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At elections for the **European Parliament**, a predicted surge by populists and nationalists failed to materialise, though such parties gained seats in Italy and Britain. The new parliament will be much more fragmented than the old one, thanks to a strong showing by green and liberal parties. The traditional main groupings, the centre-right European People's Party and the centre-left Socialists and Democrats, both lost ground, falling well below a combined majority of the chamber for the first time.

Greece's prime minister, Alexis Tsipras, said he would call a snap election after his left-wing Syriza party flopped in the Euro polls. In **Austria**, Sebastian Kurz lost a vote of confidence thanks to the break-up of his coalition with the hard-right FPÖ, so a fresh election will be held there, too. In a state election in Bremen, **Germany's** Social Democrats lost for the first time in 70 years.

Romania's ruling party did terribly in the European elections. The next day its leader, Liviu Dragnea, was jailed for corruption.

Theresa May said she would resign as Britain's prime minister, after repeatedly failing to deliver Brexit. The 12-week-old **Brexit Party** won the most votes of any party at the European elections in Britain. The anti-Brexit Liberal Democrats and Greens won more votes than the Brexit Party but fewer seats. The traditional parties of government, the Conservatives and Labour, did miserably.

Britain's **Labour Party** expelled Alastair Campbell, a former

adviser to Tony Blair, for backing the Liberal Democrats in the European elections. Party members who make anti-Semitic comments have seldom been dumped so swiftly. Several other prominent Labourites also backed other parties, mostly over Brexit.

Disparate lives

Brazil's supreme court ruled that discriminating against gay or transgender people is equivalent to discriminating on grounds of race. Homophobic and transphobic acts are to be punished under existing laws banning racial discrimination until Congress passes a bill. Brazil legalised same-sex marriage in 2013, but at least 420 gay people are thought to have been murdered last year.

Mexico charged Emilio Lozoya Austin, a former head of Pemex, the state-run oil company, with fraud. It is the first big case brought by the government of Andrés Manuel López Obrador, whose campaign last year promised to crack down on corruption.

All of the top leaders of **Amnesty International**, a human-rights group, offered to resign after an internal review uncovered a "toxic" workplace culture, including reports of bullying.

Back to the polls!

The **Israeli** Knesset voted to hold a fresh election in September, five months after a poll in April, as talks led by Prime Minister Binyamin Netanyahu, to put together a new coalition government failed. The sticking point was an attempt to end the exemption from the military draft for ultra-Orthodox Jews, which their parties refused to countenance. Mr Netanyahu pushed for a new election rather than let another party try to form a government. It is the first time in Israel that a governing majority has not been formed after an election.

The **Syrian** regime of Bashar al-Assad pounded Idlib prov-

ince, the last rebel-held stronghold. Scores of civilians have died in the bombardment, which began last month. Some 300,000 have fled.

Donald Trump declared a national emergency over tensions with **Iran** in order to push through the sale of \$8bn-worth of weapons to **Saudi Arabia**, Iran's regional rival. By declaring the emergency, Mr Trump was able to bypass Congress, which has criticised Saudi Arabia's conduct of the war in Yemen. Mr Trump said he is not seeking regime change in Iran—unlike his national-security adviser, John Bolton.

Cyril Ramaphosa named a new, smaller cabinet following his re-election as **South Africa's** president. Half the appointments were women and the new intake was generally taken as a sign that Mr Ramaphosa is serious about cracking down on corruption. They will all have to sign performance agreements.

The end of Mueller's time

Robert Mueller, who led the Department of Justice's investigation into Russian meddling in the election of 2016, gave a rare public statement. He explained that because the department works for the president, indicting Donald Trump was "unconstitutional" and "not an option we could consider". He also suggested that he has nothing to say beyond what is already in his report.

America's Supreme Court rejected a law in Indiana that would have banned **abortions** sought because of the fetus's sex or disability. However, it upheld Indiana's requirement that aborted fetuses be buried or cremated. Louisiana passed a bill banning abortions if a fetal heartbeat is detected. The Democratic governor has said he will sign it. Both pro-life and pro-choice activists expect a big battle over abortion during next year's presidential campaign.

America laid fresh charges against **Julian Assange**, this time for being "complicit with" Chelsea Manning in leaking hundreds of thousands of sensitive documents, starting in 2009. Mr Assange, who is in a British prison for jumping bail and is too ill to attend court, has already been accused by the Americans of abetting the hacking of a government computer.

WrestleMania it ain't



On a state visit to **Japan**, Donald Trump met the new emperor and attended a sumo-wrestling tournament, where he presented a trophy. He startled his hosts by saying that **North Korea's** recent missile tests did not bother him and didn't violate UN resolutions. Shinzo Abe, Japan's prime minister, called the missile tests "extremely regrettable".

John Bolton, Mr Trump's national security adviser, enraged **China** by meeting his **Taiwanese** counterpart in Washington. It was the first meeting between the top national-security officials from both countries since 1979, when America ended formal relations. China says Taiwan is part of its territory.

After weeks of political tumult, Peter O'Neill bowed to pressure and resigned as prime minister of **Papua New Guinea**. He was replaced by James Marape, a former ally who recently stepped down as finance minister. Mr O'Neill had faced mounting opposition to energy deals with foreign companies, including Total and ExxonMobil. Many locals complained that they had been overlooked in the process. ▶▶

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Fiat Chrysler Automobiles confirmed that it was seeking a merger with **Renault**, a combination that would create the world's third-largest car company behind Volkswagen and Toyota. FCA and Renault hope the merger will save cash to bolster investments in electric vehicles and self-driving cars. But Renault is also in a close partnership with Japan's Nissan and Mitsubishi. That alliance has been strained since the arrest of Carlos Ghosn, its former boss, on charges of financial misconduct at Nissan (which he denies) and its future is now in question.

The Huawei effect

Alibaba was reportedly considering a second listing of its shares, but in Hong Kong rather than New York, where its \$25bn stockmarket debut in 2014 remains the world's biggest IPO. This time it is seeking to raise \$20bn. Its decision to list in Hong Kong comes amid uncertainties over the future treatment of Chinese companies by the American authorities. Alibaba is using its profits from e-commerce to invest in artificial intelligence, quantum computing and other sensitive tech areas where America and China are competing aggressively.

The latest skirmish in the trade war saw China threaten to limit supplies to America of **rare earths**, a group of 17 metals vital to fast-growing businesses such as electric cars but also widely used in the defence industry. China accounts for the vast bulk of rare-earth production; for some of the metals it is the sole producer. In 2010 it cut exports to Japan during a maritime dispute.

Maersk, the world's biggest shipping company, gave a downbeat assessment of the effect of global-trade tensions on its industry. It estimates that container trade grew by 1.7% in the first quarter compared with the same period a year earlier. That is less than half the average for 2018.

Boeing's **737 MAX** aircraft is unlikely to return to service until at least August, according to the International Air Transport Association. A recent meeting of global safety-regulators avoided putting a date on a return for the MAX, which has been grounded following two crashes. IATA stressed that it will be regulators who make the final decision.

The Food and Drug Administration approved a **gene therapy** developed by Novartis for treating spinal muscular atrophy in children. Priced at \$2.1m, Zolgensma is the world's most expensive drug, though it costs half the current treatment for SMA over the first ten years of a child's life.

The first trial got under way in Oklahoma of a drugmaker facing claims that its marketing of painkillers fuelled the **opioid crisis**. Johnson & Johnson argues that it followed the law and has decided to fight the case. Its two former co-defendants settled with the state: Purdue Pharma for \$270m and Teva, this week, for \$85m.

Germany's unemployment rate rose to 5% in May, the first increase in five years. Most of the rise is explained by a change to the way the govern-

ment counts the unemployed, but the labour ministry said that Germany's slowing economy was also a factor.

Global Payments, which focuses on processing transactions, agreed to buy **Total System Services**, which specialises in clearing them, for \$21.5bn. It is the third big merger in the payments industry this year.

Sky broadband



After delays because of bad weather, SpaceX launched the first batch of satellites that will eventually form its **Starlink** broadband-internet network. Its boss, Elon Musk, lauded the achievement, SpaceX's heaviest payload yet. Not everyone was happy. Around 12,000 satellites will be deployed by the mid-2020s. They operate in low orbit and are brighter than expected, prompting

concerns from astronomers about obstructed telescope observations.

Arun Jaitley stepped down as India's finance minister because of ill health. Mr Jaitley oversaw many of the financial reforms introduced under the government of Narendra Modi, including a consumption tax.

Indian authorities stopped the founder of **Jet Airways**, Naresh Goyal, from flying out of the country. The government has promised to make it harder for the bosses of bankrupt companies to leave India following the case of Vijay Mallya. The boss of Kingfisher Airlines fled to London in 2016 and is fighting extradition.

In the process of finalising her divorce from Jeff Bezos, **MacKenzie Bezos** promised to give half of the \$36bn she is receiving as part of the settlement to charity. Ms Bezos made the commitment to the Giving Pledge, an initiative started by Warren Buffett and Bill and Melinda Gates through which the super-rich can donate some of their fortune to worthy causes. A contemplative Ms Bezos noted that "we each come by the gifts we have to offer by...lucky breaks we can never fully understand."



The next to blow

Brexit is already a political crisis. Sooner or later it will become a constitutional one, too

BRITONS PRIDE themselves on their “unwritten” constitution. America, France and Germany need rules to be set down in black and white. In the Mother of Parliaments democracy has blossomed for over 300 years without coups, revolution or civil war, Irish independence aside. Its politics are governed by an evolving set of traditions, conventions and laws under a sovereign Parliament. Thanks to its stability, Britain convinced the world that its style of government was built on solid foundations laid down over centuries of commonsense adaptation.

That view is out of date. The remorseless logic of Brexit has shoved a stick of constitutional dynamite beneath the United Kingdom—and, given the difficulty of constitutional reform in a country at loggerheads, there is little that can be done to defuse it. The chances are high that Britons will soon discover that the constitution they counted on to be adaptable and robust can in fact amplify chaos, division and the threat to the union.

On June 10th, three days after Theresa May steps down as Conservative leader, the race to succeed her will formally begin (see Britain section). Some of the runners, including the favourite, Boris Johnson, vow that, unless the European Union gives them what they want (which it won't), they will pull out of the EU on October 31st without a deal. The 124,000 members of the Conservative Party who will choose the next prime minister, an unrepresentative sample, to put it mildly, will thus take it upon themselves to resolve the question that has split the nation down the middle.

Worse, Britain's supposedly sovereign Parliament has voted against just such a no-deal Brexit on the ground that it would do the country grave harm. There will doubtless be more parliamentary machinations to stop a no-deal Brexit or force one through. The constitution is unclear on whether the executive or Parliament should prevail. It is unclear how to even choose between them.

Behind this uncertainty lies the fact that Britain's constitution is a jumble of contradictions scattered across countless laws, conventions and rules. As our Briefing this week describes, these can easily be amended, by a vote in Parliament or merely on the say-so of the controversial Speaker of the House of Commons—who this week vowed to stay in office in order to ensure that Parliament's voice is heard. There was a time when most British lawmakers were mindful that playing fast and loose with the rules could undermine democracy. Perhaps that is why they used to practise self-restraint. But in recent decades, when liberal democracy seemed unshakable, Britain's leaders forgot their caution. Instead, in a fit of absent-mindedness, they set about re-inventing the constitution wholesale.

Under Tony Blair and David Cameron, the Westminster Parliament ceded power to assemblies in Scotland, Wales and Northern Ireland and to the people directly through referendums. These innovations were often well-meant and, in themselves, desirable. But nobody gave much thought to the consequences for the constitution as a whole.

The resulting mess has already stamped its mark on Brexit. The referendum endorsed leaving the EU but left the details for

later. It provided a mandate for Brexit, but not for any of the very different forms Brexit can take. It is unclear how MPs should reconcile their duty to honour the referendum with the duty of each one of them to act in the best interests of their constituents. Other countries avoid that mistake. Ireland holds referendums, too. But Article 46 of its constitution is clear: the people vote on a change only after a bill has passed through the Dail with the details nailed down. Britain never thought to be so sensible.

