowing the cost of tariffs by paying higher prices (see chart), and that they were responding by importing a narrower range of products. Another study, by Pablo Fajgelbaum and Amit Khandelwal of the National Bureau of Economic Research, Pinelopi Goldberg of the World Bank and Patrick Kennedy of the University of California, Berkeley, found that although some American producers gained from weaker competition from imports, that was outweighed by losses to consumers and other producers, who had to pay more for inputs.

It seems unlikely that the Trump administration will be swayed by this evidence of collateral damage. Indeed, it may see buyers' struggles to adjust to tariffs as evidence that they were too dependent on Chinese exports in the first place. Although a deal may see an easing of the tariff regime, from the administration's perspective it has been too successful to abandon altogether. Americans had better get used to higher prices. ■

Islami Bank

After the coup

DHAKA

A government takeover has hit one of Bangladesh's better banks hard

“IT'S LIKE the Midas effect in reverse,” says Badiul Majumdar of SHUJAN, an anti-corruption pressure group. “Everything the government touches turns not to gold, but rather from gold to dust.” He is talking about Islami Bank Bangladesh, which was rocked in 2017 when the government sent military-intelligence operatives to force out senior executives and board members, and replaced them with figures more to its liking. Fears that the boardroom coup would drag down a comparatively well-managed institution in a sector marred by political meddling and cronyism now appear to have been justified.

Established in 1983 as Bangladesh's first bank run on Islamic principles, Islami thrived by handling a large share of remittances from emigrant workers and by lending to the booming garment industry. Its troubles stem from its links with Jamaat-e-Islami, Bangladesh's largest Islamist party, which allied with Pakistan during the war of succession of 1971. One of the first acts of the current prime minister, Sheikh Hasina Wajed, after taking office in 2009 was to set

up a court to try war crimes. Leading figures from the Jamaat were sentenced to imprisonment or hanging.

If anything, it is surprising it took Sheikh Hasina and her Awami League eight years to go after Islami—especially given allegations, including from America's government, that it was linked to terrorist organisations. (The bank has denied the accusations and an official investigation launched in 2017 has yet to publish anything.) A second purge last year replaced more suspected Jamaat sympathisers with government allies.

Bangladesh's state-owned banks have always had government men on their boards and in management, who lend to their allies. “But now this is happening in private banks like Islami Bank, too,” says Fahmida Khatun, the director of the Centre for Policy Dialogue, a think-tank in Dhaka. According to a report by Bangladesh's central bank, many of the loans Islami has granted have breached financial regulations. The report highlighted loans to six companies belonging to Nassa Group, a ▶▶

▶ giant of the garment industry, which it says were granted without taking the required collateral and ignoring the fact that there were several Nassa subsidiaries that had defaulted in the past.

Islami's operating profits for 2018 were 27.7bn taka (\$330m), a 14.5% increase from 2017. But net profits, with provisions against bad loans and corporate taxes deducted, are expected to be much lower. Its market capitalisation has dropped to 42bn taka, down from 59bn taka at the end of 2017. Until recently Bangladesh's most valuable bank, it is now worth just half as much as BRAC Bank, its main rival.

At the end of last year non-performing loans (NPLs) came to 33.2bn taka. That is just 4.3% of all loans—better than the 11.5% average share across the industry. But this figure is distorted by far higher figures for state banks. Moreover, says Michael Puli, an analyst covering Bangladesh at Standard & Poor's, a rating agency, not only is Islami's NPL ratio rising, but many of its stressed loans have been restructured or refinanced and thus no longer count as non-performing. It restructured 48bn taka of loans in 2018, more than any other Bangladeshi bank. Taken together, non-performing, restructured and refinanced

loans came to 7.6% of the institution's loan book at the end of 2017. The share will be higher in 2018, Mr Puli predicts.

People with political connections not only find it too easy to get loans from banks the government controls, including Islami Bank, says Biru Paksha Paul, a former chief economist at the central bank, but face little penalty for defaulting. "Wilful defaulters" have strained Bangladesh's banks in the past three years, even as the economy has seen speedy growth. If the banking sector continues to deteriorate, will it be able to keep supporting growth? Responds Ms Khatun, "I doubt it." ■

Inequality and welfare spending

Not keeping up with the Joneses

Rising inequality within the rich could explain sluggish interest in redistribution

THE PUBLICATION six years ago of Thomas Piketty's "Capital in the Twenty-First Century"—an 800-page tome that has since sold over 2.5m copies—helped reveal the huge increase in inequality in the West since the 1970s. So why has support for welfare spending to counteract it remained so stable over that period? In theory, support for redistribution should increase with the gap between rich and poor, as the envy of the have-nots is stoked. But polls in America and Britain suggest virtually no growth in support for redistribution since 1980.

A new paper* due to be presented on April 7th at the Economic History Society's annual conference suggests an interesting answer. Rather than the gap between rich and poor being the main influence on attitudes to welfare, the degree of inequality within the upper classes might matter more.

Jonathan Chapman of NYU Abu Dhabi looks at the relationship between inequality and how the poor law, a locally administered welfare system, operated in Victorian England. He compared the generosity and harshness of the conditions of poor-law relief in different areas with the gap between rich and poor, as measured by income from wages, and inequality within the rich, as measured by families' number of live-in servants. He found that areas of high wage inequality had less harsh rules for claiming poor relief—as conventional theory would suggest. More surprisingly, however, he also found that areas with a larger gap between the wealthiest and the simply well-off were much less generous and had much harsher rules for welfare handouts than those where the elites were more uniform.

There is some evidence a similar relationship could exist today. In Britain, for instance, many upper-middle-class people hate inheritance tax (which can finance welfare), as they believe that whereas they must pay it, the ultra-wealthy use clever accountants to avoid their fair share. Mr Piketty, Emmanuel Saez and Gabriel Zucman found that between 1980 and 2014 the bottom 50% of post-tax incomes in America increased by just 21%, compared with 113% for the top 10%**. But the top 1% rose even more—by 194%—while the top 0.001% rose by 617%. Even the merely well-off face rising inequality, but it doesn't make them more generous.

*J. Chapman, "Inequality and poor law policy in late-Victorian England".

** T. Piketty, E. Saez and G. Zucman, "Distributional national accounts: methods and estimates for the United States" NBER Working Paper No. 22945 (December 2016).

The world economy

Manufacturing blame

Global economic gloom is mostly confined to one sector

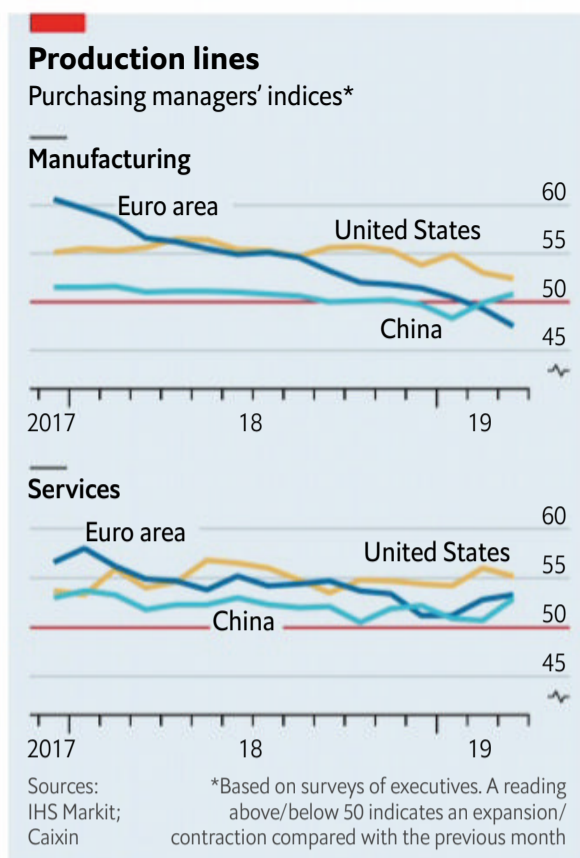
PESSIMISM ABOUT the world economy has grown throughout 2019. Disappointing data, tumbling bond yields, the trade war between China and America and political crisis in Britain have all played a part. The only bright spot has been mostly buoyant stockmarkets. On April 9th the IMF will probably report a downgrade to its forecast for global growth this year, which in January stood at 3.5%. But there has so far been only a deceleration, not a downturn, because economic weakness has been contained mostly to manufacturing, rather than afflicting the service sector (see chart on next page). And a manufacturing rebound might soon lift the global mood.

Manufacturing's woes can be blamed primarily on falling global trade growth. That is down partly to the trade war, and partly to Chinese policymakers' attempts to reduce leverage, which slowed domestic growth late last year, curtailing demand for imports. The pain has been felt most in Europe, which is more exposed than America to emerging markets. It has been particularly acute in Germany. On April 1st a survey of German manufacturers, a preview of which buffeted bond markets in March, turned out even worse than expected. Industrial production has slowed even more sharply in Germany than in Italy, which is in recession, note economists at Goldman Sachs, a bank. Yet Germany's service sector appears to be growing strongly, as does that of the euro zone as a whole.

Service industries are less volatile than manufacturing, make up a bigger slice of rich-world GDP and, by their nature, trade less. That they remain strong largely reflects relatively buoyant labour markets and consumers (German unemployment is only 3.1%). One exception has been Britain, ▶



Income distribution



► where survey data released on April 1st and 3rd appear to show growth in manufacturing at its strongest in over a year and services shrinking. Both findings are Brexit-related. The British economy is suffering from falling confidence, while manufacturing appears so strong only because firms are stockpiling in case Britain soon crashes out of the EU without a deal.

In the 2000s some economists speculated that the growing weight of services in output might help explain the “great moderation”—the fall in economic volatility after the mid-1980s. Although the global financial crisis sent volatility soaring, this summer America’s economic expansion, if it continues, will become the longest ever. It will have survived peaks and troughs in manufacturing that in another era might have been more visible in aggregate data.

China has turned to stimulus lately; some economists expect its economy to rebound in the second half of this year. In March its manufacturers reported their strongest month since last summer. That, and some strong American data, buoyed markets this week. Even if this proves to be a false dawn, for China to cause a global economic downturn would require its slowdown to become infectious not just across borders, but across sectors too. ■

Finance internship: *The Economist* invites applications for the 2019 Marjorie Deane internship. Paid for by the Marjorie Deane Financial Journalism Foundation, the award is designed to provide work experience for a promising journalist or would-be journalist, who will spend three months at the London office of *The Economist* writing about finance and economics. Applicants are asked to write a covering letter and an original article of no more than 500 words suitable for publication in the Finance and Economics section. Applications should be sent to deaneintern@economist.com by May 3rd. For more information, see www.marjorielaideane.com

How Ethiopians bank

What goes round, comes round

ADDIS ABABA

What self-help lending says about Ethiopian banking

IN 1980, IN his early 20s, Mengistu Maregne began selling soft drinks from a stall in Merkato, Ethiopia’s largest market. To finance the fledgling business he joined an ekub, a rotating savings-and-credit association (ROSCA) that pools contributions from members each week and disburses the pot to the winner of a lottery, with each member winning once over the scheme’s term. Being first to draw the lump sum of 4,000 birr (\$140), he put the money away and joined another. Within a year he had bought a home; soon after he bought a shoe shop. “Ekub changed my life,” he says.