Brexit is itself sowing the seeds of further constitutional chaos, by threatening the integrity of the union. In the elections for the European Parliament (see next leader), the Scottish National Party (SNP) won an increased share of the poll. Scotland voted Remain in the referendum, and the SNP's leaders can understandably claim that they have just won an enhanced mandate to leave the United Kingdom. Yet, at least one of the Tory leadership candidates is ruling out any further referendums.

Breaking up the union would be a constitutional nightmare—if only because no process for secession is laid down. Merely choosing to hold a second Scottish referendum could be fraught. Mr Johnson is loathed north of the border. Plenty of English voters are calling for a second Brexit referendum. Mrs May told the SNP to wait until Brexit had been resolved. Legally, could Prime Minister Johnson hold the line against a determined Scottish campaign? It is unclear.

The very act of leaving the EU would also load the constitution with fresh doubts. The Charter of Fundamental Rights, which enshrines EU citizens' rights in law, would no longer govern British courts. Some would-be Tory leaders, such as Dominic Raab, want to scrap domestic legislation that embeds those rights. If Parliament passed oppressive new laws, the courts might complain, but they could not stop it. Voters who moan about meddling European judges might start to have second thoughts. Cue calls for a British Bill of Rights and another fit of ill-considered constitutional innovation.

And that leads to a final worry. Britain's ramshackle, easily amended constitution is vulnerable to the radicalised politics produced by three years spent rowing about Brexit. Jeremy Corbyn and his colleagues on the hard left could not be clearer about their ambitions to revolutionise Britain. It is naive to think they would focus on the economy and public spending, but leave the rules alone. A Labour government under Mr Corbyn—or, for that matter, a Conservative government led by a populist Tory—would be constrained only by its ability to get its way in Parliament. Labour has already called for a constitutional convention.

Most Britons seem blithely unaware of the test ahead. Perhaps they believe that their peculiar way of doing things always leads to stability. It is indeed just possible that their constitution's infinite flexibility will permit a compromise that gets the country through the Brexit badlands. More likely, however, it will feed claims that the other lot are cheats and traitors.

Brexit has long been a political crisis. Now it looks destined to become a constitutional crisis, too. It is one for which Britain is woefully underprepared. ■



The EU's top jobs

Buggins belongs at the back

When picking leaders, Europe should put skill before box-ticking

SEEN FROM afar, Europe is shrinking and ineffective. In Germany Angela Merkel's chancellorship is winding down. Domestic woes bedevil the French president, Emmanuel Macron. Britain is leaving the EU, which is divided between east and west, north and south, liberals and authoritarians. The big centre-right and centre-left blocks are struggling, as politics fragments across the continent. If America or China wants to speak to Europe, it is less clear than ever whom they should call.

The European Parliament elections have brought yet more fragmentation, with the two main groups losing seats and their joint majority in the EU's legislature (see Europe section). Liberals, Greens and right-wing populists gained. The union today resembles a patchwork of ideological and regional tendencies (see Graphic detail). That makes the task of parceling out its big jobs extra-fiddly. There are four vacancies: the presidencies of the European Commission (the EU's executive), the European Council (its senate-like body of national leaders) and the European Central Bank (ECB) as well as the "high representative" for the EU's foreign and security policy. A convention of 2014 says the commission job should go to the "lead candidate" of the largest group in the parliament. Under an older precedent, those appointed to the top positions are meant to include representatives of all corners of the continent and of the big political families. Different permutations are lined up until, like a Rubik's cube, everything slots into place.

A more complex political landscape puts both of these conventions in doubt. The top lot in the parliament is now, as before, the European People's Party (EPP), a group consisting mainly of Christian Democrat parties. But the EPP won only 24% of the seats, which hardly justifies an exclusive claim to lead the commission. And the Rubik's routine cannot hope to capture the variety of political families and regional patterns in today's Europe. Even if a token southerner were appointed, for example,

the difference between a candidate from pro-European Spain and one from Eurosceptic Italy might be vast. If Christian Democrats, Social Democrats and Liberals all get to run things, the only slightly smaller Greens will understandably object. The cube has too many dimensions.

Perhaps that is just as well. For now, more than ever, Europe's leaders should be concentrating instead on getting the right people for the job. President Donald Trump has questioned the transatlantic alliance, tariff wars threaten Europe's prosperity, turmoil on its borders challenges its security, digital giants from China and America are dwarfing its firms, and economic stormclouds are once again gathering above the euro zone. Leading a more fragmented Europe through these difficulties—let alone reasserting its interests and relevance in the world—will require seasoned leadership.

The EU may not get it. Manfred Weber, the EPP's candidate for the commission, has no executive experience and, judging by his association with Hungary's authoritarian government, poor judgment. If he falls short, leaders may offer the ECB presidency to another German, Jens Weidmann, a banker with über-hawkish views,

to ensure that a German gets at least one of the top jobs. But that should not be a given. In a more meritocratic EU the commission presidency might go to Margrethe Vestager, the dynamic (Danish) competition commissioner. Antonio Costa of Portugal, Leo Varadkar of Ireland or even Mrs Merkel, all skilled compromise-brokers, might lead the council. At the ECB, a moderate like Finland's Olli Rehn would be better than Mr Weidmann.

True meritocracy is improbable, alas. National egos and power politics will always require some horse-trading. But as much as possible, the EU should focus on substance. From the eurozone and migration crises to the Brexit vote, the EU has had several brushes with mortality in recent years. More are doubtless to come. Its big jobs matter. Placeholders should not apply. ■



Central banks

Think bigger

To equip themselves for the next recession, central banks face a delicate task

IT HAS BEEN a decade since America's latest recession, and it has taken that long for the Federal Reserve to ask itself whether it is ready for the next one. On June 4th officials and scholars will gather in Chicago to debate how monetary policy should work in a world of low interest rates. The benchmark rate is 2.25-2.5%, which gives the Fed little room to cut before hitting zero—and less than half as much as it has needed in past downturns. As if to remind policymakers that rock-bottom rates are here to stay, the ten-year Treasury yield fell below 2.3% this week. Other central banks, many of which preside over still lower rates and weaker economies, are looking to the Fed for inspiration.

The belated battle-planning, although welcome, is awkwardly timed. Central banking is becoming more politicised. President Donald Trump has called for the Fed to cut rates and tried unsuccessfully to appoint two of his cronies to its board. Left-wingers are increasingly interested in taking charge of monetary policy. In Britain they have suggested, variously, that the Bank of England should cap house-price growth and target productivity—as if the rate of technological change were a monetary phenomenon. Central banks are often eyed as a source of cash for infrastructure investment or for fighting climate change. The European Central Bank's quantitative easing (QE), bond-buying ►

▶ with newly created money, is a source of tension between eurozone countries, helping make the ECB's leadership race even more political than usual.

Given these pressures, central bankers' caution should hardly be surprising. They surely fear that overhauling their targets and tools could lead to a free-for-all in which stability and independence give way to populist interference or even economic quackery. But that is not a sufficient reason to hold back. A worse danger is that the world faces a downturn it cannot adequately fight (see United States section). Central banks need to prepare for what is coming, by looking afresh at their targets and their tools, even as they strive to keep their independence.

Unfortunately, the outcome of the review is likely to be just a tweak to the Fed's target or its communications policy and a decision not to change to its tools. The Fed may pledge to redefine its inflation goal, of 2%, so that this applies on average over the economic cycle. Overshoots during booms would make up for shortfalls during busts. The theory is that this might help deal with interest rates stuck near zero, by boosting inflation expectations in a downturn. That would mean real rates were lower, giving the economy a boost.

However that is likely to prove too modest. Start with targets. Inflation has undershot the Fed's target 85% of the time since it was announced in 2012. Financial markets expect these shortfalls to continue for years. Investors may well ignore any new pledges from central bankers to get inflation above the target. And even if they believed the Fed, the cut in real interest rates

would be too small to offset a bad bust. In the dark days of 2009 one rule of thumb for monetary policy suggested that nominal interest rates needed to be almost minus 4%.

The tools are equally in need of an overhaul. Most central banks have three unconventional policies to stimulate depressed economies: QE, forward guidance (trying to talk down bond yields) and negative interest rates. Debate rages over the effectiveness of QE—some see it as little more than forward guidance in disguise. Yet forward guidance is not always credible, whether it is disguised or not. And deeply negative interest rates require reforms to prevent people from hoarding cash or from causing instability at banks, which will struggle to get people to pay them for taking deposits.

The federal preserve

If the reforms are inadequate, the result could be a long and ruinous slump. Avoiding that fate is worth the risks. Central banks should thus swap their inflation targets for something better—we favour a target for nominal GDP, a measure that is more closely tied to the fortunes of debtors and investors—and they should search for new sources of monetary ammunition.

Politicians will inevitably play a part in the choice of such innovations—and rightly so, because they set the framework for the technocrats. What is more, the necessary work will take sustained effort, not a single meeting. The bankers should not be cowed by the threat of politicisation. Their work is too urgent and too important for that. ■

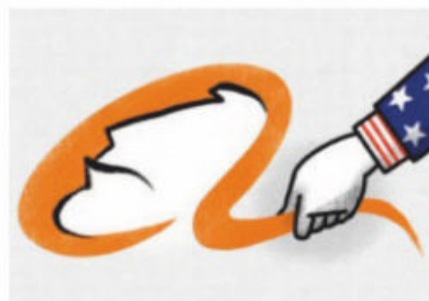
The trade war and big tech

One thousand and one sleepless nights

Alibaba's experience shows how relations between America and China have soured

IF YOU WANT to understand how cooling relations between America and China are changing global business, a good place to look is Alibaba, an internet giant. It is China's most admired and valuable firm, worth a cool \$400bn. For the past five years it has also been a hybrid that straddles the superpowers, because its shares are listed only in America. Now it is considering a \$20bn flotation in Hong Kong, according to Bloomberg. The backdrop is a rising risk of American moves against Chinese interests and the growing clout of Hong Kong's capital markets. A listing there would be a sign that Chinese firms are taking out insurance to lower their dependence on Western finance.

The world looked very different back in 2014, when Alibaba first went public. Although based in Hangzhou and with 91% of its sales in mainland China, it chose to list its shares in New York, home to the world's deepest capital markets, which also permitted its complex voting structure. Wall Street banks underwrote the offering. Alibaba's boss, Jack Ma, already a star in China, was toasted in Manhattan high society as the kind of freewheeling capitalist Americans could do business with. He was not alone: 174 other Chinese firms have their main listing in America today, with a total market value of \$394bn, including tech stars like Baidu and JD.com. A recent notable arrival is Luckin Coffee, a Starbucks wannabe, which floated for \$4bn in May (see Finance section).



As Alibaba has found, however, America has become less hospitable. The firm's profits have soared and investors have made hay. But in January 2018 Ant Financial, its payments affiliate, was blocked from acquiring MoneyGram, an American rival, on national-security grounds. In November Mr Ma's halo in America slipped when it was revealed he was a Communist Party member, like many Chinese tycoons (he is due to retire from Alibaba this year). Silicon Valley's chiefs whisper that Alibaba's global cloud

business is a threat to American interests. If Alibaba invests in startups it could fall foul of a new law, known as FIRRMA, that requires foreign purchases of "critical technology" to be vetted. The firm is not yet under attack, unlike its compatriot, Huawei, but the mood is tense.

The trade war between America and China has already spread from tariffs to encompass legal extradition, venture capital and the global dollar-payments system. It is easy to see how an American listing could become a vulnerability. If, for example, China were to boycott Apple (see Schumpeter) or Boeing, America could respond by suspending the trading of Chinese firms' shares and stopping them raising capital.

Mainland China's vast but immature capital markets are not a substitute for Wall Street. Hong Kong, China's offshore hub, is far from perfect, not least because China appears intent on gradually undermining the rule of law there. Still, it has become a plausi- ▶

▶ ble alternative venue for China's global companies. It now welcomes firms with dual-share classes after a rule change in 2018. It has expanded its role as a conduit through which mainland investors can buy shares and global investors get access to China. Last year more money was raised in listings in Hong Kong (\$37bn) than on Nasdaq or the New York Stock Exchange.

Hong Kong's rise has been accompanied by an erosion of Western hegemony in Asian high finance. A decade ago Chinese banks were peripheral. Now Wall Street firms are not as essential as they used to be. Last year seven of the top 20 equity underwriters in Asia were Chinese. Chinese banks are among the largest cross-border lenders in Asia. America still controls the dollar-payments system, but in time that could change, too.