Though ROSCAs are found across the developing world they are often assumed to serve the poor. But Ethiopia’s are used across the income scale. They encourage members to save, and enable some to raise business capital or buy pricey items such as cars. Some have hundreds of members, with officers who vet applicants and analyse risks.

ROSCAs are entrenched in Ethiopian culture. But their ubiquity is also an indication of the shortcomings of Ethiopian finance. Though the formal banking sector has grown fivefold in just over a decade, it is still much smaller than in neighbouring countries. Bank assets per person are less than a third the level in Kenya. Ethiopian banks also underperform African peers in business lending. Just 12.9% of Ethiopian firms had access to a bank loan or formal credit in 2015. For the rest of the continent the share was 20%. Ethiopia lacks credit cards, a stockmarket and foreign banks.

Ekubs help fill the gap. One recent study found them to be the most common source of external funding for manufacturing firms in Addis Ababa, Ethiopia’s capital. Another found that more than two-thirds of small and medium-sized enterprises used them between 2002 and 2010. “You cannot imagine the Ethiopian economy without ekubs,” says Gebreyesus Yimer of Mekelle University.

Part of their secret lies in the trust between members, who tend to be from the same neighbourhood, workplace or ethnicity. Since many small businesses have patchy records and no credit rating, Ethiopian banks demand interest rates of up to 20% and physical collateral of up to three times the value of the loan. Most ekubs, by contrast, require only a character testimony. Even so, default is rare. “People tend to observe the rules of the ekub more than the

bank,” says Yohannes Ayalew, a former vice-governor of Ethiopia’s central bank.

As ekubs have grown they have moved away from their origin as self-help groups. An ekub chief may draw a salary and manage a fund made up of several schemes as if it were an investment vehicle. “It’s the best way to start a business,” says Maru Sore, who launched one three years ago. Some allocate payouts by auction instead of lottery, which effectively means demanding interest. Others charge fees.

One unintended consequence of the sector’s expansion is erosion of the social pressure that keeps defaults low. In this respect Ethiopia could learn from Argentina, where ROSCAs are regulated to protect savers, and banks run some large, formal ones. A bigger issue is that ROSCAs are no substitute for formal financial institutions, since members cannot predict when they will be the winner and get a payout.

If Ethiopia’s private firms are to flourish, the government needs to address concentration in the banking sector. The state-owned Commercial Bank of Ethiopia controls about two-thirds of assets; a handful of other banks account for most of the rest. “Lack of competition is the major reason for the banks’ lending behaviour,” says Ashenafi Beyene Fanta of the University of Stellenbosch Business School. And so it is that small businessmen like Mr Mengistu have just one real option. “Nobody in Merkato could live without ekub,” he says. ■



Self-help, on the books



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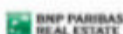
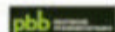


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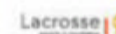
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Free exchange | It's complicated

How economists are grappling with the unpredictable outcomes of simple interactions



CONSIDER THE task economists have set themselves. The global economy is the outcome of near-constant interaction between billions of unique individuals. To attempt to model even a small corner with a few equations is bold, even foolhardy. That economists have made as much progress as they have is impressive.

Might a radically different approach do better? In February the *Boston Review*, a quarterly magazine, convened a forum to discuss prospects for an “economics after neoliberalism”. “What we call ‘the economy’”, read one of the entries, “is in fact a highly complex, multi-level system. It must be studied as such.” The authors represent “complexity economics”. Though still a niche within the field, its potential impact is profound.

Most economics is centred on equilibrium: an economy’s natural resting state. Solving a set of equations that describes a market, conceived of as populated by predictably self-interested individuals who face various constraints, yields that equilibrium—the prices that balance supply and demand, say, and the level of welfare generated. A researcher can subject such a toy economy to an external shock, such as a new technology or a change in tax policy, and watch it return to a new equilibrium. But no matter how much these models are perturbed, they cannot generate the strangeness of economic events seen in the real world.

Complexity economics draws on strands of the discipline less enamoured of equilibrium. Joan Robinson, a British economist, worried that equilibrium models understated the role of history in determining outcomes. Joseph Schumpeter, an Austrian economist, saw the economy as undergoing constant change, powered by innovation. And Friedrich Hayek, another Austrian, wrote on how the separate actions of individuals could generate “spontaneous order” of incomprehensible complexity.

But a bigger influence is the multidisciplinary study of complex systems, the components of which are well understood but interact to produce unexpected large-scale phenomena. The whole is weirder than the sum of the parts. Flowing water can produce unpredictable turbulence, for example, even though the molecules are obeying simple, deterministic physical laws. In 1984 a group of scientists, most of them fundamental physicists at the Los Alamos National Laboratory, a nuclear-research facility in

New Mexico, founded the Santa Fe Institute, a centre devoted to the study of complex systems. In 1987 scientists there met with a group of economists, among them Kenneth Arrow, a Nobel prize-winner, to consider how the study of complex systems might be of use in economics.

The meeting was timely. In the 1970s critics of Keynesian economic models had argued that important macroeconomic relationships, such as that between unemployment and inflation, were not fixed but would change as people observed and adjusted to government policy. A reliable model of the macroeconomy, they reckoned, should have “microfoundations”. It should derive its descriptions of the economy as a whole from mathematical characterisations of individuals’ behaviour. It has become fashionable to scorn such models because they rely on unrealistic assumptions—in particular, that people are rational and purely self-interested. Some scholars are working to improve them by incorporating the insights of behavioural economists. Complexity economists say the project was doomed from the start. Even models based on more realistic descriptions of human behaviour would fail to capture the odd outcomes that can emerge out of interactions among billions of people.

The complexity approach begins with more human humans. People are not purely rational or self-interested, but reason with limited information and follow rules of thumb. Those rules evolve as people learn from and adjust to the world around them. Out of countless interactions complex structures emerge, such as firms and political institutions. These constitute a “meso”, or middle, layer between the microeconomy and the macroeconomy, which affects both. There is no single guaranteed equilibrium: neither a tendency towards a particular outcome nor a point at which everything settles down and scholars can take stock.

How such a system plays out is exquisitely sensitive to the starting position; you have to run history forward to know the result. But much can still be understood. Economists can use powerful computers to see what sorts of things might happen. They can specify decision rules for algorithms that stand in for the people in an economy, choose a starting position and see how the algorithms interact. For example, work by Brian Arthur, a founding scholar of complexity economics, has explored how one of a number of competing technologies can come to dominate a market, even if it is not technically superior. Such exercises show how much history matters. They reveal how seemingly stable systems can flip from one state to an entirely different one: from stasis to industrialisation, say, or from placid financial markets to crisis. César Hidalgo and Ricardo Hausmann, for instance, have explored the link between an economy’s complexity, as determined by bilateral export links, and growth in income per person.

Chaos is a ladder

Orthodox economists also study such matters. Models incorporating increasing returns to scale explain how one firm among many can rise to become a monopolist, or how the actions of self-interested individuals can transform one town into a megacity while another withers. But complexity economists reckon that these oddities are not zigzags away from a path towards a single predictable outcome. Rather, they are the norm.

Complexity has yet to up-end economics. It still provides more metaphors than results. But it offers new approaches to hard questions. In time its contributions will grow—until, perhaps, economics suddenly flips from one way of doing things to another. ■



Missile technology

Hypersonic boom

BERLIN AND WASHINGTON, DC

Long range, gliding missiles that fly at more than five times the speed of sound are coming

“Once the rockets are up, who cares where they come down? That’s not my department!” says Wernher von Braun.

TOM LEHRER’S satirical ditty on the Nazi-turned-American rocketeer was faithful to the essence of early missile development, whose principal challenge was hoisting the weapons into the sky. Gravity did most of the rest. The first warheads capable of steering on descent did not arrive until the 1980s. Even they were limited in how much they could move around, making it pretty easy to predict their target area.

A new generation of hypersonic missiles is changing all that. Some might be capable of gliding across continents at great speed, their target unpredictable until seconds before impact. Russia claims to have a hypersonic glider on the cusp of deployment; others are redoubling their efforts. Many are likely to start entering service in the 2020s. All this opens up new military possibilities—and problems.

Missiles that travel at speeds greater than Mach 5 (five times the speed of sound, or about 1.5km per second), have existed for some time. Intercontinental ballistic missiles (ICBMs) re-enter the atmosphere at up to 8km per second. What is different about

the hypersonic weapons in the pipeline is that they are designed to sustain such speeds over long distances, manoeuvre as they do so and, in some cases, hit targets with pinpoint accuracy.

“Manoeuvrable missiles travelling at many times the speed of sound barely leave time for considered human responses,” warned Heiko Maas, Germany’s foreign minister, in March. Such weapons may also elude today’s arms-control agreements, which were written for an earlier generation of weapons.

There are two basic designs: cruise missiles and gliders. Hypersonic cruise missiles are essentially faster versions of existing ones but powered by very different jet engines. Gliders are pricier and harder to build, but can travel faster and farther, and so are receiving more attention. Like ICBMs and von Braun’s V-2s, they are lofted into

space and fall to earth unpowered. But unlike the old-fashioned projectiles, they do not follow a predictable, parabolic arc through the sky. Instead, a hypersonic glide vehicle (HGV) detaches from the rocket while it is still ascending and either skips along the upper atmosphere or, having re-entered, glides through it for hundreds or thousands of kilometres.

Such gliders have several advantages. Ballistic missiles are less agile and tend not to be very accurate. A Minuteman III ICBM, the backbone of America’s nuclear arsenal, has a “circular error probable” of roughly 120m, meaning only half the missiles fired are expected to land within 120m of the impact point. That is fine for nuclear bombs but useless for hitting a ship or runway. Today’s cruise missiles, on the other hand, are very accurate—one could be sent through a window—but much slower. HGVs combine the speed of ballistic missiles with the manoeuvrability and accuracy of cruise missiles. “You can fly, you can shape your trajectory, you can turn,” says Will Roper, the US Air Force acquisitions chief.

The key is their trajectory. An unpowered ICBM warhead spends most of its time in the vacuum of space where it cannot duck or dive, but HGVs spend 80% of their time below 100km, allowing them to manoeuvre for most of their flight. They can also dodge ground-based radar for longer by hiding behind the curvature of the Earth. Whereas American ICBMs must fly over Russia to hit China—which could lead to dangerous misunderstandings—gliders could take more circuitous routes, avoiding missile defences and leaving adversar-

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► ies uncertain of the target.

Hypersonic gliders are almost a century in the making. The first rocket-booster glider flew in Germany in 1928. During the second world war, German engineers tried to extend the range of von Braun's V-2 by having it glide. After the war, America and the Soviet Union pilfered German rocketry, leading to a series of technological leaps. Alpha Draco, an American HGV, was tested to hypersonic speeds in the 1950s and hypersonic gliding was refined by the space race: the space shuttle was a hypersonic glider, in its way.

War at Mach 5

Why, then, have hypersonic missiles taken so long to arrive? Extended hypersonic flight presents fiendish scientific and engineering challenges. The lift-to-drag ratio of the space shuttle at hypersonic speeds is around one, notes James Acton of the Carnegie Endowment, a think-tank; an advanced glider would require over twice that. Higher lift-to-drag ratios require sharp leading edges, which, combined with extreme velocities, can generate surface temperatures up to 2,000°C. That can erode a glider's protective coating, fry its electronics and bend it out of shape. America's test of one prototype in 2011 failed when the skin blistered and peeled off. The resulting shockwaves overwhelmed control systems in less than two seconds.

The only thing that seems to work, says an expert at an arms company that is developing gliders, is to cover the vehicle in cork. But that is vaporised in minutes or less, so does not work for long-range missiles. Dissipating heat as quickly as it is built up is "daunting" and "perhaps impossible" above Mach 10, he says.

Great speeds also break up molecules in the atmosphere, creating a field of charged particles (or "plasma") around the glider, which disrupts GPS and other signals required for guiding the missile to its target. Researchers "still don't completely understand the physics of hypersonic flight", wrote Ivett Leyva of America's Air Force Office of Scientific Research in a 2017 paper.

The big powers have all made some progress in surmounting these challenges. Thomas Bussing, who heads missile development for Raytheon, an arms company, says there has been a "step change" over the past decade, thanks to advances in computational fluid dynamics, new materials and electronic and guidance systems. America, which set aside \$2.6bn for hypersonic weapons in the Pentagon's 2020 budget, is probably farthest ahead. It tested a wedge-shaped glider in 2010 and 2011, a more successful cone-shaped design in 2011, 2014 and 2017 (the Alternate Re-entry System) and is working on tactical systems that use smaller, cheaper rockets and could be launched from ships and aircraft.

Russia has been working on hypersonics for decades, haltingly. Its flagship Avangard glider was flaunted publicly by President Vladimir Putin in March 2018 and tested to great fanfare in December, after which it was declared ready for service this year—somewhat implausibly, say experts. Pavel Podvig of the United Nations Institute for Disarmament Research points out that very few of the glider's tests were successful and that the programme was nearly shut down four years ago.

China has tested its own DF-ZF HGV at least nine times since 2014. Almost nothing is publicly known about its nimbleness or accuracy. Australia, India, France and Japan are all chasing the pack. "We have lost our technical advantage in hypersonics," warned General Paul Selva, America's highest-ranking air-force officer in January. China has built two to three times as many hypersonics-related facilities as America, including the world's fastest wind tunnel for testing, and pumped out the most public research on the technology (716 publications in 2017, compared with 207 from America and 76 from Russia).

Even so, Mr Acton suggests that the Chinese programme is probably less advanced than America's. For one thing, America is testing its gliders over significantly longer ranges than China is. It is also solving a different, harder, problem. America wants the ability to deliver conventional warheads over continental distances. It is because ICBMs are not accurate enough for this that it wants HGVs. Russia and China are keener on nuclear-tipped ones, partly because they fear their existing nukes might one day be stopped by improvements in America's missile-defence shield. Their own gliders need not be so precise.

Douglas Barrie, an expert at the International Institute for Strategic Studies, a think-tank, forecasts that hypersonic gliders are likely to start entering service in the early 2020s. The result might be twitchier decision-makers and a more

frenzied battlefield.

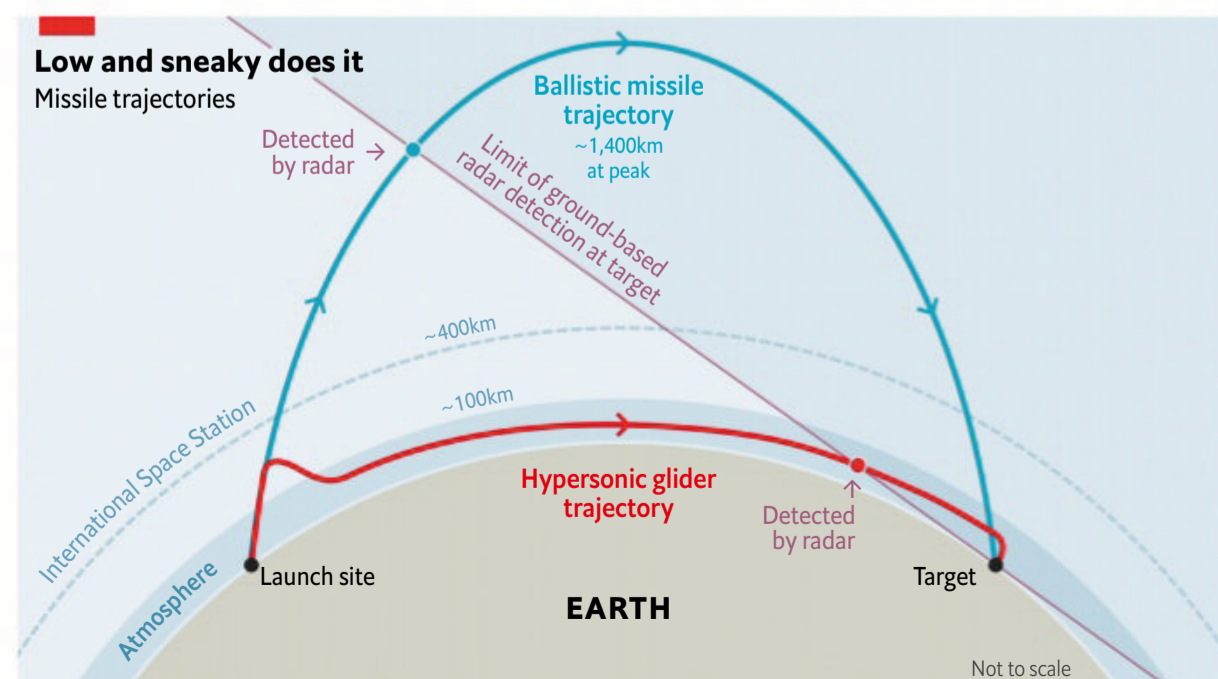
Area defences, which guard broad swathes of territory like continental America, rely on shooting down missiles mid-course and on a straightforward trajectory. Gliders do not go as high and are less predictable, hence Mr Putin's boast that the Avangard is "invulnerable to interception" (some reckon that interceptors placed in space might have a shot as super-hot gliders should stand out to infra-red sensors).

Point defences, which guard individual sites against shorter-range missiles, might have more luck. Gliders must slow down as they approach their targets. Systems like America's THAAD have a proven ability to shoot down ballistic missiles, which close in more quickly.

"The world has changed dramatically," says Mr Bussing. "These systems are very, very difficult to counter and fundamentally give the holder a tremendous advantage over the states that don't have them. The sense of urgency to develop ways to counter them is an imperative."

One American military official suggests that humans will have to hand ever more control to defences that are already semi-autonomous: "There will be no time at all for a man in the loop." The uncertain payload of gliders is another problem. If targets could not tell the difference between conventional and nuclear gliders, or feared that conventional ones, through accuracy and kinetic energy alone, could threaten important targets, they might choose to launch their own nuclear forces to avoid losing them.

There are also wider implications for arms control. The impending collapse of the Intermediate-Range Nuclear Forces (INF) Treaty, which barred America and Russia from possessing land-based missiles of 500km-5,500km ranges, clears the way for both countries to develop and deploy new ground-launched hypersonic missiles. A separate treaty, New START, caps the number of longer-range weapons, ►►



▶ but is up for renewal in 2021 and looking shaky. When it was negotiated in 2010, America and Russia implicitly agreed that gliders would not be covered. Former officials say that was a mistake.

Germany convened an arms-control conference in Berlin on March 15th to kick-start a discussion on taming the risks posed by futuristic weapons, including hypersonic missiles, through diplomacy. Mr Maas called for an “international missiles dialogue” to discuss the challenge.

The UN’s disarmament office has proposed that rivals could swap information on test flights and take other confidence-building measures. Corentin Brustlein of IFRI, a French think-tank, suggests capping glider numbers. Yet America and Russia are enmeshed in worsening disputes over today’s weapons, let alone tomorrow’s, and China shows little interest in tying its hands. Gliders are likely to enjoy a fair geopolitical wind. ■

E-health

Don’t be still, my monitored heart

What happens when your watch tracks your pulse?

ON THE MORNING of March 28th, the owners of newish Apple Watches in 19 countries woke up to find their timepiece was now a medical device. Two new features arrived. One monitors the wearer for an irregular pulse. The other allows a brief but detailed electronic portrait, or ECG, to be captured and inspected for signs of a common heart arrhythmia called “atrial fibrillation”, or AFib.

Americans have had these options since December, but their global expansion puts the technology squarely within the purview of public-health systems, which typically think carefully about how to screen for health conditions. The watch is also spurring debate about how doctors should handle the AFib that it and other consumer devices, such as AliveCor, detect.

AFib is the most common cardiac arrhythmia and occurs when the heart’s upper chambers do not beat in a co-ordinated fashion. Blood can pool in parts of the chambers and form clots. Patients with AFib are five times more likely to have a stroke. They can be treated successfully with blood-thinners, but these carry risks, primarily excessive bleeding. AFib is thought to occur in 2% of the population. However, as the risk of suffering from it increases greatly with age, it will be rare in Apple Watch owners, who are younger, richer and healthier.

Acoustics

Hear, hear

Some political noise really is just that

BEING HEARD in Britain’s House of Commons is not always essential to get things done. One of the most influential and famous speeches was made there 230 years ago next month, when William Wilberforce denounced slavery and kick-started the abolitionist movement. Yet a new study suggests many MPs in the audience wouldn’t have been able to hear him properly.

Catriona Cooper, a digital archaeologist at the University of York, used a computer model to recreate the acoustics of the 18th-century Commons, which was housed in the former St Stephen’s Chapel. Then, using reports of how many people were in the building at the time and where they would have sat or stood, she worked out how Wilberforce’s speech on May 12th 1789 would have sounded to those present.