With a Hong Kong listing, Alibaba would have another place to raise capital. It is still expanding fast—sales grew by 51% last year. New York will continue to thrive as a financial centre, even if Chinese firms start to shy away. But the bigger message is that, as the trade war rumbles on, the immensely complex global network of financial and commercial ties is adjusting. Big hardware firms are tweaking their supply chains. Retailers are shifting their sourcing so that goods sold in America are not made in China. Banks are cutting their exposure to counterparties that could face American sanctions. And even the world's most successful firms, such as Alibaba, feel they need a backup plan. It is a very different vision from the one Mr Ma stood for when he rang a ceremonial bell at the New York Stock Exchange back in 2014. ■

Brazil's militias

Fighting thugs with thugs

You cannot defeat crime by tolerating militias

JAIR BOLSONARO, Brazil's president, was elected last year on a promise to rid his country of a trio of plagues: economic stagnation, corruption and sickening violence. For residents of Rio de Janeiro, the last of these is most urgent. The number of murders in Rio state reached 40 per 100,000 in 2017, 14 times the rate in New York state. The government felt compelled to send in the army, temporarily, to quell the mayhem. Much of the city and its favelas are controlled by organised criminals, who are difficult to prosecute because residents are terrified to testify against them. Mr Bolsonaro is well aware of this. He was a seven-term federal congressman for the state of Rio de Janeiro and has deep personal ties to the city. Yet his prescription for fighting crime in Rio and places like it is clueless (see Americas section).

Instead of bolstering the institutions of law and order so that they can restore calm and prosecute gang bosses, Mr Bolsonaro thinks the way to tackle violence is with more violence. He has allowed more Brazilians to own and carry guns, encouraging them to confront criminals themselves. He also wants to make it harder to punish police officers who kill suspects. Under one proposal, a judge could suspend a cop's sentence for homicide if he acted out of "excusable fear, surprise or intense emotion". Yet how many cops do not experience "intense emotion" just before shooting someone? Unsurprisingly, the number of shootings by police has soared. In the first four months of this year, officers in Rio state shot dead nearly five people a day. That is more than all the police in the United States typically kill, while policing a population 19 times larger.

Worse, Mr Bolsonaro has smiled on militias—paramilitary groups that are often run by current and retired police officers. These mafia-like organisations now, in effect, control a quarter of Rio's metropolitan area and hold sway over a little under a sixth of its population—some 2m people. They claim to offer protection from drug gangs, and to provide services to people who live in the areas they control. In fact, they run their patch like a medieval estate, extracting money from residents with the threat of violence. Far from suppressing drug gangs, they have in some places held auctions where gangs bid for the right to distribute their wares on militia turf.

Mr Bolsonaro has done nothing to stop the militias. He has argued, ludicrously, that they prevent violence. Until last year his eldest son, Flávio, now a federal senator from Rio, employed the wife and mother of a fugitive police officer accused of leading a militia called the "Crime Office". Two of its members are accused of the murder of an opposition city councilwoman. Polling suggests most residents fear the militias, perhaps even more than drug gangs. Politicians, however, find them useful. They share loot with political patrons, shepherd their supporters into polling stations and intimidate their opponents.

This should not need spelling out, but if Mr Bolsonaro wants to reduce crime, he should not allow police officers to run their own mafia. It is hard to foster respect for the law if cops can gun people down and run extortion rackets with impunity. It is also hard to instil in the cops themselves the necessary habits of patient detective work and the impartial gathering of evidence if they can close a case simply by pulling a trigger. Evidence from around the world shows that crime is lowest when the police are trusted; when officers come from the areas where they work, know the people who live there and are not seen as the enemy.

In the past, Rio had started to do a better job of curbing gang violence. Before the football World Cup in 2014, the state government cracked down on revenge killings by cops and tried community policing. It also promised better infrastructure (such as piped water) and better services (such as schools and youth centres). The death toll declined. But then a fiscal crisis hit, the money dried up and the campaign to restore the rule of law fizzled. Now Rio has a governor who urges police to shoot criminals in their "little heads".

Bullets do not solve crimes

Ultimately, making Brazil safe will require an overhaul of its rotten, ineffectual institutions. If the government provided people with decent public services, taxed them fairly and cracked down on the corruption which keeps state spending from reaching them, lawlessness in the favelas would eventually fall. Sadly, there is little sign that Mr Bolsonaro or his trigger-happy allies have the patience for such a task. ■



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Africa's jihadist belt

Your article on the spreading jihadist menace in the Sahel, and the poor response to it by some governments, should ring alarm bells ("The West's forgotten wars", May 4th). I served with American forces in Africa in 2011. Although unquestionably competent, they were badly overstretched and, given the challenge, heavily focused on containing the chaos emanating from Somalia.

Perhaps not unreasonably, the Americans also felt that Europeans could do more; after all, the consequences of collapsing states or the unchecked rise of west African jihadist movements would be felt most keenly in Europe. That geopolitical analysis still holds good, but its salience is not felt keenly enough. Formulating a robust enough response would be a classic role for an "EU army". Britain, in or out of the EU, should be supportive of that initiative.

In addition to a military response, the West must support and help transform the governments of the region. In AFRICOM we had strong civil-affairs components but they were designed as tactical enablers, not strategic transformers of a country's polity. Moreover, we should be careful of criticising an over-reliance on sometimes ill-trained and ill-disciplined pro-government militias. Their behaviour needs to improve, certainly, but often they are the only readily mobile source of security. Their use reflects a state's limited capacity and capability, not any inbuilt malevolence.

COLONEL (RET'D) SIMON DIGGINS

Combined Joint Task Force Horn of Africa, AFRICOM, 2011
Rickmansworth, Hertfordshire

Conservative Liberals

Judging from the tone of your article previewing the Australian election ("Heated debate", May 18th) you are probably bemused as to how the Liberal coalition, with its

"reactionary" view on climate change, won the poll. Could it be that the Australian deplorables grew tired of being harangued by climate ideologues and comfortably well-off inner-city dwellers?

GEORGE KING

Melbourne

Modi must do better

I take issue with the support for Narendra Modi expressed in your letters page (May 18th). Unemployment in India is at a multi-decade high, investment has fallen, and the increased import of lentils, despite bumper domestic crops, has resulted in a higher suicide rate among farmers. These facts were overlooked by Jagdish Bhagwati and his colleagues. Nitin Mehta papered over the failures of the Modi regime; in fact, only 10% of rural electrification has been achieved in real terms.

Airing deep delusional concerns of the plight of the majority Hindus is a familiar canard. As a member of a minority community (I am a Sikh married to a Parsi), I have heard this all my life. Blaming the troubles of Hindus, who constitute 80% of the population, on half a dozen minorities is pathetic. This kind of thinking is irrational, petty, irresponsible and harmful to the sanctity of the country.

RAJINDAR SINGH
Colorado Springs

Voicing concerns on privacy

I enjoyed your myth-busting leader on the growth of voice-assistants on the internet ("How creepy is your smart speaker?" May 11th). But the dichotomy you posited between convenience and privacy is a false one and risks misleading businesses. Allowing Alexa, or any similar smart device, into our homes does not entail a tacit forfeiture of privacy. This is certainly the regulators' view. The sweeping online-privacy rules outlined in Europe's GDPR, and California's CCPA, are intended to empower consumers against Big Tech. I predict there will be

both higher fines under the new laws and even further regulations as our devices continue to get smarter. Businesses must take note: regulators have new powers and they will flex their muscles to avoid any sleepwalking into a surveillance society.

Irrespective of whether fears are overblown, what matters is that there has been a sea change in the laws and those looking to monetise big data now have a much heavier legal burden on their shoulders. Offering convenience will be no defence of overreach in the use of personal data.

RAFI AZIM-KHAN
Head of data privacy, Europe
Pillsbury Winthrop Shaw Pittman
London

Intervening in Venezuela

There seems to be amnesia about the recent history of interventions by Western powers ("How to get rid of Maduro", May 4th). Whatever the faults of Nicolás Maduro (which are many), whatever the shortcomings of Venezuela's elections (which are almost as many), and whatever the state of Venezuela itself (parlous), military coups supported by hostile foreign powers are not instruments of democracy. And they usually make bad situations worse.

Your newspaper cannot have forgotten that military intervention in Afghanistan, Iraq, Libya and Syria turned those countries into bloody quagmires. Nor that Western support for Abdel-Fattah al-Sisi's coup in Egypt has resulted in stagnation and repression. *The Economist* must also be perfectly aware of the lowlights of American policy in Latin America: Chile, Nicaragua, El Salvador, Guatemala, Panama and, under the guise of the war on drugs, Colombia and Mexico.

It is unlikely this time will be different. Perhaps the failure of the coup in Caracas has something to do with Venezuelans' view of that history.

GEORGE VENNING
London

The move from the suburbs

Charlemagne exhorted European politicians to go to the suburbs, "where the IKEAs are", to get a real understanding of where Europe's political fault-lines lie (May 11th). But although he, and Renzo Piano, may be right in thinking there is more energy in the peripheries than the centres of large cities, IKEA no longer agrees.

With the opening of its store in central Paris and plans for many more to come in city centres, IKEA is throwing its lot in with bearded cyclists and flat-white drinkers.

ANDREW GAINES
Brussels

Politics is a joke

I laughed at your take on the comedic aspects of today's politicians ("You couldn't make it up", May 18th). Another politician who should have made your list is Dilma Rousseff, a former president of Brazil. She once stated that "We are not going to set a goal. We are going to leave the goal open, but, when we reach our goal, we are going to double it." But Ms Rousseff's best one-liner came during her campaign in 2014: "I don't think that whoever might win or lose, will either win or lose. Everybody will lose."

GUSTAVO BRUGNOLI
Belo Horizonte, Brazil

Raul Labrador, a Republican congressman, told a town-hall meeting in 2017 that "Nobody dies because they don't have access to health care."

FRANK ROBINSON
Albany, New York

Allan Lamport, a mayor of Toronto in the 1950s, said, "If I'm going to be pushed off a cliff, I want to be there."

CEC JENNINGS
Toronto

Letters are welcome and should be addressed to the Editor at The Economist, The Adelphi Building, 11 John Adam Street, London WC2N 6HT
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The referendums and the damage done

Britain needs a robust constitution now more than ever. Which is a pity

AT SOME POINT in June or July roughly 124,000 people in Britain can expect to receive a ballot paper in the post. It will offer them the names of two Conservative MPs. The one they select will, shortly thereafter, enter 10 Downing Street as prime minister. The rest of Britain's 66m inhabitants will have no say whatsoever.

Britain has changed prime ministers without elections many times before. But the coming replacement of Theresa May, who announced her resignation as Tory leader on May 24th, is different. Previously the new leader would have been picked by elected MPs. But since 1998 the role of the Tory party's MPs has been to whittle the candidate list down to two. Unless one of those two then withdraws (as was the case when Mrs May was elected) the final choice will be left to the membership. A group of people more likely to be of pensionable age than not, more than two-thirds male, just half the size of Wolverhampton and far less ethnically diverse has become Britain's electoral college. "It is weird, isn't it," says

Shaun Gunner, one of the party's younger members. "My family and friends don't get to choose the prime minister. And I do."

The power that has been given to Mr Gunner and his colleagues might be less unnerving if their chosen prime minister were easy to oust, or if his or her powers were clearly and formally constrained. Neither is the case. For Tory MPs to turn on the leader their members had just given them would be a mixture of fratricide and suicide; the Fixed-term Parliaments Act of 2011 upturned established conventions on confidence votes within the Commons, leaving confusion among MPs over both how to bring a government down and what happens when one falls. And the quirks of British parliamentary procedure provide various ways in which a sufficiently bloody-minded prime minister might force a "no-deal" Brexit without a majority in Parliament. This has all the makings of a constitutional crisis.

The British constitution is unusually opaque and poorly grasped even by those

whose powers it governs: "The British constitution has always been puzzling and always will be," as the queen has put it. In normal times, this does not matter all that much. In abnormal times it does, and Brexit has brought abnormal times.

The dominant party in Scotland, the SNP, rejects Brexit, seemingly to no avail; the dominant party in Northern Ireland, the DUP, refuses the Tories' vision of Brexit but props up their minority government nonetheless. As a result legislation put together to bring about the Brexit the people voted for in a referendum has repeatedly failed to pass the House of Commons. The two big Westminster parties won less than a quarter of the vote in the European elections of May 23rd.