Many in the chamber would have been distracted by booming echoes, the model suggests. And those MPs in the best seats, including the front benches, would have heard worst of all. To them, Wilberforce’s fine rhetoric would have been a mush of rebounded sound. In fact, the best places to listen to this and other Georgian debates in the Commons were largely out of sight, in the doorway or behind the Speaker’s chair.

Dr Cooper’s model, whose results are published in *Parliamentary History*, suggests that in 1798 the chamber had an average reverberation time—a measure of how slowly sound dissipates—of 1.6 seconds. A lower number means less echo, and the optimal reverb time for spoken words is less than a second. St Stephen’s Chapel sounded more like an



Best seat in the house

opera house (which typically aims for a reverb time of 1.3 to 1.8 seconds).

It burned down in 1834, but the acoustics of the modern House of Commons remain notoriously poor, and that’s not all down to the braying and heckles. High ceilings and stripped-down furnishings encourage echoes. Blame Winston Churchill for some of that. After the Commons was destroyed by German bombs in 1941, he ignored suggestions for a design that was more fit-for-purpose and insisted it be rebuilt faithful to its previous “intimate and conversational” style. The next chance to improve things will be in 2025, when the Palace of Westminster is scheduled for a long-overdue update. Whether that will improve British political affairs is open for debate.

Jonathan Mant, a professor of primary-care research at the University of Cambridge, runs a study of the over-65s that is hoping to discover if AFib screening can prevent stroke and other problems, such as heart attacks or even dementia. Dr Mant says AFib, picked up clinically, is important and worth treating, but that may not be true of the cases found by the watch. “We really have no idea what that would mean,” he says.

Some public-health scientists have warned that AFib screening leads to many false positives and negatives, and these problems could be made worse by consumer technologies. Carl Heneghan, a professor of evidence-based medicine at the University of Oxford, says these new

technologies bypass the usual governance systems that ensure new screening programmes do not create harm. He also worries that false positives will generate a huge amount of pointless work.

The recent “Apple Heart Study”, covering 420,000 patients, looked at the predictive value of the device’s monitoring for irregular pulses. It found that the watch only agrees with a gold-standard method 84% of the time. The feature is intended to prompt wearers to use the ECG app, which is designed to deliver a diagnosis. A study conducted by a research organisation contracted by Apple found the app’s algorithm was able to correctly identify 98.3% of true positives and 99.6% of true negatives.

Yet neither trial included randomised ▶▶

▶ controls, which would offer the kind of information doctors want. This is now planned among the over-65s. There is also an urgent need to understand how common intermittent AFib is, and its consequences. This is something the watch might help with, by providing reams of data that are otherwise difficult to come by.

Matt Kearney, the National Clinical Director for Cardiovascular Disease Prevention for Britain's National Health Service, admits there are challenges with the watch and the rise of consumer-health technologies more generally. But he says the device will uncover cases of AFib that need treatment, and in younger people who have no other symptoms it will be an "opportunity for people to be advised about their risks".

Health professionals will need to embrace new technologies, if only because they are inevitable, Dr Kearney adds. And health systems will need to adapt to the torrent of data. As for the broader impact of the Apple Watch, Dr Mant concludes it is "paradigm-shifting. I just don't know if it is going to be in a good way or a bad way." ■

Mass extinctions

Day of reckoning

Stony evidence of the hellfire that drove dinosaurs to extinction

WHEN, IN 1980, Luis Alvarez, a physicist, and his son Walter, a geologist, made public their theory that the dinosaurs were killed by a massive asteroid strike, it came as a curveball to palaeontologists, who believed dinosaurs had gradually died out through other means. The father-and-son team from the University of California, Berkeley, argued that evidence of the catastrophe was hiding in plain sight, the world over, as a thin layer of sediment enriched in iridium, a metal commonly found in asteroids but rare on Earth. They pointed out that no dinosaurs, with the exception of birds, were ever found beyond this critical layer and suggested a devastating impact was responsible.

The only piece of the puzzle that has been missing is evidence of what actually happened when the asteroid struck. Now, almost 40 years later, an American fossil bed is revealing details of the raging hellstorm that followed just minutes after the asteroid impact, and eventually drove the dinosaurs to extinction.

Under most circumstances, fossils form when animals die in places like river deltas where fine sediment slowly covers up their bones and ultimately encases them in rock. Not so at the aptly named

Hell Creek formation of Tanis in North Dakota. Here, Robert DePalma, a PhD student at the University of Kansas, and a team of colleagues that includes Walter Alvarez are reporting the discovery of a 1.3-metre-thick sedimentary layer that was catastrophically dumped in a single day.

The layer is loaded with the bodies of marine and freshwater fish. This alone struck Mr DePalma as odd since Hell Creek is not known for the preservation of brackish ecosystems where such animals could mingle. But what proved truly unnerving was the fact that all of the bodies were intact, faced the same direction and were scattered among felled tree trunks. That hinted at a sudden surge of water: the streamlined shape of fish means they automatically orient themselves with their heads pointing into a current of fast-moving water. That the bodies were all intact suggests that they were rapidly buried. Moreover, only the most powerful of currents can knock trees down, so the assemblage must have formed during a single devastating event.

Wedge between a 66m-year-old layer of Cretaceous sediment, and another dating from the subsequent Tertiary period, when mammals came to dominate Earth, the Hell Creek fossils are in the perfect position to record the moments that immediately followed the asteroid impact.

Supporting this, spheres of what was once molten glass and fragments of quartz generated under exceptionally high pressures and blasted into the air are scattered throughout the site. Some of it was lodged inside the gills of fossilised fish. Presumably, they sucked it in with their last desperate gasps. The bottom layer of the site contains burrows that appear to have been dug by mammals and are filled with coarse sand brought in over land at great speed, the signs of which are seen in the ripples

left in the sand. Dusting the top of the formation is an ominous layer of iridium.

Other fossil finds, yet to be confirmed, include fish impaled on the spines of one another, wasp nests, flooded ant hills, ancient primates and the leaves of plants probably related to the modern banana tree. The team are studying these but their findings have yet to be peer-reviewed and so are not included in the discovery's scientific announcement, which was published by *Proceedings of the National Academy of Sciences* last week.

What is clear already from the confirmed evidence is the sequence of events that unfolded in the minutes and hours after the asteroid hit. It struck the Mexican coast, sending enormous volumes of gas and molten material into the atmosphere, and igniting a firestorm that would have engulfed much of the planet. Its impact crater, located beneath the Yucatan peninsula and the southern Gulf of Mexico, has been a focus of scientific interest for many years. Undoubtedly, this would have created an enormous tsunami, but Mr DePalma suspects that the Tanis fossils, located thousands of kilometres to the north, were killed by a different phenomenon, triggered by the impact: a seiche wave.

Also known as standing waves, seiche waves form in large bodies of water that are either steadily blown by strong winds or shaken by tremors. Mr DePalma and his colleagues propose that the asteroid impact shook Earth so forcefully that seiche waves as tall as 100 metres rose up in every large body of water across the planet, including the shallow sea near Tanis.

Further fossil evidence will be needed to prove the theory, but if Mr DePalma is correct then the inferno initiated by the impact was made worse by devastating walls of water everywhere. No wonder the dinosaurs threw in the towel. ■



A fishy finish



Jewish-American culture

Chronicle of the golden land

NEW YORK

The history of the *Forward* is a parable of Jewish intellectual life in America

THEY CAME, for the most part, from a cloistered world that time and tragedy have dissolved. It was circumscribed by dogma and poverty and revolved around ritual. From homelands with names that have faded from maps of Europe—Galicia, Bessarabia, the Pale of Settlement—they traversed hostile countryside, boarded trains to Hamburg and Bremen, and packed into ships bound for *di goldene medine*.

Between 1880 and 1924 as many as 2.5m Jews came to America from eastern Europe. They were not the country's first Jewish citizens: Sephardim (Iberian Jews) arrived in small numbers in the colonial period, and among the immense 19th-century wave of German immigrants were around 250,000 Jews. But this later cohort formed

the foundation of what grew into a recognisably Jewish-American culture.

On the whole the immigrants were poor but relatively well educated: Judaism prized argument and exegesis, which require literacy. In daily life they spoke and read Yiddish (Hebrew was the language of prayer), a hybrid tongue perfectly suited to expressing what Irving Howe, a Jewish-

American historian, called the “distinctive traits of the modern Jewish spirit at its best ...an eager restlessness, a moral anxiety, an openness to novelty, a hunger for dialectic, a refusal of contentment, an ironic criticism of all fixed opinions.”

In 1897, a decade and a half after arriving in New York from Vitebsk (now in Belarus), a young socialist and writer named Abraham Cahan founded the *Jewish Daily Forward*—the *Forvertz* in Yiddish, the language in which it was published. By the mid-1920s its daily circulation was higher than that of the *New York Times*. Mostly read in and around New York, it had followings in Boston, Chicago, Detroit and Philadelphia and as far afield as Buenos Aires, Berlin, Warsaw and Tel Aviv. No Jewish periodical anywhere had a larger circulation than the *Forward* until *Maariv*, an Israeli paper, overtook it in 1968. It was based in the Lower East Side, the epicentre of Jewish America, but had bureaus across the country. An array of Jewish writers contributed, including Isaac Bashevis Singer, the sole Yiddish Nobel laureate for literature, who maintained his *Forward* column until 1991.

The *Forward* expanded into radio. Its station, WEVD, was named in honour of Eugene V. Debs, a five-time presidential candidate from the Socialist Party of America. The paper, and its readers, were so steeped in Yiddish that it did not publish an English edition until 1990. But it was not parochial. As Seth Lipsky, who launched that English edition, explains: “It was a general-interest daily in the Jewish language.” Unsurprisingly, it thrived on argument, and never shied from slaughtering a sacred cow. Despite his early socialist views, Cahan swiftly turned on Bolshevism; he visited the Soviet Union in 1927 and found life there even worse than it had been under the tsars.

The newspaper had an intimate side. It ran an advice column called “A Bintel Brief” (“A Bundle of Letters”), which began answering readers’ questions about their bewildering new country in 1906. The letters, and their answers, took a deeply Jewish, morally practical tone. “I am a ‘greenhorn’, only five weeks in the country,” explained one young man. “I come from Russia, where I left a blind father...I promised that I would send him the first money I earned in America.” The writer has managed some modest savings, but his work is tenuous. “I want you to advise me what to do. Shall I send my father a few dollars for Passover, or should I keep the little money for myself,” as a safeguard against future penury? “The answer to this young man”, explained the editor paternally, “is that he should send his father the few dollars [because] he will find it easier to earn a living than will his blind father in Russia.”

Another correspondent, another sticky situation. He is “a Russian revolutionist ▶

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▶ and a free thinker” who is about to marry. The problem is that his in-laws are still hooked on the opiate of the masses. Should he stick to his principles and alienate them, or grit his teeth through a synagogue marriage? The *Forward's* advice—“there are times when it pays to give in to old parents”—will resonate with anyone who has endured overbearing elders.

The Russians were coming

Jewish immigration slowed after Congress passed the Immigration Act of 1924, which admitted newcomers in proportion to their nationality's presence in America in 1890. During the second world war millions of potential emigrants were reduced to ash. Meanwhile second- and third-generation Jews whose families had made it to the golden land began to assimilate (including in their reading matter), as the Germans and Irish did before them. Yiddish became the language of the dwindling older generation—viewed from Jewish suburbs with affectionate nostalgia, as an ornament of comedy sketches rather than an everyday tongue. By the 1980s the *Forward's* acculturative function was becoming superfluous. Some Jews were still arriving, but as J.J. Goldberg, who succeeded Mr Lipsky as the editor of the English edition, summarises, “they were assimilated Russians coming to become assimilated Americans.”

For a time the *Forward* published a Russian edition. A Jewish-American journalist who worked under Mr Lipsky fondly recalls the mix of staff: Hasidim from Brooklyn who laboured in Yiddish; secular American Jews who put out the English edition; fast-talking, conspiracy-minded Russians who wrote in their language. Even as the Yiddish readership aged and the Russian edition was sold in 2004, the *Forward* soldiered on. But paper is expensive, the industry is changing and everything must end: the last print copies will roll off the presses in April or May. The building in Manhattan that was once the paper's headquarters now houses condominiums.

This does not mark the end of the Yiddish press: *Di Tzeitung* is published weekly in Brooklyn and caters to Hasidim, many of whom still reserve Hebrew for liturgy as their ancestors did, and wish to hold the secular American world at bay. Nor, even, does it mark the end of the *Forward*, which will continue as an online publication in both English and Yiddish. The business, says its publisher, Rachel Fishman Feddersen, remains “on firm financial footing”, committed to its mission “to create the best independent journalism and protect the Jewish-American soul”.

But in an age of atheism and intermarriage, what is that soul, and how best to protect it? That is the beginning of an argument—one that Abraham Cahan would surely have loved. ■



This great stage

Ripeness is all

NEW YORK

A mighty actor's Lear is the thing itself

GLENDA JACKSON has a reputation for asperity. As a star of stage and screen, she earned notoriety and two Academy awards for her knack for finding something wise and sharp in even middling scripts. A profile in 1971 heralded her as “the screen's champion castrator”. As a left-wing Labour backbencher for over two decades until 2015, she regularly skewered Tony Blair and took Margaret Thatcher's death as an opportunity to lambast her. Yet it is hard to be intimidated on meeting Ms Jackson (pictured) at her New York haunt of choice—a humble Manhattan diner—where she is dressed in what she calls her “work gear”: a shabby Tintin sweatshirt and no makeup.

In person, she is less harsh than self-assured. Perhaps because she is a woman, her fierce and unapologetic intelligence has earned comparisons to a schoolmistress, but her assertiveness is more puckish than pedantic. In a voice that nearly growls after a lifetime of smoking, she speaks with refreshing candour about her return to Broadway to star in “King Lear”, directed by Sam Gold, which opens at the Cort Theatre on April 4th.

As well as, in the past, being overwhelmingly reserved for men, the role of Lear is often thought too demanding for actors close in age to the geriatric patriarch. Few have the stamina to disintegrate on stage for over three hours, racked by time, betrayal and hubris. With a dismissive wave, Ms Jackson quickly rejects the notion

that, at 82, she might find it taxing to shoulder Shakespeare's tragedy eight times a week: “There's an energy in the play which gives you energy.” She commands the part with electrifying charisma, at once vitriolic and vulnerable, grandly trilling her Rs and—always convincing when she is cruel—wielding her words like a scythe. Yet Lear's encroaching impotence leaves her slicing at air. Stripped of most of her clothes and nearly all of her power, she is a hauntingly mortal figure on spindly legs.

After a quarter of a century away from the stage, Ms Jackson's turn as Lear in London in 2016 made it clear that time had burnished her original craft. Last year she won a Tony for her performance as an acidic widow in Edward Albee's “Three Tall Women”. With disarming humility, she admits she is surprised to be getting such good roles again. She recalls her first years after graduating from the Royal Academy of Dramatic Art, when her unconventional looks and “unemployable accent”—she grew up in north-west England—made it hard to find work. “Every time I finished a job I thought, I'm never going to work again. That doesn't go away.” Mr Gold admires her for “a work ethic that goes beyond anyone I've worked with before.” For Ms Jackson, such dedication is part of her inheritance. “I come from a socio-economic group where if you didn't work, you didn't eat.”

In this production, Lear's court is gilded in an unmistakably Trumpian splendour. The fool (a delightful Ruth Wilson) wears socks printed with the American flag. “I think we need to see what happens when an autocrat's madness gets taken to its logical extreme,” Mr Gold says of the play's calamitous ending. Casting a female Lear unexpectedly amplifies the sense of male privilege. Ms Jackson's version is generally androgynous—less a man or a woman than a human undone by human frailty—but the king's shock at his waning power seems terribly male. It is hard to imagine a woman going to such lengths to lament the loss of a supremacy that she never truly had.

It is not lost on Ms Jackson that so many of the best roles are still written for men. “There are a lot of very good contemporary dramatists around, but they don't find women interesting.” She does not seem impressed by the cascade of sackings that have followed the #MeToo revelations. “It makes you laugh, doesn't it? Did people really not know it was going on?”

Acting, she says, is sadomasochistic. “Every night is the first time,” she explains. “A performance has to be alive every time.” It's hard work, and she is not always sure why she does it. But at its best it involves a group of strangers in the light sending their energy to a group of strangers in the dark, “and when it works that energy is strengthened and sent back to you in a kind of perfect circle. It's a unique experience.” ■

Petals and politics

Flower power

The Englishman who helped safeguard Japan's cherry trees

ON MARCH 21ST a Japanese phenologist observed the pink-and-white blossoms on a cherry tree in the Yasukuni shrine in central Tokyo and formally declared the start of the cherry-blossom viewing season. There are many of this type of cherry, known as *somei-yoshino*, in the shrine that honours Japan's war dead. Some are so old they are held up by wooden struts. In Japan's militaristic mythology, the petals represent the souls of dead fighters.

Few of those currently visiting Japan would associate the delicate flowers with the cruelty of war. More likely they will swoon over nature's ephemeral beauty and, like their hosts at this time of year, drink wildly. Yet the *somei-yoshino* has a dark past, which Naoko Abe explains in her lovely book, "The Sakura Obsession". It is also the story of a quintessentially English nature lover, Collingwood "Cherry" Ingram, who was one of the first to grasp the *somei-yoshino* cherry tree's dangerous seductiveness, and to attempt to tame it.

Cherry trees come in hundreds of forms. In the mountains of Japan, the lordly *yama-zakura*, for instance, is one of a few wild cherries. But in the cities, the vast majority are *somei-yoshino*, a cloned variety that flowers for a mere eight days or so in spring, evoking syrupy delight as its mist of pink blossoms billow in the wind. As Ms Abe tells it, the tree was first hybridised in the 1860s, just as Japan was emerging from a 400-year period shut off from the outside world by its rulers. After the fall of the shogunate, its outward-looking leaders needed a symbol of unity and modernisation. The *somei-yoshino* "fitted the bill perfectly".

Ingram was a cherry devotee. Shortly after returning from the first world war, the middle-aged country toff decided to plant as many cherry varieties as he could find in his large garden in Kent. He imported seeds, grafted scions onto root stock, and worked feverishly to understand the naming system of Japanese cherry trees. In 1926 his quest took him to Japan, almost 25 years after he had first visited the country as a young man and been smitten by its beauty.

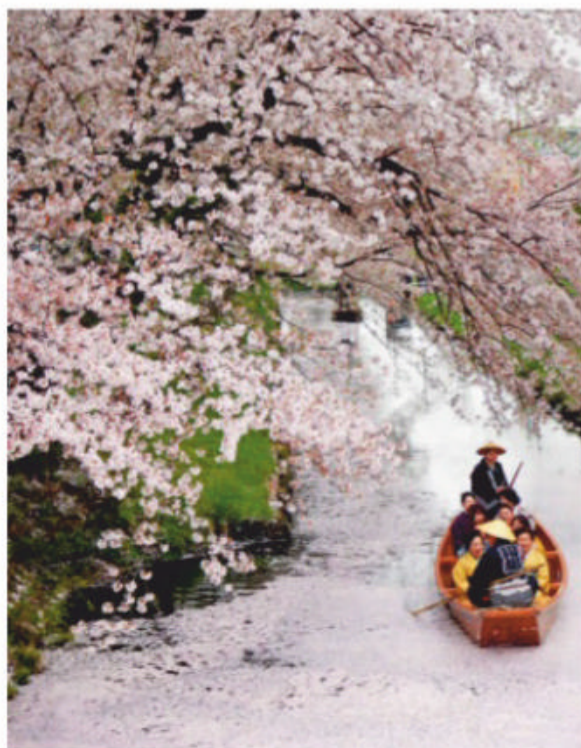
He was no idle enthusiast. He soon realised that an extraordinary variety of cherry trees cultivated during 2,000 years of tree-worship in Japan were in danger of being lost in favour of one, the *somei-yoshino*. Not only did he relate this in a blunt speech to the titans of Japanese industry at Tokyo's Imperial Hotel. He also promised to help Japan restore more variety by sending stock back from his garden.

The Sakura Obsession. By Naoko Abe. Knopf; 400 pages; \$27.95. Published in Britain as "Cherry' Ingram: The Englishman Who Saved Japan's Blossoms" by Chatto & Windus; £18.00

Two tensions animate this book: the difficulty of sending fragile scions around the world and successfully grafting them; and the wrenching historical context. As Ingram battled to safeguard Japan's cherry legacy, the country was succumbing to beligerent nationalism. Many loathed the idea of relying on a Westerner to recover its botanical heritage. Moreover, the *somei-yoshino* cult was just getting into its swing. Within 20 years, *kamikaze* pilots would fly to their doom with cherry blossoms painted on their fuselages. After death, they were promised, they would be reborn as blossoms at Yasukuni.

Be warned. It is hard to view the blossoms of the *somei-yoshino* with such tender joy after reading Ms Abe's book. On the other hand, visitors to Japan will yearn to see more of the *yama-zakura*, great-white cherries and other varieties that Ingram so devotedly helped to rescue.