Such times test constitutions. The British one looks woefully hard put to pass its current test—in part because, over the past two decades, it has undergone an unprecedented spate of often poorly thought-through changes.

Beyond Bagehot

Britain is often said to have an unwritten constitution, and many Britons have blithely taken this to be something of a badge of merit, one "bestowed upon us by Providence", as the complacent twit John Podsnap says in "Our Mutual Friend", a novel by Charles Dickens. In fact most of the constitution is written down, but not all in the same place or with the same ►►

standing. Statutes such as the Bill of Rights (1689) rub up against the Human Rights Act (1998) in a manner scholars call “uncodified”, which means messy. Many of the conventions for how Parliament goes about adding to such statutes are to be found in written references, such as the works of Thomas Erskine May, a Victorian clerk of the Commons. A few, such as who the monarch calls on to form a government, are indeed unwritten.

Peter Hennessy, a British historian who sits in the Lords without party affiliation, argues that law, precedent and procedure provide a constitution which is as much a “state of mind” as anything else. For decades, the men who dominated Britain’s ruling class felt they knew what was in and out of bounds in politics just as they did in cricket. It was a constitutional approach which relied more than that of any other country, in the words of William Gladstone, on “the good faith of those who work it”. Lord Hennessy calls this the “Good Chap” theory of government.

Over the past few centuries, the Good Chaps have mostly behaved themselves. They reformed the system in which they operated rarely, piecemeal and mostly in response to strong feelings among the public. The Representation of the People Acts of 1832 (the Great Reform Act), 1867 and 1918 expanded the franchise to all men not peers, incarcerated or insane; the Representation of the People Act of 1928 saw all women enjoy the same rights. Over the 20th century hereditary peers had their powers and their number reduced.

Under Tony Blair’s Labour government this restraint disappeared. In its 1997 manifesto Labour promised to formalise the rights of the people and offer devolved power to the various nations and provinces of the United Kingdom. After referendums in Scotland and Wales a revived Scottish Parliament received significant powers, a brand new assembly in Wales rather less. The Good Friday Agreement which brought peace to Northern Ireland changed its constitutional status, too, in various ways. Later, new statutory instruments ensured that laws affecting only England had to have the consent of a majority of the MPs representing English constituencies.

The Human Rights Act of 1998 and the ratification of the European Charter of Fundamental Rights in 2000 beefed up the rights of citizens. Freedoms that previously depended on Good Chaps in Parliament became protected by increased powers for the judiciary instead. The conflict inherent in the fact that the Law Lords sat astride both parliamentary and judicial horses was resolved when their judicial role was hived off to a new Supreme Court.

Almost as striking as the breadth of the reforms was the insouciance with which they were carried out. When he recalls the

day he introduced legislation for referendums on devolution in Scotland and Wales in his memoirs, Tony Blair chirpily adds “and we announced a seven-point plan to revive the British film industry”. Richard Wilson, who was Britain’s top civil servant at the time, recalls the speed at which the legislation flew through Westminster as “breath-taking”. The hurried inception of the Supreme Court was, in the mocking words of its former president, David Neuberger, “a last-minute decision over a glass of whisky”.

When David Cameron took office in 2010 he kept up the pace. But whereas most of Mr Blair’s reforms had the legitimacy that comes from being outlined in a manifesto, Mr Cameron’s did not. They were for the most part stop-gaps to convince the Liberal Democrats to enter a coalition with Mr Cameron’s Conservatives. The Fixed-term Parliaments Act got rid of the power that prime ministers had previously enjoyed to call an election at any time, thus reassuring the Lib Dems that the Tories would not cut and run as soon as they fancied their chances. A referendum on electoral reform—only the second ever nationwide referendum—was further Lib Dem bait, though Mr Cameron led the No side and won. When faced with an SNP majority in the Scottish Parliament, Mr Cameron agreed to a referendum on Scottish independence. Again, he won.

Why did the long years of constitutional stasis come to an end? One answer is that there were fewer lessons in constitutional instability to learn from. In the 19th century Britons watched countries such as France and the United States tear themselves apart. In the first part of the 20th century, they saw the rise of totalitarianism. They recognised that the delicate British constitution had to be taken seriously, argues Robert Saunders, a historian at Queen Mary University of London.

Mr Blair and Mr Cameron, by contrast, came to power when history was said to have come to an end. They saw no need to

take particular care of the constitution. The constitution was just another archaic part of public life to modernise according to the dehistoricised dictates of the age—or to mess with for short-term advantage. Mr Cameron is said to have first hatched the idea of an EU referendum over a pizza in Chicago O’Hare airport.

The Dicey is thrown

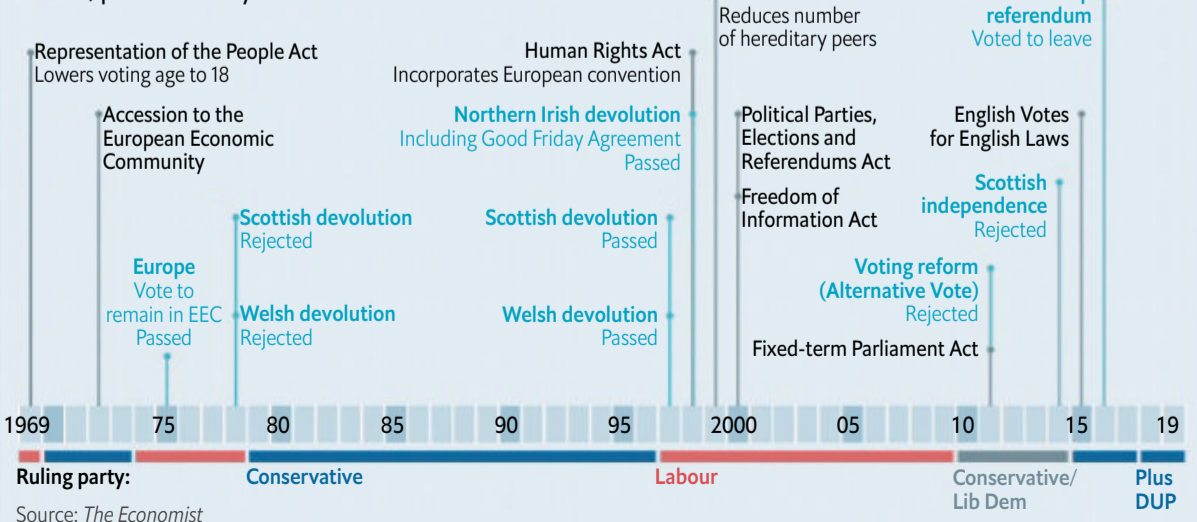
“Time and again we do constitutional change as if we were anaesthetised, and then we slowly wake up,” says Lord Wilson, the former cabinet secretary. “It is painful.” It can be worse than that. Some of the wounds left by the recent impromptu surgery are re-opened and infected by Brexit.

Take the relationship between Westminster and the devolved institutions. Instead of providing a clear differentiation of powers, devolution brought a fudge whereby Westminster would “not normally” legislate on devolved matters without permission from the relevant institutions. When the Brexit vote showed that Scotland (62% against) and England (53% for) differed on something fundamental, that fudge became inedible. Many Scots felt that Mrs May’s insistence that the United Kingdom which had joined the EU as one country would leave it as one country ignored two decades of devolution. “It is constitutional illiteracy,” harrumphs Michael Russell, the SNP’s minister for constitutional affairs. But when the question ended up with the Supreme Court, the judges ducked. The fudging convention, they ruled, was a matter of politics, not law. Keep us out of it.

Attempts to leave the EU show up constitutional shortcomings in part because membership helped to hide them. Devolved policy areas often overlapped with EU competencies, and Scotland was happier under the EU yoke than the English one. The Good Friday Agreement was made feasible by the fact that Ireland and Britain were both EU members sharing EU rules and both happy to be under the aegis of the European Court of Human Rights. ▶▶

Season of change

Britain, parliamentary events and referendums



▶ Mr Blair's government also used Europe to provide constitutional protections. Should Britain leave the EU, the Charter of Fundamental Rights, which allows judges to poke their noses into any legislation that touches EU competencies, will no longer apply. Thus Britain is shifting back from a protected constitution, in which rights are guaranteed by a judiciary, to an unprotected one where they are at the mercy of Parliament, argues Vernon Bogdanor, one of Britain's foremost commentators on the constitution. But the fact that post-Brexit Britons will enjoy fewer rights in law does not mean that judges will necessarily acquiesce in a shrunken role. Some may seek to step into the breach.

The country may thus see a new conflict over where sovereignty lies—the constitutional question which, above all others, Brexit has dragged into the light. The splendidly bearded Victorians who sought to clarify the constitution held that in the modern world sovereignty, once settled in the monarch, rested with the crown in Parliament. Parliament could thus do what it wanted, including overturning what previous parliaments had thought good. This vision offered little scope for referendums.

The only national referendum held in the 20th century was called by Harold Wilson two years after Britain joined the European Economic Community, the predecessor to the EU. Because some prominent Labour and Tory politicians opposed this, the 1974 Labour manifestos promised to first renegotiate membership and then put it to a popular vote. Two-thirds of the people voted to stay. Mr Cameron presumably hoped that his Brexit referendum would be as similar in result as it was in form.

Instead, Parliament ended up with an instruction most of its members disagreed with, but about which they seemed unable to do anything. This is not a problem with referendums per se. Other countries use them, sometimes quite liberally, without collapsing into political disorder. In Ireland, for example, the constitution, which is well codified, says that referendums are required if the constitution is to be changed. Voters choose between the status quo or a fully cooked proposal. But the British constitution, uncodified and long referendum-averse, makes no such clarifying provisions.

The decision to resort to a referendum that produced a result capable of many interpretations cannot take the whole blame for the current chaos. After all, both the Tories and Labour vowed to honour the people's revealed will in the general election of 2017 and between them they took 82% of the vote. Some of the subsequent mess rests on the back of the Fixed-term Parliaments Act of 2011. Before this a prime minister whose flagship legislation was voted down—just once, never mind repeatedly—

would have been expected to call an election. If he or she had not, a vote of confidence would have followed which a minority government would have been near certain to lose. The 2011 act replaced this convention with statute which says that a lost confidence vote triggers a two-week period during which any MP can attempt to win the backing of the Commons and form a government to avoid an election. When asked what this would actually look like, the clerk of the House of Commons responds: "I really don't know—I don't think anybody knows."

Britain finds itself in a halfway house which may be the worst of both worlds. Partial codification has removed a mixture of predictability and flexibility while providing neither certainty nor clarity in recompense. A readiness to change the constitution has provided some statutory and



legal checks and balances to rein in bad actors. Yet these new rules are weak and may encourage perverse outcomes. They have probably also lessened the expectation of good behaviour and restraint.

Such norms matter. Even countries with strong, written constitutions and clear separations of power are at risk without unwritten conventions on how that power is wielded, argue Steven Levitsky and Daniel Ziblatt in "How Democracies Die". In 1951 a jeremiad offered by Lord Radcliffe, a former Law Lord, warned of Britons "losing their character, and being left with their institutions; a result disastrous indeed." It has come to pass with the institutions in disarray.

The situation is made worse by changes within the parties. The Brexit referendum weakened the parties; the parties, for their part, have weakened Parliament. Their memberships, not their MPs, get the final

say on who leads them and thus who can become prime minister. As a result, British politics resembles a selectocracy. Rather than ending up with a leader designed to appeal to a wide range of voters, activists pick candidates who satisfy their own niche concerns, argue Frances Rosenbluth and Ian Shapiro in "Responsible Parties: Saving Democracy from Itself". Tory MPs can, under some circumstances, depose their leader; Labour ones cannot be sure of the same power. When the parliamentary Labour Party voted by 172 to 40 to remove Jeremy Corbyn in 2016, the party's members simply re-elected him to his post.

The Tory selectocrats who will choose Britain's next prime minister would, polling suggests, prefer a no-deal Brexit over staying in the EU by three to one; the electorate as a whole swings three to two the other way. The prime minister will thus have to either disappoint those who have given them their job, or those in whose name they will rule. The dodginess of the prime minister's claim to legitimacy will be seen by many in Parliament as justifying a selective approach to precedent and convention in order to thwart the prime minister's intentions.