These days Japanese people increasingly bemoan the tide of foreigners, especially from China, who join their *hanami*, or cherry-blossom viewing parties. Perhaps commentaries like Ms Abe's will inspire them to cultivate other cherry trees, which flower earlier or later, and delight in their variety, as their ancestors did centuries ago. ■



Pretty in pink

Exercise and exploration

Feet first

Walking: One Step at a Time. By Erling Kagge. Translated by Becky Crook. Pantheon; 192 pages; \$19.95. Viking; £9.99

HAVE YOU ever been so heartbroken that you felt a need to cover yourself in effluent? Erling Kagge, a Norwegian explorer, has. In his latest book, "Walking: One Step at a Time" (translated by Becky Crook), he describes how the sewer he was navigating once became so small that he was forced to shuffle on his stomach, his nose skimming a river of muck. He emerges into daylight head to toe in human waste, yet feeling better for his jaunt.

In his previous book, "Silence: In the Age of Noise", Mr Kagge emphasised the quiet of subterranean New York. In "Walking" he revisits the urban underworld to reflect on the therapeutic effects of exploration. The first person to complete the "Three Poles Challenge"—ie, reaching both poles and the summit of Mount Everest—on foot, Mr Kagge reminisces about how far he has gone to escape. In those sewers he took a break from his crumbling marriage and dodged arrest for trespassing. He lives out his notion that pain can be "beneficial and pleasurable"; his credo is that shortcuts make any endeavour "superficial" and pointless.

Initially his book risks becoming a didactic screed about the dangers of modern technology, as the author laments the way cars, trains, buses and gawking at a smartphone speed life up, leaving little to be savoured. Yet in the end it is much more subtle than a typical self-help tome. He does not expect his readers to visit the meanest streets of Los Angeles, as he has done, or become so hungry that they crouch in the snow to retrieve a single lost raisin, as he did in Antarctica. Instead he uses his acquaintance with extreme environments to reflect on the mental and physical benefits of walking.

"He who walks lives longer," he writes, but that is "only half the truth". The other half is that the act of walking also slows down time, and forces you to consider your surroundings. "The mountain up ahead, which slowly changes as you draw closer, feels like an intimate friend by the time you've arrived." Walking, in other words, prolongs the experience of life, as well as life itself.

Cli-fi

The tallest story

Can the novel handle a subject as cataclysmic as climate change?

THE LITERARY NOVEL has a problem with scale. For centuries it has principally focused on the stuff of everyday life. It doesn't generally concern itself with the cataclysmic or tectonic. Compare Homer's "Odyssey" with James Joyce's "Ulysses": whereas the epic incorporates gods, slaughters and the fate of nations, the novel celebrates the intimate and quotidian.

The literary novel has a problem with time. Novels are one of the ways in which a culture thinks about the challenges it faces, but frequently the form looks to the past to illuminate the present, rather than into the future. The Victorian novel pondered the rapidly industrialising economy and shifting class structures of the age. Yet many of the great books of the period, from "Middlemarch" to "A Tale of Two Cities", employed historical settings. Today's novelists often turn to the two world wars, or even more remote eras, for their subjects.

These tendencies are a handicap in the age of climate change, a crisis which is both current and to come. The Indian novelist Amitav Ghosh recognised this drawback in "The Great Derangement", a collection of essays published in 2016. In a piece ostensibly about environmental catastrophe, Mr Ghosh pondered the cultural role of the novel. Climate change, he argued, seems just too capacious, uncertain and abstract a subject to be addressed by a form with an innate fear of the unknowable and provisional—ie, of the future. And if the novel cannot confront the biggest danger to humanity, can it retain its relevance?

Time is a factor in more ways than one. Particularly since Modernism, which saw Joyce and Virginia Woolf anatomise the minutiae of life, literary time has been circumscribed. Whether it is Mrs Dalloway's day or the longer arc of the *Bildungsroman*, there is generally an inherent limit on the temporal horizons of serious novels: the length of a character's life. Novelistic time is tightly bounded, as well as being sequestered in the past. The leap forward needed to envisage the climate's trajectory requires more elastic parameters.

Not all fiction is hobbled in this way. What Mr Ghosh snobbishly calls the "generic outhouses"—speculative and science fiction—have tried to tackle climate change head-on. These genre boundaries are blurry and contested: J.G. Ballard's "The Drowned World" (1962), a sci-fi novel that was among the first to deal with climate-related fears, has been reassessed and reclassified as the author's reputation evolved. But the literary novel has long defined itself in opposition to other genres, and the future and its risks have been tainted by association. At least, they were until recently.

Not waving but drowning

As the divide between literary and other types of fiction has become increasingly porous, so the literary establishment has begun to recognise the imaginative possibilities of climate change. Cormac McCarthy's "The Road" (2006), in which a father and son traverse an ashen landscape after an unnamed apocalypse, was an early

turning point. The book served as a bridge between the fears of one generation, which involved mushroom clouds and mutually assured destruction, and those of the next, which are of melting ice caps and wildfires.

Mr McCarthy wrote "The Road" after becoming a father in his 50s. Gazing over a Texan landscape with his son, he imagined the hills scorched black, depredations the boy would see but he would not. The story can be interpreted as a message from Mr McCarthy to his child, as a metaphor for a universal anxiety about leaving offspring to fend for themselves, and as a dramatisation of a horror that humans have despoiled the Earth. The book draws attention to the fact that novels are in a sense always about the future, because that is when they will be read. It was a breakthrough for writers keen to engage with the climate. Novelists including Ian McEwan and Margaret Atwood have done so.

Now the genre that Mr McCarthy helped galvanise, sometimes known as "cli-fi", is gathering pace. His impulse to tell stories for future generations animates two recent examples. In "The End We Start From", Megan Hunter evokes "An unprecedented flood. London. Uninhabitable. A list of boroughs, like the shipping forecast, their names suddenly as perfect and tender as the names of children." The anonymous narrator shepherds her baby son, Z, through this flooded Britain in search of safety and the boy's father. The narrative is interlaced with passages from mythological sources, closing the circle between the destructive floods of the cli-fi future and the watery origin stories of many religions.

Similarly, Louise Erdrich's "Future Home of the Living God" purports to be written by a woman to her unborn child, preparing it for the world it will inhabit. A thermometer ticks upwards like a primed bomb; the novel ends with a lyrical passage in which the narrator recalls the snows of her youth. "Next winter it rained. The cold was mild and refreshing. But only rain. That was the year we lost winter."

Some dystopias combine the spectre of climate carnage with other fears. John Lanchester's "The Wall" imagines a future in which Britain's coastlines have been replaced by the titular wall, built to hold back both the rising tides and the "Others"—boat-borne hordes seeking refuge. The migrant crisis and Brexit contribute to a bleak vision of paranoid insularity. In Omar El Akkad's "American War", meanwhile, swathes of late-21st-century America are under water. Florida has vanished; a second civil war erupts over fossil-fuel usage.

Literary novelists have begun to appreciate that climate change is not just an urgent subject but a font of drama and plots. All too soon the theme may revert from the territory of science fiction to the realm of old-fashioned realism. ■



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Tenders



FEDERAL REPUBLIC OF NIGERIA

MINISTRY OF TRANSPORTATION (AVIATION)

in compliance with the

Infrastructure Concession Regulatory Commission (ICRC) Establishment Act 2005 & National Policy on Public Private Partnership (N4P)

REQUEST FOR QUALIFICATION (RFQ)

INVESTMENT OPPORTUNITIES FOR PRIVATE INVESTORS IN THE NIGERIAN AVIATION INDUSTRY

The Federal Government of Nigeria (FGN) through the Federal Ministry of Transportation (Aviation) is seeking to reposition Nigeria's aviation sector as part of efforts towards the diversification of the economy, enhanced competitiveness of the sector, boost productivity and enhance economic growth.

To this end, the FGN is seeking to attract private capital and technology to design, build, finance, operate and maintain aviation infrastructure needed to attain the full potential of the aviation sector in Nigeria.

The FGN is therefore soliciting responses from interested parties to the RFQ on the following projects;

1. Establishment of an Aviation Leasing Company (ALC)
2. Establishment of a Maintenance, Repairs and Overhaul (MRO) Facility

Interested parties can download the RFQ and the Information Memorandum (IM) from the website www.nigerianaviationpppprojects.com

Any addendum issued to the RFQ will be published on the same website. Clarifications and enquiries may be sent via email to alc@nigerianaviationpppprojects.com and alc@catamaranng.com.


All responses to the RFQ must be received in hard copies not later than **Monday 20th May, 2019 at 16:00 (HRS) Local Time** at the address below;

The Director Procurement
Federal Ministry of Transportation
6th Floor
Bukar Dipcharima House, Central Business District,
Abuja, Nigeria.

Signed
Permanent Secretary

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Easy access to the airport (approx. 18.6 km, 20 minutes)
Easy access to the port (approx. 12.3 km, 25 minutes)