John Bercow, the Speaker of the House of Commons and thus arbiter of its procedure, has shown an elastic attitude to what had been seen as rigid precedent. He is said to have reconsidered his previous intention to resign this summer. "The idea that Parliament is going to be evacuated from the centre stage of debate on Brexit", he said on May 28th, "is unimaginable."

The possibility of a crisis in the House, like the possibility of an outcome that ignores the wishes of Scots so blatantly as to drive them to independence, underlines what David Pannick, a lawyer in the Lords, sees as the central irony of Brexit: it at once makes constitutional reform more necessary and less likely. It is not just that "the exam paper is simply too big," as Robert Hazell, a professor of government at University College London, puts it. There are fundamental issues of trust. Though Labour and the Liberal Democrats have both pledged to hold a constitutional convention if they come to power, the chances of their creating the space for an honest debate of who has what powers, codifying their results and getting them agreed is very small—and any attempts to do so would be widely interpreted as nefarious.

The relationship between the United Kingdom's constituent countries needs to be settled. So does the position of Britain's judges and the further role, if any, of referendums. Britons must decide whether they are comfortable with a largely unconstrained executive in the gift of all-powerful party members. But without a stable constitution, in what forum can this all take place? ■

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A person is standing on the edge of a large, curved, metallic structure that resembles a wing or a bridge component. The structure is made of steel and has a series of parallel lines running along its length. The background is a bright blue sky with scattered white clouds. The person is small in comparison to the massive scale of the structure.

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Climate change and the Midwest

Soaked and less sceptical

HARDIN, ILLINOIS

Floods and storms are altering inland America's attitude to climate change

FOUR GENERATIONS of one family run Riverdock Restaurant in Hardin, a small town on a spit of wooded land between the swollen Illinois and Mississippi rivers. The matriarch is Sara Heffington, in red T-shirt and jeans. She says the Illinois river usually passes 400 feet (120 metres) from the long, ground-floor room where they serve biscuits and sausage gravy. Today water laps at the front door. She recalls a previous deluge, as they prepared to open in 1993. Back then, a levee broke and neck-high, muddy water submerged them. "That was a one-in-500-year flood," she says.

In years when lots of snow melts upstream or increasingly stormy spring rain overfills midwestern rivers, the Heffingtons get gravel from a nearby quarry, fill bags and build a defensive wall. At the moment an oozing white barrier again surrounds their restaurant as diesel-pumps spit defiant jets back towards the river.

They just about keep nature at bay, even as a fast-moving torrent almost wets the roadway on Hardin's green metal bridge.

When that closed, 26 years ago, the town was all but cut off for five months. The Illinois is likely to crest again next week, at almost the same high level. "It's starting to scare us," admits Mrs Heffington.

Asked why a one-in-500-year flood is back so soon, she first blames a recent lack of dredging and then talks of "extraordinary rains up north". She sees a long-term "cycle" as the climate changes, but "the Lord has a plan", and she doubts people affect the weather much. The youngest waitress, Skylar Giberson, disagrees with her

older relative. Denial won't do, she says. Humans and carbon emissions are changing the climate permanently. Her plan? "We should just move."

Ms Giberson, just out of high school, may be proved right. America has just notched up its wettest 12 months ever, and floods are worsening across the Midwest. In the past century annual precipitation has risen by 10% across the region, a faster increase than for America as a whole. The Great Lakes region heated up by an average of 0.9 degrees Celsius (1.6 Fahrenheit) in the 115 years to 2016, concluded scientists from the region in a report in March. That was also faster than the national trend.

Because warmer air holds more moisture (and can suddenly release it), precipitation will keep rising. A 30% increase in the region is possible this century if global carbon emissions go unchecked, according to the federal agencies who produced the National Climate Assessment (NCA) late last year. This warned that more winter and spring downpours will mean more sodden soil, leaching of nutrients and delays to farmers' planting season.

Robert Criss, a hydrogeologist at Washington University in St Louis, says rain bursts are most destructive and can "go crazy" in smaller river basins. But even huge rivers like the Mississippi can struggle with higher overall flows. Decades of building levees close to rivers has narrowed them, blocked flood plains and lifted water. No ▶▶

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▶ year has yet surpassed a huge flood in 1903, but he says the Mississippi in St Louis has reached historically high water marks in four of the past seven years.

“Rivers are being constrained like never before,” he says. The Missouri river, for example, is on average half the width of its former natural state. Narrowed channels plus rising rainfall make sudden collapses of levees more likely, such as the one that wrecked the Riverdock Restaurant in 1993, or another that struck part of Davenport, an Iowan city on the Mississippi, early in May this year. Sudden floods can “tear asphalt off roads, strip top soil away, smash grain silos”, making them more destructive than gradual ones.

As waters rise, politicians across the Midwest are starting to speak more about climate change. In part that is because several Democrats took over governors’ mansions after elections last year. By late April 24 governors, including those of industry-heavy places like Illinois, Michigan, Pennsylvania and Wisconsin, had joined an alliance of states formed in 2017 to combat climate change. Members vow to meet emissions targets set in the Paris climate accord, defying President Donald Trump’s promise to pull America out of it.

Tony Evers, Wisconsin’s Democratic governor, for example, says he has “brought science back” to his state after eight years of “climate-change deniers” under his Republican predecessor, Scott Walker. He did so because he worries about the “amount of water that’s been dumped on the state, as the crazy weather happenings continue. We’re having hundred-year floods every couple of years.” He has also beefed up the state’s once-neglected environmental agency. Illinois Democratic governor, J.B. Pritzker, declared in January that “climate change is real” and that the state’s emissions would fall by at least 26% (compared with 2005) by 2025.

Democrats are also responding to voters who tell pollsters they care more about the subject than ever. Several aspiring presidential candidates support some form of a “green new deal”. Jay Inslee, Washington’s governor, is basing his presidential run on the issue. Pete Buttigieg, from Indiana, says “climate change is happening in the Midwest now, it is not theoretical”. He says even Catholic conservatives in Indiana warmed to the topic after a papal encyclical on the environment in 2015.

Mr Trump remains as hostile as ever. The *New York Times* reports that his administration has told scientists not to include worst-case scenarios of climate change in the next NCA, due before 2022. Some were told not to make any forecasts for changes beyond 2040, when the biggest disruption is likeliest. Yet ever more voters can see what is happening first-hand.

Older polling, by Pew, had suggested

that coast-dwellers were more alarmed by climate change than those living 300 miles or more inland. But inlanders’ views seem to be shifting, too. A survey published this year by the Energy Policy Institute, part of the University of Chicago, found that 70% of Americans believe climate change is real. Nearly half are also more persuaded by warnings from climate scientists than they were five years earlier.

Many said that witnessing extreme weather events—like the tornadoes, storms and floods battering the Midwest—did most to form their views. Michael Greenstone, who runs the institute, says the Midwest is already affected by “hotter summers, and it is more challenging for agriculture”. The region’s farmers are already at the sharp end of change.

Mr Greenstone’s current research, not yet published, points to spikes in summer

temperature that could threaten the viability of the region’s two staple crops, corn and soybeans, possibly even before mid-century. Unless geneticists can develop heat-resistant strains, planting will march steadily northwards. Other researchers, at Indiana University, warned late last year that more frequent summer droughts, plus the spread of pests in warmer winters, also threaten agricultural productivity across the Midwest. One summer drought, in 2012, cost the region an estimated \$30bn.

Down by the river, there are some compensations. At Riverdock Mrs Heffington says a few tourists who come to gawp at the floods stop for a meal. Downriver at Alton, high-flood marks adorn white grain silos opposite the tourist centre. Molly Price, who runs it, says the floods at least provide a lively topic of conversation. “And then everyone talks about climate change.” ■

Recession planning

Automatic for the people

WASHINGTON, DC

If politics were no impediment, how would America fight the next downturn?

ON JUNE 1ST the expansion will pass its ten-year anniversary to match the longest on record. America’s unemployment rate is just 3.6%. But as the Republican Party basks in its good fortune in occupying the White House at such a time, economists—a doomy bunch—are suffering a sense of dread. They fear that policymakers are missing a wonderful opportunity to

prepare the country for the next recession.

No one knows when that will be. The gaps in America’s economic defences are not so hard to foresee, however. Normally, when recession hits, monetary policymakers slash interest rates in response to a downturn. With interest rates as low as they are today there is little room to do so. Legislation to provide discretionary stimulus, such as temporary tax cuts or spending bumps, can help. This has become a more important component of the response to recession in America.

Agreeing and implementing tax cuts and spending increases takes time, though, and can be undermined by partisan politicking. In 2011, for example, Republican politicians forced a fiscal policy of severe contraction on an economy that was still reeling from the deepest downturn in living memory, with the result that the recovery was probably slower than it otherwise would have been.

If politics were no obstacle, what would be the best way to respond to recessions? A group of policy wonks convened by the Brookings Institution and the Washington Centre for Equitable Growth, two think-tanks, recently proposed an array of fixes for Congress to consider. Rather than relying on politicians to do the right thing in the heat of a crisis, they reckon that America needs better automatic stabilisers, which would kick in quickly when a recession occurred and which would gradually ▶▶



► be removed when the economy was steady enough to cope without them.

Claudia Sahm of the Federal Reserve argued in favour of a payment to all Americans, to be triggered by a historically accurate and timely gauge of whether the economy is in recession. The idea is not as odd as it sounds. The payment she proposes would amount to 0.7% of GDP, around half of the typical slowdown in consumer-spending growth in a recession, and about as much as was paid out to American families as part of the Economic Stimulus Act of 2008. Perhaps the biggest innovation would be administrative, which is why the planning would need to start now.

Recessions tend to involve downward spirals of confidence and consumer spending. Separate research by Christina Patterson of the Massachusetts Institute of Technology has found that the people whose earnings are most likely to crash with the economy—young black men, say—cut their spending most sharply when their income falls. It thus might make sense to fight future recessions by putting cash straight into their wallets.

Food stamps or Temporary Assistance for Needy Families, two welfare programmes that have an immediate impact, could be made more generous in recessions, for example. Or unemployment benefits could be made more generous, or more widely available. Either step would have a more immediate effect than extending unemployment benefits for longer, which is a perennial debate in Congress.

Ignoreland

States and local governments have historically offset around a quarter of federal-level fiscal stimulus in recessions, because of balanced-budget requirements that force them to tighten their belts, meaning that stimulus from the federal government can often be counteracted at a local level. In theory states, cities and counties could draw on rainy-day funds. But although an analysis published on May 23rd by Moody's Analytics, a consultancy, found that "more states are within at least striking distance of being prepared for a moderate recession", it found that many states were not even close. One solution would be an automatic increase in federal government funds for state-level Medicaid and the Children's Health Insurance Programme, which would then free local budgets for other things.

Kevin Hassett, the chairman of the Trump administration's Council of Economic Advisers, sees merit in the idea of strengthening America's automatic stabilisers, as it can take too long to realise a recession is happening for discretionary stimulus to arrive in time. "It's a good time to think about it," he muses, recalling his own past proposals for the government to

encourage employers to share out hours rather than make workers redundant.

But Mr Hassett points out that the Trump administration's near-term agenda is already packed. He also seems sceptical about the idea that handing out lumps of cash would deliver much long-term help, pointing out that the boost to GDP may just be temporary, and then only the bill would be left. Mr Hassett argues that cuts to tax

Raising the Clotilda

Diving into the wreck

Remains of the last slave ship are discovered in southern Alabama

IT BEGAN WITH a bet. Timothy Meaher, a rich plantation owner, thought he could defy a decades-old federal ban on importing Africans as slaves. He was right. On July 9th 1860 the *Clotilda*, a two-masted schooner whose journey Meaher financed, docked in Mobile Bay. It was the last ship to bring enslaved Africans to America. Less than five years after its arrival, the Union defeated the Confederacy—which seceded from the United States to preserve slavery in the South—in America's civil war.

In her hold were about 110 men, women and children who survived a harrowing journey from Ouidah, a notorious slaving port in what is today Benin. They joined the roughly 45% of Alabama's population that was then enslaved. To escape detection, the captain burned and sank the *Clotilda* in the bay. Her bones lay undiscovered, amid mud and maritime detritus, until now.