Contact: officekaliningrad@gmail.com

Economic data

	Gross domestic product			Consumer prices		Unemployment rate		Current-account balance		Budget balance		Interest rates		Currency units			
	% change on year ago			% change on year ago		%		% of GDP, 2019†		% of GDP, 2019†		10-yr gov't bonds	change on	per \$	% change		
	latest	quarter*	2019†	latest	2019†							latest,%	year ago, bp	Apr 3rd	on year ago		
United States	3.0	Q4	2.2	2.3	1.5	Feb	2.2	3.8	Feb	-2.5		-4.9	2.5	-25.0	-		
China	6.4	Q4	6.1	6.3	1.5	Feb	2.6	3.8	Q4§	0.2		-4.4	3.0	§§	-63.0	6.71	-6.4
Japan	0.3	Q4	1.9	1.0	0.2	Feb	1.4	2.3	Feb	3.9		-3.4	-0.1	-10.0	111	-4.4	
Britain	1.4	Q4	0.9	1.1	1.9	Feb	2.0	3.9	Dec††	-4.0		-1.6	1.1	-31.0	0.76	-6.6	
Canada	1.6	Q4	0.4	1.6	1.5	Feb	1.7	5.8	Feb	-2.8		-1.4	1.7	-44.0	1.33	-3.8	
Euro area	1.1	Q4	0.9	1.3	1.4	Mar	1.4	7.8	Feb	3.0		-1.1	nil	-50.0	0.89	-9.0	
Austria	2.4	Q4	5.1	1.3	1.5	Feb	1.8	5.0	Feb	2.0		-0.1	0.3	-41.0	0.89	-9.0	
Belgium	1.2	Q4	1.4	1.3	2.3	Mar	2.2	5.7	Feb	0.4		-0.9	0.5	-28.0	0.89	-9.0	
France	1.0	Q4	1.3	1.3	1.1	Mar	1.3	8.8	Feb	-1.2		-3.4	0.4	-35.0	0.89	-9.0	
Germany	0.6	Q4	0.1	1.0	1.3	Mar	1.4	3.1	Feb‡	6.6		0.8	nil	-50.0	0.89	-9.0	
Greece	1.6	Q4	-0.4	1.8	0.6	Feb	0.8	18.0	Dec	-1.9		-0.4	3.6	-61.0	0.89	-9.0	
Italy	nil	Q4	-0.4	0.1	1.0	Mar	0.9	10.7	Feb	2.3		-2.9	2.5	74.0	0.89	-9.0	
Netherlands	2.2	Q4	2.2	1.4	2.6	Feb	2.3	4.3	Feb	9.8		0.7	0.1	-49.0	0.89	-9.0	
Spain	2.4	Q4	2.2	2.2	1.4	Mar	1.2	13.9	Feb	0.8		-2.4	1.0	-5.0	0.89	-9.0	
Czech Republic	3.0	Q4	3.4	2.8	2.7	Feb	2.2	2.0	Feb‡	0.4		0.7	1.9	nil	22.9	-9.9	
Denmark	2.5	Q4	3.4	1.9	1.1	Feb	1.1	3.7	Feb	6.3		0.2	0.1	-47.0	6.65	-8.7	
Norway	1.7	Q4	1.9	1.9	3.0	Feb	2.0	3.9	Jan††	7.9		6.4	1.6	-29.0	8.56	-8.5	
Poland	4.5	Q4	2.0	3.8	1.7	Mar	1.7	6.1	Feb§	-0.5		-2.4	2.9	-29.0	3.82	-10.5	
Russia	2.7	Q4	na	1.5	5.2	Feb	4.9	4.9	Feb§	6.5		2.4	8.4	123	65.2	-11.7	
Sweden	2.4	Q4	4.7	1.6	1.9	Feb	1.8	6.6	Feb§	3.5		0.4	0.2	-48.0	9.27	-9.7	
Switzerland	1.4	Q4	0.7	1.8	0.7	Mar	0.7	2.4	Feb	9.8		0.5	-0.3	-34.0	1.00	-4.0	
Turkey	-3.0	Q4	na	1.1	19.7	Mar	15.5	13.5	Dec§	-3.8		-2.3	17.4	475	5.62	-29.0	
Australia	2.3	Q4	0.7	2.6	1.8	Q4	2.0	4.9	Feb	-2.2		-0.2	1.8	-79.0	1.40	-7.1	
Hong Kong	1.3	Q4	-1.4	2.2	2.1	Feb	2.3	2.8	Feb††	4.5		0.5	1.6	-36.0	7.85	nil	
India	6.6	Q4	5.1	7.4	2.6	Feb	3.3	6.7	Mar	-1.8		-3.4	7.3	-6.0	68.4	-5.0	
Indonesia	5.2	Q4	na	5.2	2.5	Mar	3.1	5.3	Q3§	-2.8		-2.2	7.6	104	14,220	-3.2	
Malaysia	4.7	Q4	na	4.5	-0.4	Feb	0.9	3.3	Jan§	2.4		-3.4	3.8	-19.0	4.08	-5.2	
Pakistan	5.4	2018**	na	4.0	9.4	Mar	7.4	5.8	2018	-4.4		-4.7	13.4	†††	440	141	-18.4
Philippines	6.1	Q4	6.6	5.9	3.8	Feb	4.6	5.2	Q1§	-2.2		-2.5	5.9	-4.0	52.1	-0.1	
Singapore	1.9	Q4	1.4	2.4	0.5	Feb	0.5	2.2	Q4	16.5		-0.6	2.1	-24.0	1.35	-3.0	
South Korea	3.2	Q4	3.9	2.4	0.4	Mar	1.6	4.7	Feb§	4.6		0.5	1.9	-74.0	1,134	-7.0	
Taiwan	1.8	Q4	1.5	1.8	0.2	Feb	0.1	3.7	Feb	13.1		-1.2	0.8	-22.0	30.8	-5.4	
Thailand	3.7	Q4	3.3	3.5	1.2	Mar	0.9	0.8	Feb§	8.8		-2.5	2.1	-30.0	31.7	-1.7	
Argentina	-6.2	Q4	-4.7	-0.9	50.7	Feb	46.1	9.1	Q4§	-2.2		-3.4	11.3	562	42.7	-52.7	
Brazil	1.1	Q4	0.5	1.8	3.9	Feb	3.7	12.4	Feb§	-1.4		-5.8	7.1	-95.0	3.84	-13.5	
Chile	3.6	Q4	5.3	3.2	1.7	Feb	2.2	6.7	Feb§††	-2.8		-1.4	4.0	-50.0	666	-9.5	
Colombia	2.9	Q4	2.4	3.1	3.0	Feb	2.9	11.8	Feb§	-3.5		-2.0	6.5	-7.0	3,130	-11.3	
Mexico	1.7	Q4	1.0	1.6	3.9	Feb	4.1	3.4	Feb	-1.7		-2.3	8.1	76.0	19.2	-5.2	
Peru	4.8	Q4	11.4	3.7	2.2	Mar	2.2	9.0	Feb§	-1.6		-2.0	5.6	64.0	3.30	-2.4	
Egypt	5.5	Q4	na	5.1	14.3	Feb	12.1	8.9	Q4§	-0.1		-7.3	na	nil	17.3	1.6	
Israel	2.8	Q4	3.0	3.1	1.2	Feb	1.2	4.1	Feb	2.7		-3.7	2.0	30.0	3.60	-1.7	
Saudi Arabia	2.2	2018	na	1.8	-2.2	Feb	-0.8	6.0	Q4	3.6		-7.2	na	nil	3.75	nil	
South Africa	1.1	Q4	1.4	2.2	4.1	Feb	5.0	27.1	Q4§	-3.0		-4.1	8.5	50.0	14.2	-16.6	

Source: Haver Analytics. *% change on previous quarter, annual rate. †The Economist Intelligence Unit estimate/forecast. §Not seasonally adjusted. ‡New series. **Year ending June. ††Latest 3 months. ‡‡3-month moving average. §§5-year yield. †††Dollar-denominated bonds.

Markets

In local currency	Index	% change on:	
		one week	Dec 31st 2018
United States S&P 500	2,873.4	2.4	14.6
United States NAScomp	7,895.6	3.3	19.0
China Shanghai Comp	3,216.3	6.4	29.0
China Shenzhen Comp	1,772.1	7.1	39.8
Japan Nikkei 225	21,713.2	1.6	8.5
Japan Topix	1,621.8	0.8	8.5
Britain FTSE 100	7,418.3	3.1	10.3
Canada S&P TSX	16,279.9	0.9	13.7
Euro area EURO STOXX 50	3,435.6	3.4	14.5
France CAC 40	5,468.9	3.2	15.6
Germany DAX*	11,954.4	4.7	13.2
Italy FTSE/MIB	21,755.9	2.7	18.7
Netherlands AEX	561.4	3.0	15.1
Spain IBEX 35	9,487.8	2.8	11.1
Poland WIG	61,924.9	3.5	7.3
Russia RTS, \$ terms	1,224.4	1.4	14.8
Switzerland SMI	9,570.1	1.9	13.5
Turkey BIST	94,441.1	2.8	3.5
Australia All Ord.	6,368.7	2.4	11.5
Hong Kong Hang Seng	29,986.4	4.4	16.0
India BSE	38,877.1	2.0	7.8
Indonesia IDX	6,476.1	0.5	4.5
Malaysia KLSE	1,643.2	nil	-2.8

	index	% change on:	
		one week	Dec 31st 2018
Pakistan KSE	38,022.8	-2.4	2.6
Singapore STI	3,311.3	3.5	7.9
South Korea KOSPI	2,203.3	2.7	7.9
Taiwan TWI	10,704.4	1.5	10.0
Thailand SET	1,649.1	1.2	5.4
Argentina MERV	31,765.1	-1.3	4.9
Brazil BVSP	94,491.4	2.8	7.5
Mexico IPC	43,339.8	0.9	4.1
Egypt EGX 30	15,197.8	4.4	16.6
Israel TA-125	1,434.7	1.4	7.6
Saudi Arabia Tadawul	8,985.5	2.5	14.8
South Africa JSE AS	57,926.0	3.2	9.8
World, dev'd MSCI	2,143.0	2.3	13.8
Emerging markets MSCI	1,079.8	3.4	11.8

US corporate bonds, spread over Treasuries

	Basis points	
	latest	Dec 31st 2018
Investment grade	166	190
High-yield	462	571

Sources: Datastream from Refinitiv; Standard & Poor's Global Fixed Income Research. *Total return index.