On May 22nd the Alabama Historical Commission announced that a sunken wreck which divers and archaeologists had been examining for the past several months was the *Clotilda*. Nothing in the wreck bore the ship's name. But it matches construction and dimensional details gleaned from insurance documents; the metal and wood match historical practice; and it appears to have been burned.

What happens next is unclear. After the civil war ended many of those brought to America on the *Clotilda* wanted to return home, but could not raise enough money. Instead they bought land from Meaher and established a community known as Africatown, which today is a proud but poor neighbourhood in northern Mobile.

Around 2,000 people live there—including numerous descendants of the original inhabitants. The last survivor died in 1937. The second-to-last, Cudjo Lewis, died two years earlier, not long after sitting for a series of interviews with Zora Neale Hurston that became



Cudjo Lewis: cargo, slave, American

"Barracoon", a searing biography.

Africatown is an ageing neighbourhood, sorely lacking in private businesses. Many hope the discovery will provide a much-needed economic boost. Denizens have suggested raising the wreck and building a museum round it, though that may prove difficult: the ship is mostly buried, and the surrounding waters are alligator-ridden and dangerous.

Yet the discovery itself has moved Africatown residents, whatever ultimately comes of it. As one of them, Cleon Jones, told AL.com, a local news website, "The saga began with the voyage and the cargo of the *Clotilda*. Now, there can be an ending to the story."

rates should be kept on the table.

Some wonks still hold out hope for change in the more distant future. Fixing America's defences before the next recession looks unlikely. But if congressional staffers get to work on drafting legislation now, then when the next recession strikes it might be possible to introduce better automatic stabilisers—just in time for the recession after that. ■

The Texas legislature wraps up

Hide your crazy

DALLAS

Texan politicians put money behind moderate, sensible policies

THERE'S NO COMPROMISE in Washington right now. But the good thing is, there's compromise in Texas," says Michael Hinojosa, superintendent of the Dallas Independent School District. On May 27th Texan legislators, who meet for 140 days every other year, concluded their session, having passed several bills with bipartisan support, including ones related to public education and property tax. It was the most productive legislative session in a decade.

Much of the credit for that should go to voters in the 2018 election, who introduced political competition into the legislature, with Democrats winning two state Senate seats and 12 seats in the House. (Republicans now control 55% of seats in the state House and 61% in the Senate.) This prodded Republicans to work on issues of consequence to voters and to broker consensus. Far-right proposals on social issues that had sparked battles during the 2017 legislative session, including regulations on which toilets transgender people could use, were less frequent this spring. "The major story is what this session wasn't about, which is the conservative issues that have been bandied about for the last decade. There was a real effort to get substantive things done," says Jason Sabo of Frontera Strategies, a lobbying firm.

The chief accomplishment in this legislative session was a school finance bill, which puts \$6.5bn in new state funding towards public schools and \$5.1bn towards reducing Texans' property taxes. The additional school funding will have the biggest impact. Around 10% of American children are educated in Texas, but the parsimonious state has lagged behind for years in funding and exam results. The Republican-led legislature cut over \$5bn in education funding in 2012-13. School districts have sued the state several times for underfunding education, and they have won.

In 2017 Texas ranked 46th in the country in fourth-grade reading proficiency, down five places since 2015, according to the National Assessment of Educational Progress, which measures pupil achievement. A report by the Texas Commission on Public School Finance, released in December, concluded that the state was failing roughly four out of five Texas pupils every year, who were leaving school without the qualifications to earn a living wage. This, it said, was both a poor return on the \$125,000 invested in each pupil's educa-

tion from pre-kindergarten and a missed opportunity "to capture the tremendous unrealised potential of our Texas youth".

The new bill will increase most school districts' funding by around 5-6%, but the "systemic reforms" will matter even more, says Todd Williams, who runs the Commit Partnership, an educational non-profit, and served on the commission. These include money for full-day pre-kindergarten for poor pupils and those learning English; funds for elementary schools that elect to extend the academic year by 30 days into the summer; and a merit-pay programme that rewards top-performing teachers and those willing to work in difficult schools.

Houston, we have a solution

The bill pays school districts more for each high-school graduate who goes on to earn a higher degree or certificate, or joins the armed forces within six months. It also requires school districts to set five-year goals for third-grade (eight-to-nine-year-olds') reading and maths, broken down by race and income, and to publish results annually. "What gets measured gets fixed, and this bill will require all 1,100 school districts to hold themselves accountable to specific goals," says Mr Williams.

In an effort to appease voters concerned not just about school quality but also their

tax bills, the legislature also agreed to reduce property taxes. School districts will no longer be able to raise them above a certain threshold each year without holding a special election. Boosting education spending while thinning revenue streams is a delicate balancing act, but because the state has promised to step in and cover the cost of the tax cuts for homeowners, this should not deal a big blow to schools.

Where will the money to increase funding, while cutting taxes, come from? The Texan economy is booming, and so legislators were able to reshuffle money to fund education and tax cuts for the next two years without identifying a permanent new revenue source. "They have to count on this robust economy continuing," says Mr Hinojosa of the Dallas school district, who says that "in the short term we're better off. But I'm more worried about four or five years from now".

Texas does not have an income tax, so the state and local governments rely disproportionately on sales and property taxes. In order to ensure sustainable funding for education, the state should do all it can to prevent small amounts of money from slipping away, says Dick Lavine of the Centre for Public Policy Priorities, a left-leaning think-tank in Austin. But a couple of other tax cuts made it through this legislative session, including a bill that caps the sales tax that can be collected on purchases of boats and yachts up to 115 feet long, which will cost the state \$6.4m in forgone revenue from 2020 to 2024.

Governor Greg Abbott, lieutenant-governor Dan Patrick and the House Speaker, Dennis Bonnen, known as the state's "big three", have enjoyed mostly smooth sailing. They faced only two setbacks this session. First, although the three of them supported a proposal to increase the sales-tax rate to fund property-tax cuts, the legislature killed the idea, because it would disproportionately hurt the poor. Second, Mr Abbott's nominee for secretary of state, David Whitley, was ensnared in a scandal. Earlier this year Mr Whitley compiled a list of 100,000 people the state suspected were not citizens and encouraged local election officials to purge them from the rolls, even though some were recently naturalised. The incident prompted a federal inquiry and court battle, and Texas agreed to settle. Mr Whitley resigned after the legislature did not vote to confirm him.

Is this focus on bread-and-butter issues in the Texas legislature the new normal? That will not be clear until 2021, when the legislature next convenes. In the interim there will be another election that could further alter the state's political alignment, as more young, urban and Hispanic voters go to the polls in 2020. If this session is any guide this may make Texas politics comparatively boring—in a good way. ■



Sam's club

Female genital mutilation

The first cut

NEW YORK

Six states have criminalised FGM this year. Another nine may do so

MARYUM SAIFEE was in a college anthropology seminar when she realised she had been a victim of female genital mutilation (FGM). As a classmate described the practice, a flood of memories came rushing back. She had been seven and living with family in India for the summer while her parents stayed at home in Texas. Her aunt, a doctor, led her to a downstairs clinic, cut her clitoris without anaesthetic, and gave her a chocolate bar as a reward. “It was by far the most traumatic thing I’ve ever experienced,” says Ms Saifee, but like most survivors she never talked about it. She broke her silence only recently when she grew impatient at how few Americans seemed to know about the issue, or that it affected well-off, educated citizens like herself. “Everyone thinks this is happening somewhere far away, but it touches communities you wouldn’t expect.”

The Centres for Disease Control and Prevention estimates that 513,000 women and girls in America have either endured or are likely to suffer the procedure, which involves the medically unnecessary removal of some or all of the external genitalia. But this figure was cobbled together from immigration rates and data collected from abroad, and few believe it accurately measures the phenomenon. It is hard to monitor a secret act performed mainly in close-knit immigrant communities. Many women are too ashamed to come forward. Those who do are often shunned or accused of stoking Islamophobia.

Although Congress banned FGM over 20 years ago, the subterranean nature of the practice has made it hard to crack down on offenders. This seemed to change when prosecutors brought the first federal FGM case to trial. The Justice Department charged Jumana Nagarwala, a doctor, with cutting the genitals of nine girls, all of them members of the Dawoodi Bohra sect of Indian Shia Muslims, in a clinic in Michigan. But in November last year the judge dismissed the case, ruling that the federal ban is unconstitutional because Congress lacks authority over criminal law. Federal lawmakers had prohibited FGM as an interstate commerce under the Commerce Clause, which struck the judge as inapt. Anti-FGM advocates have argued back, pointing out that parents of girls in states where FGM is illegal specifically travelled to Dr Nagarwala for the procedure because Michigan lacked a ban. The government

Country music

Lonesome whistle

NEW YORK

Sociologists discover a rich data set

WITH ITS lilting banjo, cowboy theme and lyrics like “Ridin’ on a tractor” and “Wrangler on my booty”, not to mention an extremely catchy refrain, Lil Nas X’s “Old Town Road” should be a country-music hit. Yet it was kicked off the Billboard country-music chart for not embracing “enough elements of today’s country music”. Billboard later told *Rolling Stone* magazine that its decision to take the song off the chart “had nothing to do with the race of the artist”. Lil Nas X, the 20-year-old African-American who blended hip-hop, rock and country in his earworm of a song, does not look like the typical country star. Those tend to be white, and most are male.

One of country music’s greatest strengths is its ability to celebrate working folk in America. But that has also “been its greatest liability”, says Charles Hughes, a historian and author of “Country Soul: Making Music and Making Race in the American South”. A recent paper in *Rural Sociology*, an academic journal, examined how men talk about themselves in mainstream country music. Its



Can't nobody tell him nothing

author, Braden Leap of Mississippi State University, analysed the lyrics of the top songs on the weekly Billboard country-music charts from the 1980s until the 2010s and found that the near-routine depiction of men as breadwinners and stand-up guys has changed.

Over the past decade, more songs objectify women and are about hooking up. Mr Leap’s examination of lyrics also found that masculinity and whiteness had become more closely linked. References to blue eyes and blond hair, for example, were almost completely absent in the 1980s. In the 2000s, they featured in 15% of the chart-topping songs.

Country radio is the genre’s powerful gatekeeper. Country stations have not played Lil Nas X much until recently. Nor are they playing as many women as before. Jada Watson, of the University of Ottawa, recently found that in 2000 a third of country songs on country radio were sung by women. In 2018 the share was only 11%. Even the top female stars get fewer spins. Carrie Underwood had 3m plays between 2000 and 2018; Kenny Chesney received twice as many. A report from the Annenberg Inclusion Initiative found that 16% of all artists were female across 500 of the top country songs from 2014 to 2018.

A few black artists, such as Charley Pride, Darius Rucker and Kane Brown, have been successful. Some popular white artists have rapped on country ditties. Yet a young black man using similar imagery and sounds to those that dominate country radio stations gets little play. Lil Nas X’s “Old Town Road” remix, which features Billy Ray Cyrus of “Achy Breaky Heart” fame, has topped Billboard’s Hot 100 for eight weeks. Mr Hughes, the historian, says the fact that Lil Nas X “has had to force his way in is a real commentary on country music’s long-term racial politics, which has always had a very uneasy relationship with blackness.”

has declined to pursue an appeal.

Despite its failure, the case has helped to raise awareness of FGM and has pushed states to get laws on the books. Michigan rushed to ban the practice after Dr Nagarwala was arrested in 2017, and other states quickly followed suit. That is despite the fact that this issue, which pits people who are anxious to be friendly to Muslim immigrants against feminists, splits the Demo-

cratic coalition down the middle. Of the 33 states that have criminalised FGM, nine either passed, enacted or amended their laws this year and a further nine states are considering legislation. Because the Michigan case showed that people are willing to cross state lines to avoid arrest, lawmakers now see the need for bans in presumed low-risk states, says Ghada Khan of the US End FGM/C Network, an advocacy group. ■

Lexington | Nemesis Pelosi

The House Speaker is the best judge of whether to impeach Donald Trump



NANCY PELOSI appears to be in a somewhat contradictory position. In her second stint as Speaker of the House of Representatives, the 79-year-old Californian has won plaudits for keeping the enlarged Democratic House caucus united, passing over 100 bills in five months, and intimidating Donald Trump as no other politician has done. Remarkably, given that the Republicans have spent a decade pinning her face to a metaphorical dartboard, the president has largely refrained from badmouthing Mrs Pelosi. He is said in private to express admiration for her grip on her party. Meanwhile, Mrs Pelosi is denying a growing minority of Democratic lawmakers and more Democratic voters what they most want: Mr Trump's impeachment. This balancing act is likely to get harder after Congress reconvenes next week.

Ever since six Democratic House members drafted impeachment proceedings against Mr Trump 18 months ago, Mrs Pelosi has claimed to be open-minded on the matter, while manifestly against it. A witness to Newt Gingrich's effort to oust Bill Clinton, which led to a wave of sympathy for the president, a boost in his ratings and his acquittal by the Senate, she fears impeaching Mr Trump—a politician whose entire modus is based on grievance—could have the same effect. It would almost certainly not lead to his removal, given his own control of his party.

Hence Mrs Pelosi has offered a series of reasons to avoid pressing the button. After Robert Mueller refrained from accusing Mr Trump of the obstruction of justice that his report describes (simply because Justice Department guidelines forbade him to do so, the enigmatic prosecutor suggested on May 29th) Mrs Pelosi said that further House investigations were required. After the president began defying the Democrats' subpoenas—and last week promised to end all bipartisan co-operation while they continued their probes—she claimed Mr Trump was so obviously goading Democrats to impeach him that they must not take the bait. Yet some House Democrats have had enough of this.

Around 40 are committed to launching an impeachment inquiry into Mr Trump, the preliminary step to impeachment. As an indication of which way the party is moving, around half of the Democrats sitting on the House Judiciary Committee, which has borne the brunt of Mr Trump's obstruction, are among them, in-

cluding a senior Pelosi lieutenant, David Cicilline. Pro-impeachment groups, such as Stand Up America, which has recruited over 2m members in the past two years, are planning a media blitz in Democratic districts. At a town-hall meeting in Michigan this week Justin Amash, a Republican congressman, gave them additional encouragement by arguing that Mr Trump's "incredible dishonesty" made impeachment necessary. "I think you have to have proceedings to deter this kind of conduct," he said, before a crowd of outraged Republicans and grateful Democrats, in a state that Mr Trump won by a narrow margin.

This is liable to get ugly. Not least because most Democratic proponents of impeachment are on the left, which sees Mrs Pelosi's reticence on the issue as part of a broader want of conviction. "I think that, at a certain point, this is no longer about politics," says Alexandria Ocasio-Cortez. But that is not true. Impeachment is almost always about politics. And Mrs Pelosi, as her standing in her party indicates, is a better judge of its interests than her critics.

The decision to impeach is a political one informed by legal precedent. In other words, even when it is obvious, as in Mr Trump's case, that an official has met past impeachment standards, the Speaker is under no compulsion to impeach. Indeed, if Mrs Pelosi believes impeaching a malfeasant president would make him stronger, she is entitled to argue that her constitutional duty is not to do so. When Mr Amash accused her of "trying to play it both ways", in seeking to hold Mr Trump to account while protecting Democratic interests, he was in a sense merely describing her job. Only if Mrs Pelosi had downplayed Mr Trump's wrongdoing, in order not to impeach him, would she be failing in her duty, and she has not. She says Mr Trump is so obviously committing impeachable offences that he is becoming "self-impeachable".

Whether they know it or not, most of her Democratic critics are also making political calculations. Most Democratic voters—representing around 45% of Americans—now say Mr Trump should be impeached. And Ms Ocasio-Cortez represents one of the safest Democratic districts in the country (which, to boot, she has vowed to represent by putting a firecracker up the sort of Washington consensus-building Mrs Pelosi is engaged in). Yet to win a majority in the House, and probably also the presidency, Democrats need over 50% of the electorate, because of the uneven distribution of their votes. And Mrs Pelosi has that margin, of flakier Democrats and independents, who are much less likely to consider impeaching Mr Trump warranted or important, strongly in mind. That is why she has taken more pains to promote and mollify the concerns of the many new Democratic members elected in competitive districts last November than lefties such as Ms Ocasio-Cortez. The torrent of bills House Democrats have passed has been designed to honour promises, on health care, fighting corruption, and so forth, that these majority-making Democrats made on the trail. So far, few of them have said they want to impeach Mr Trump.

A marginal voter decision

This may well change. The Mueller report has had little impact on public opinion mainly because hardly anyone—even in Congress, according to Mr Amash—has read it. Yet in his frenzied effort to shut down legitimate congressional probes into his affairs, Mr Trump is threatening to re-enact, in plain sight, the obstructive behaviour it describes. If that starts to interest marginal voters in impeaching him, expect Mrs Pelosi to do so. But don't try second-guessing her. The Democratic Speaker knows her caucus better than her critics do. ■



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Shadow state

DUQUE DE CAXIAS

Groups of rogue police officers are terrorising the peripheries of Rio de Janeiro

LATE LAST year mysterious trucks started dumping industrial waste at a precolonial archaeological site in Duque de Caxias, an industrial city of 900,000 people some 24km (15 miles) north of Rio de Janeiro. Environmental activists thought they knew who was behind it. Over the past decade, their battle to protect local nature reserves and the poor people who live near them has become a battle against criminal groups known as militias.

Prosecutors say that from the mid-1990s these groups, often made up of rogue police officers, started snatching swampy federal land. They filled it with dirt and sold the lots to families, mostly poor migrants from other states. In São Bento, a neighbourhood in the city, a hill overlooks thousands of identical tin-roofed shacks. “The militias control all of it,” says an activist. For a fee, they provide transport, water, cooking gas, cable television and internet. But they also flaunt heavy weapons, run extortion rackets and threaten to kill anyone who opposes them.

According to an investigation last year by G1, a Brazilian news site, militias control 348 square kilometres of land—roughly a quarter of the Rio de Janeiro metropolitan

region. That territory is home to 2m people. Unlike drug-traffickers, who also control plenty of neighbourhoods in Rio, militias have close connections to the state. “They’re untouchable by the law because they themselves are the law,” says José Cláudio Souza Alves, of the Federal Rural University of Rio de Janeiro. As a congressman, Jair Bolsonaro, Brazil’s populist president, defended militias, though he is more careful now. “Where the militia is paid,

there is no violence,” he claimed last year.

Violence and politics have long been intertwined in Rio de Janeiro. In the 1950s a federal deputy from Duque de Caxias prowled around with a German machinegun. A film in 1986 romanticised his life, but historians pin several dozen violent crimes on him, including at least one murder. Brazil’s military dictatorship, which fell in 1985, used police death squads to kill political opponents (some of whom were urban guerrillas) and other unwanted people.

Militias evolved out of citizen-led vigilante groups that emerged in the 1990s to tackle drug gangs, says Mr Alves. Today they are de facto mafias. They thrive in the power vacuum of Rio’s peripheries, offering what Mr Alves calls “false security”. They are popular with politicians thanks to their talent for getting out the vote. Police officers among their members help them to thwart investigations. Their political ties help them to filch public money.

In 2007 Marcelo Freixo, then a state congressman from the left-wing Socialism and Liberty Party (PSOL), proposed a parliamentary commission to investigate militias. But it was not until 2008, after militia-men kidnapped and tortured two journalists and their driver, that politicians agreed to the inquiry. After months of testimony, the commission released a 282-page report that accused 226 people of having militia connections, including police and army officers and city and state politicians. Most were eventually jailed.

Those who avoided prison and worse—25 of those named in the report have since been murdered—shifted their



► strategy to become less brazen and more enterprising, often outsourcing violence. Duque de Caxias is among Brazil's richest municipalities thanks to its oil refinery, chemical industry and position on the highway. That makes it an attractive market for what Gabriel Ferrando of the state police's organised-crime unit (DRACO) calls the militias' "power project". They have "an absurd capacity to adapt", he says.

By contrast, the authorities are weak. A federal judge was murdered in another part of Greater Rio in 2011. A police delegation sent in February to investigate land-grab-

bing in Duque de Caxias concluded that officers could not do their work without risking their lives. According to Julio José Araujo Junior, a federal prosecutor, "our goal, frankly, is not to resolve the situation but to keep it from getting worse."

To prosecutors' consternation, the mayor's office has sought to issue titles for irregularly occupied federal land. "It's precisely this stamp of approval that the militias seek," says Mr Araujo. Locals say that after several low-lying areas in São Bento were declared uninhabitable and 300 families were promised apartments in a gov-

ernment housing project, militia members distributed the flats among families from another area, and then extorted money.

In 2016, when he was a federal congressman, the mayor of Duque de Caxias, Washington Reis, was fined by the supreme court for cutting down trees in a nature reserve in order to build an illegal housing development. He appears in Facebook photos with Chiquinho Grandão, a city councilman accused by prosecutors in 2010 of leading an extermination squad responsible for some 50 murders. Both deny militia connections. Mr Grandão laments the ►►

Bello Export or stagnate



Latin America is falling behind economically. Here's why

FORECASTERS SLASHING their predictions for economic growth in Latin America has become a depressing annual ritual. This year is no different. The IMF at first expected growth of 2%. By April that had become 1.4%. Even this may be too rosy. In the first three months of the year the three biggest economies—Brazil, Mexico and Argentina—all seem to have contracted and others performed weakly. Since the world economy has expanded relatively strongly in recent years, what this means is that Latin America is falling behind.

Of course there are some bright spots. Many Latin American economies are at least more resilient and less volatile than they were, thanks to more responsible fiscal policy. Those countries where leaders thought that prudent macroeconomic policy was for dummies—Hugo Chávez in Venezuela, Dilma Rousseff in Brazil and Cristina Fernández in Argentina—have seen slumps. But the really worrying thing is that Latin America's lagging economic performance has lasted for several decades (see chart). The gap between the region's average income per person and that of the United States is wider than it was in the 1950s. Two new studies try to explain this relative failure, and how it could be reversed.

In a paper for the Inter-American Dialogue, a think-tank in Washington, Augusto de la Torre and Alain Ize look at what distinguishes those Latin American countries whose GDP per person has grown significantly faster than that of the United States in this century. That applies to Peru, Chile and Uruguay, which are commodity exporters, and to Costa Rica, the Dominican Republic and Panama, which are service exporters. They conclude that success in international markets—as measured by a rising

share of world exports—has been the route to income convergence. That is partly because exporting is a form of learning, as other economists have noted. There is a troubling exception to this rule: Mexico has gained export share but its income has stagnated largely because the rest of its economy is so inefficient.

Counter-cyclical macroeconomic policies are crucial, too, especially in countries that export commodities, the prices of which can fluctuate wildly. But extreme income inequality and widespread poverty make it hard for Latin American governments to resist public pressure to spend during booms. This means that rather than an afterthought, good social policy should be considered a core component of economic management. Clearly, not every country can expand its share of world exports; this is especially hard when protectionism is on the rise. But Latin America has much scope to expand service exports, such as care of the elderly as well as tourism, provided it reduces crime.

Researchers at the McKinsey Global

Institute look at Latin America's lack of convergence from a different angle. Focusing mainly on Brazil, Mexico and Colombia, they identify two "missing middles". The first is a shortage of medium-sized firms. Relative to the size of the economy, Latin America has only about half as many companies with sales of \$10m to \$500m a year as a comparator group of ten emerging economies elsewhere. The Latin American ones tend to make higher profits—a sign that they face less competition.

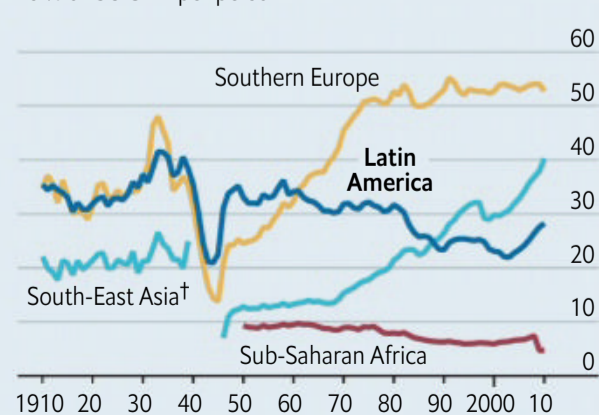
The flipside is a lack of well-paid jobs and thus "a missing cohort of middle-class consumers with sufficient income to maintain robust domestic demand", the report finds. The poorest three-quarters of Latin Americans account for just 40% of total consumption, compared with two-thirds of consumption in the comparator group. Lack of consumer demand deters firms from investing.