Commodities**The Economist commodity-price index**

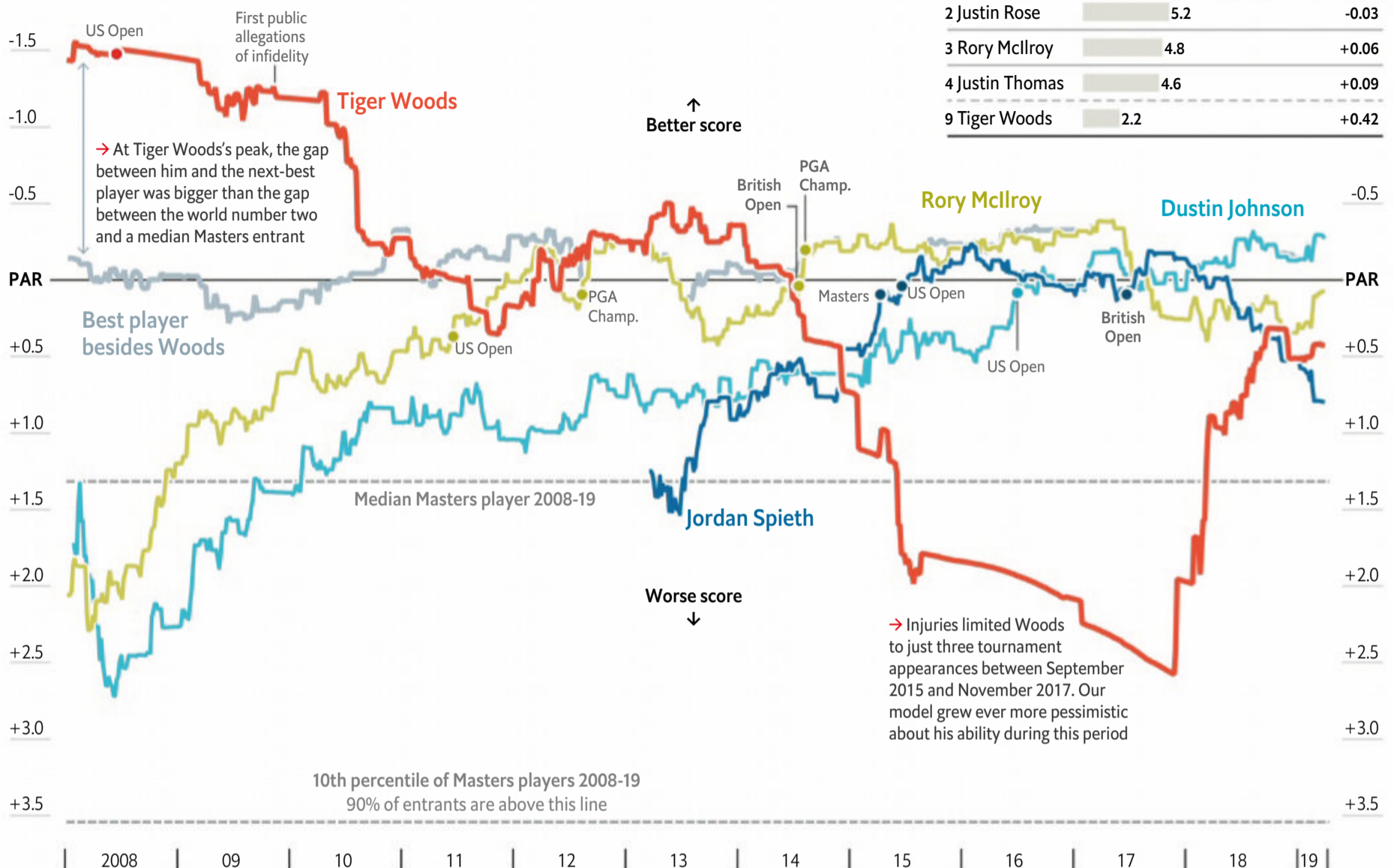
2005=100	Mar 26th		Apr 2nd*		% change on	
	Mar 26th	Apr 2nd*	month	year		
Dollar Index						
All Items	139.4	139.8	0.7	-8.2		
Food	143.8	143.5	0.6	-9.3		
Industrials						
All	134.8	136.0	0.7	-7.0		
Non-food agriculturals	125.8	125.7	1.6	-9.5		
Metals	138.7	140.4	0.4	-6.0		
Sterling Index						
All items	191.9	195.2	1.3	-1.1		
Euro Index						
All items	153.7	155.4	1.7	0.7		
Gold						
\$ per oz	1,314.1	1,290.6	0.4	-3.0		
West Texas Intermediate						
\$ per barrel	59.9	62.6	10.6	-1.5		

Sources: CME Group; Cotlook; Darmann & Curl; Datastream from Refinitiv; FT; ICCO; ICO; ISO; Live Rice Index; LME; NZ Wool Services; Thompson Lloyd & Ewart; Urner Barry; WSJ. *Provisional.

For more countries and additional data, visit [Economist.com/indicators](https://www.economist.com/indicators)

Modern greats pale in comparison with peak Tiger. So does modern Tiger

EAGLE*, expected score to par per round† ● Major tournament wins
Selected players



EAGLE predictions for the 2019 Masters Tournament

Player	Chance of winning, %	Expected score to par per round
1 Dustin Johnson	8.6	-0.29
2 Justin Rose	5.2	-0.03
3 Rory McIlroy	4.8	+0.06
4 Justin Thomas	4.6	+0.09
9 Tiger Woods	2.2	+0.42

*Economist Advantage in Golf Likelihood Estimator †On course of average difficulty for a major, translated to 2019 scoring environment. Par is the score that course organisers expect from an "expert" player on each hole Source: The Economist

The once and future king?

The Economist's Masters forecast is lukewarm about golf's biggest star

TIGER WOODS is back—sort of. He had won 14 major titles by the age of 32, and seemed destined to break Jack Nicklaus's all-time record of 18. Since 2009, however, Mr Woods has not been himself, thanks to injuries and the mental turmoil that began when his marriage fell apart. After playing in just three events during the two years to November 2017, his career seemed over.

Recently, however, Tiger has burned bright once again. He was among the top finishers in the past two majors, and in September won his first event since 2013. The Masters, the first of the four annual major tournaments, begins on April 11th. Is the 43-year-old really a credible contender?

The best-known measure of golfers' ability is the Official World Golf Rankings

(OWGR). Players earn OWGR points based on their order of finishing in each event and the previous rankings of other golfers taking part. However, the OWGR make no use of individual scores once play begins. As a result, a golfer who performs brilliantly—but loses to a rival who plays even better—gets fewer points than one who ekes out a win because everyone else had a bad day.

Is this the best way to evaluate skill? We think not. EAGLE (Economist Advantage in Golf Likelihood Estimator), our prediction model for men's major golf tournaments, ignores competitors' results and relies on players' personal scoring records, adjusted for course conditions and difficulty. Starting with the Masters, we will launch an on-line visualisation showing EAGLE's forecasts of every golfer's chances of victory and odds of each possible score on each hole. It will update every two minutes.

Our algorithm is impressed by Mr Woods's comeback. At his worst point, EAGLE predicted him to shoot an average of 2.6 strokes above par per round on a typical major course—worse than 85% of golfers in the Masters. It now puts him at 0.4 shots

above par, among the world's ten best.

However, Mr Woods's renaissance still leaves him 0.7 strokes per round behind Dustin Johnson, the best current player. That gap is large enough for EAGLE to give Mr Johnson a 9% chance to win the Masters, compared with just 2% for Mr Woods.

And even Mr Johnson cannot compare to Mr Woods at his best. If the Mr Woods of 2008, when he last won a major, were transported to 2019, EAGLE finds he would shoot 1.5 strokes below par per round. The gap between "peak Tiger" and Phil Mickelson, then the second-best player, was bigger than the one between Mr Mickelson and a median Masters entrant. Such dominance gave Mr Woods a 25% chance of winning each major he entered in that era.

Betting markets put Mr Woods's odds of donning the Masters victor's green jacket at 5%, more than twice EAGLE's estimate. He has made many a pauper of punters who bet against him. But it is more likely than not that he has let loose his last roar. ■

You can follow our Masters predictions live at Economist.com/eagle



I am a camera

Agnès Varda, film-maker, died on March 29th, aged 90

BECAUSE SHE liked recycling, in 2003 Agnès Varda built herself a shack. It was made of 35mm prints of “The Creatures”, her biggest flop, one of the very few in which she had cast a star, Catherine Deneuve. But when she sat inside this new construction the sunlight entered in the most beautiful ways, glowing through the images, so that she inhabited cinema.

And she did inhabit it, not as a great feted director but as someone joyfully on the margins, a stout elf doing her own little thing in shapeless, often purple, clothes and with pudding-bowl two-tone hair; someone who couldn't help making films, because the urge to look and listen never let go. In a car she would naturally hold her hand to the windscreen to frame the views and the passing cars. Behind a camera she would dart about as an eye would behave, resting for a while on a man reading a newspaper, then getting distracted by a bicycle, a picture on a wall, a child shouting. She had started as a photographer and went on taking stills all her life, but her eye was restless. The smaller cameras became, from 35mm to 16mm to hand-held digital, weaving up and down with her, the happier she was. She called her craft *cinécriture*, cine-writing, and hoped to be as radical in it as Joyce or Faulkner were in literature.

For this some people called her the grandmother (or godmother) of French *nouvelle vague*, the embrace of realism and social con-

sciousness, and thought her film “La Pointe Courte” of 1955, which she shot in her home town of Sète using mostly local fishermen, marked the start of it. But she began as a crazy innocent who had seen perhaps five films. She didn't consort with François Truffaut or the others just as she didn't mix with Hollywood later, despite an Oscar for lifetime achievement. Instead, since her films mostly made no money and she didn't care, she sold DVDs of them to passers-by from an improvised place beside her ramshackle pink atelier in rue Daguerre in Paris. Just like the neighbour-shopkeepers in her first documentary, “Daguerréotypes”—the perfumier gently filling bottles of violet-water, the butcher wrapping meat, the baker stretching dough—she offered her produce where it was made.

Documentaries pleased her as a schooling in modesty, just placing the camera to observe, not hovering like an eagle or overlaying ideas of her own. Another, “The Gleaners”, recorded the lives of the poor or frugal who picked up wasted food from thrown-out pallets or the ground, her hand-held camera bending with them to see what they found, rejoicing especially in a potato shaped like a heart. People often told her they had nothing to say, but she drew words out of them, gleaning herself. In “Faces, Places” in 2017 she travelled round rural France with JR, a maker of giant photographs, delighting to persuade shy overlooked folk to have their portraits posted briefly but grandly on walls and water-towers.

Dignifying people, by recording part of the million tiny impulses and observations that made up their lives, was also something she did in her fiction films. In these she sometimes followed one actress, surrounded by non-actors, through a not-so-normal day: walking with Cléo, a singer with two hours to wait for a possible cancer diagnosis, through the streets of Paris in “Cléo from 5 to 7”; placing her fear of death against the beauty of ordinary life; or trudging in “The Vagabond” over tracks and frozen fields with a young woman, Mona, who had decided to abandon her job for the freedom of the open road, though it also meant derision and hunger and sordid trysts in her tent. Each time the camera was discreet and, when it was kinder to do so, gazed elsewhere.

Social messages ran all through these films, but only one about America's Black Panthers, and a collation of 4,000 black-and-white stills of the revolution she took in Cuba in 1963, proclaimed her left-wing convictions. Feminism was another matter. She was born a feminist, changing her name to sober Agnès from silly, giggly Arlette, signing a manifesto to legalise abortion in France and making films in which the patriarchy smothered even supper-table conversation. “Le Bonheur”, the tale of a handsome carpenter casually two-timing his wife, showed how women could be interchangeable to men; “Lions Love” told the story of a woman director pestered by studio executives; “One Sings, the Other Doesn't” explored the growth of a friendship between two girls, one needing an abortion, one helping to pay. She filmed Jane Birkin's ogled body and the imprisoned caryatids of Paris. Her husband, Jacques Demy, maker of “The Umbrellas of Cherbourg”, was an exception, a treasure, for whom she made a trilogy of films after his death. They began with the small Jacques creating a camera out of cardboard to frame a scene and focus on things, just like her.

Her own girlhood was spent on a moored boat at Sète, catching sticklebacks from the quay and playing on the sands of the Grande Plage. If, as she believed, people were full of landscapes, then she was full of beaches, and waves played in her all the time. In “The Beaches of Agnès”, made in 2008, she wandered on various shores with acrobats and friends. In three stills she summed it up: quiet, foam, sand. On her 90th birthday, she swam in the sea.

By this time she had turned many film prints into miniature glowing shacks, and one into a little boat. Like the sea, they showed how ephemeral everything was that her eye saw and the camera recorded. All those memories and realisations that made up her life would fade away unless she kept voyaging through new landscapes, meeting new people, looking and listening and constantly rebuilding the world out of sheer curiosity. ■



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