Unless Latin American businesses become more productive, the region's outlook is dim. According to McKinsey, 72% of the region's economic growth between 2000 and 2016 was owing to the expansion of the labour force rather than higher productivity. Latin American women now have fewer babies so the labour force will soon stop growing.

Two political lessons stand out. The left should understand that fiscal discipline and exports are vital to achieve sustained income growth. But the right needs to learn that monopolies hold back economies, that workers should share in productivity gains and that taxes should be adjusted so that they do not fall disproportionately on consumption rather than income. Otherwise Latin America risks being trapped in a vicious circle of economic stagnation and social and political conflict.

Going south

Average regional GDP per person*
As % of US GDP per person



Source: Maddison Project Database

*1990 constant \$
†No data for 1940-45

► waste-dumping and land-grabbing in São Bento, but blames it on the mayor's office. He says he has "never heard about militias" there. The mayor's office argues that giving out titles deters illegal construction.

Militias in Duque de Caxias have also been accused of stealing sand (for building work) and petrol from government pipelines. On April 26th a leak from an illegal tap left a nine-year-old girl with third-degree burns; she died in hospital. Militias in some places hold auctions where drug gangs bid for the right to sell their wares on militia turf. In Nova Iguaçu, a city that borders Duque de Caxias, militiamen recently started extorting money from taxi drivers. The drivers were already paying off drug dealers and corrupt cops. "So who do you report it to?" one driver asks.

The government's plans may end up strengthening militias. Sérgio Moro, the justice minister, has introduced a bill that would shield from prosecution police who kill criminals because of "excusable fear, surprise or intense emotion". Mr Bolsonaro has expanded the right to own and carry guns, suggesting people need them to protect themselves from criminals. "We're returning to the origin myth that fuelled the militias," says Tarcísio Motta, the leader of PSOL in Rio's city council.

However, the militias' links with Mr Bolsonaro's government may provoke a backlash. There was an outcry after the murder in March last year of Marielle Franco, a city councilwoman from PSOL. In March two former cops were arrested for her murder and accused of belonging to a militia in Rio's West Zone. One lived in the same condo as Mr Bolsonaro; his daughter had dated the president's son. Another of Mr Bolsonaro's sons, Flávio, a senator from Rio, employed the wife and mother of a fugitive police officer accused of leading the same militia. Flávio and the aide who hired them are under investigation for money laundering, involving real estate deals. On May 29th President Bolsonaro's wife's uncle was arrested on suspicion of ties to an allegedly land-grabbing militia near Brasília. All deny wrongdoing.

Mr Ferrando of DRACO admits that militias were "not a priority" in the past. Now, he says, police, prosecutors and regulatory agencies will use lessons from Brazil's Lava Jato anti-corruption investigations to attack the militias' economic activities. This "follow the money" strategy will be put to the test in Muzema, a favela in Rio's West Zone where two apartment buildings collapsed in April, killing 24 people. The illegal properties had been built by the militia thought to be responsible for Ms Franco's murder. In the days after the tragedy, relatives watched as firefighters pulled bodies from the rubble. The sound of their pneumatic drills blended with those at new construction sites all around. ■

Mapping favelas

Terra cognita

COMPLEXO DA MARÉ

A new census shows how a favela really works

AS YOU WALK down Rua Teixeira Ribeiro, a commercial avenue in the Complexo da Maré, Rio de Janeiro's biggest favela, you barely notice the open-air drug markets guarded by teens with AK-47s. There are also pet stores with exotic fish, restaurants with better service than most Copacabana bistros and a hipster barbershop with mood lighting and retro décor. And now, for the first time, they have been counted. An unofficial census conducted by more than 100 local people over a period of six years found that the Maré includes 660 bars, 307 beauty salons, 138 supermarkets, 69 computer stores, 21 ice-cream shops and 8 dental offices. In total, 3,182 licit businesses employ 9,371 people.

The census was organised by two NGOs, Redes da Maré and Observatório de Favelas. Later this month they will publish a 112-page book of their findings. The idea is to put a part of the city that until recently was mostly uncharted onto the map. Despite being home to some 140,000 people, roughly the same as the more famous Copacabana, this informal settlement was a blank spot on Google and city maps. Such invisibility "makes it easier for the government and society to treat favela residents like they don't exist", says Everton Pereira da Silva, one of the census-takers. His grandfather moved to the favela in the

1960s from Brazil's north-east and worked on its electricity grid; now he is working on its informational grid.

The national government conducts a census, too; the most recent was in 2010. But its universal survey had only a couple of dozen questions. The unofficial census, led by Dalcio Marinho, a geographer, and Eliana Sousa Silva, the founder of Redes, had many more and reached 93% of Maré residents. Some results were expected. Some 26% of Maré residents were born in Brazil's north-east, 62% identify as black or mixed-race and 60% root for the football team Flamengo. But others have spurred the government to tackle problems it had long overlooked—for example, proof that the Maré has lots of children skipping classes has helped convince the city to build 25 new schools.

The data created by the mapping have been shared with Google, and now the Maré's streets and businesses are visible online and recorded by the city government. In 2016 more than 530 street names entered the official register, the largest collection in history. Their residents gained postcodes, which enabled them to sign up for bank accounts and receive letters.

The results illuminate how the favela's economy works. Around 13% of businesses close each year but owners often start new ventures. The Maré has no physical bank, so startup capital usually comes from savings earned from jobs in the formal economy; only 15% of favela entrepreneurs have any debt. Businesses that are obsolete elsewhere thrive. Getúlio Tolentino, who runs a DVD-rental shop for some 6,000 clients, benefits from the fact that newly ubiquitous Wi-Fi is still too slow for streaming. (He also has a side business, selling sex toys and providing "erotic lessons".)

Similar mapping projects are now taking place in more than 200 of Rio's 1,018 informal settlements, home to 23% of the city's population. The hope is that they can bring about similar changes. But although counting encourages the government to pay attention, it cannot restore order. On May 6th police helicopters started shooting over the Maré just as children left schools. In the first four months of this year, cops in the state gunned down 558 people. A city councilwoman, Marielle Franco, the first person elected to office from the Maré, was murdered last year.

At the Museu da Maré, a humble institution housed in an old ship-building factory, exhibits show how life has improved. There are *pula-pulas*, barrels once used to haul water from the nearby Guanabara Bay. Nowadays 98% of residents have running water. Each year more attend university. "We thought the violence would disappear once we got electricity, water and trash collection, but we were wrong," says Lourenço Cezar da Silva, the museum's director. ■



In for the count



The death penalty in Pakistan

The ultimate wrong

ISLAMABAD

Miscarriages of justice are breathtaking in their frequency and cruelty

THE DAY Ghulam Qadir and Ghulam Sarwar were acquitted of murder after a miscarriage of justice should have been a moment to celebrate. The brothers had been awaiting execution for over a decade, only for the Supreme Court belatedly to quash their case. Eyewitness testimony against them was shaky and the prosecution case flimsy, the justices declared. Yet when officials sought to bring the pair the good news, they had a shock. They had been hanged a year earlier. No one had told the court or their lawyer.

This combination of injustice and incompetence is common in capital cases in Pakistan, a new report argues. Two NGOs, the Foundation for Fundamental Rights, which is based in Pakistan, and Reprieve, based in Britain, have studied the 310 known cases in which the Supreme Court reviewed death sentences between 2010 and 2018. They found that the justices revoked 78% of them. About half of those overturned ended in outright acquittal. The rest saw sentences commuted or a review initiated. If these proportions hold for Pakistan's 4,700 death-row prisoners, some 1,800 should be set free. As many should have their sentences commuted or

their cases retried or reviewed. But such reprieves do not come quickly. The average death-row prisoner spends ten years under threat of execution before the case reaches the Supreme Court.

The country's highest judges often complain that lower-court convictions rely on dubious "eyewitness" testimony. Sometimes it is directly at odds with the physical evidence. Particularly suspect are "chance" witnesses—people unrelated to killer or victim who, prosecutors claim, happened to observe a murder or other crime by coincidence. These witnesses often give evidence deemed clinching even if there is no proof they were present when the crime was committed. Such witnesses are sometimes people known to bear a grudge against the accused.

The Supreme Court also often questions the reliability of the police. Corrupt cops have been found not only to tamper with (or concoct) witness statements, but also to plant evidence and collude with victims or their families. Confessions are often extracted by beating.

Blundering and inconsistency are also rife. Bungled identity parades, in which the police do not stick to required procedures,

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undermine even cases in which credible witnesses identify culprits. The lower courts can be arbitrary, too. Evidence strong enough to send one suspect to the gallows, for instance, is deemed too weak to convict his co-accused.

Then there is the question of which offences merit execution. A total of 27 crimes can lead to a death sentence, ranging from murder, treason, kidnap and drug smuggling to blasphemy. But many Pakistanis are put on death row for crimes the highest court does not believe warrant execution. Over the nine years the NGOs looked at, the court did not uphold a single death sentence for a non-lethal offence. Even for murders, it appeared to favour life sentences for all but the most heinous. Yet lower courts often impose death sentences for drug crimes, for example.

Supreme mercy

More than 500 people have been executed since 2014 (pictured is the central jail in the north-western city of Peshawar, where some of the hangings took place). And yet the Supreme Court seems ever more sceptical about capital cases. In 2018 it upheld the death penalty in just 3% of those it reviewed. Among the death sentences it overturned was, most famously, that imposed on an alleged blasphemer, Asia Bibi, which it said was based on "concoction incarnate". Amnesty International, a London-based watchdog, has recorded a drop in recent executions, from at least 87 in 2016 to 60 in 2017 and 14 in 2018. Yet Amnesty recorded at least 360 death sentences handed down in 2016, over 200 in 2017 and ►►

► upwards of 250 last year.

Concerns about the use of the death penalty are long-standing. The Pakistan Peoples Party (PPP), in power from 2008 to 2013, introduced a moratorium on executions in 2008. But the Pakistan Muslim League Nawaz, which defeated the PPP in the election of 2013, pledged to lift the moratorium to tackle a tide of crime and militancy. Indeed, it did so just days after an attack in 2014 on the Army Public School in

Peshawar, where the Taliban killed more than 140 people, including 132 children.

In their new report the NGOs argue that Pakistan's capital-punishment regime is so broken that the government elected last year, led by Imran Khan, the prime minister, should impose another moratorium immediately. He seems unlikely to listen. That leaves it to the Supreme Court to temper some of the injustices of the judicial system over which it presides. ■

his state. But Mr Modi's majority proved so big that he has no need of Mr Reddy, even if the young politician did indeed sweep the polls in his own state (where the BJP hardly bothered to campaign).

Most shocking of all was the BJP's successful invasion of West Bengal, a state with 100m Bengali-speaking people, nearly a third of them Muslim, who have traditionally favoured local parties. Its fiery chief minister, Mamata Banerjee, had been a thorn in the side of Mr Modi, accusing him of lying, cheating and sowing sectarian division. The BJP fought back with all its formidable logistical and financial might. Its party workers are said to have been paid three times what Ms Banerjee offered.

Not only did the BJP take an unprecedented 18 of the state's 42 parliamentary seats. Disturbingly for Ms Banerjee, it won 57% of the Hindu vote, up from 21% five years ago, suggesting that Mr Modi's tactic of stirring fear of Muslims, and calling critics "appeasers", had worked. Ms Banerjee's party now looks uncomfortably like the Muslim front that the BJP had unfairly said it was. More dismaying still, dozens of its elected officials are defecting to the BJP.

Even without its coalition partners, the BJP now controls 303 of the Lok Sabha's 543 seats. Despite such dominance, India's peculiar constitution still denies the BJP a majority in the 245-seat Rajya Sabha, the upper house of parliament, where indirectly elected members serve six-year terms that expire not all at once, but in a complex bi-annual rotation. Congress, despite its diminished strength, still has enough residual clout in the chamber to block legislation. But with numerous seats due to fall vacant, the reckoning is that the BJP and allies should acquire a full majority ►►

Politics in India

In need of a hand

DELHI

It has been a grim five years for the Congress party. Can it recover?

WHAT COULD be worse in politics than for a governing party to lose four-fifths of its seats in a single election? Try spending years clawing your way back to relevance, only to see your rival do even better in the next poll. And what could be worse than that? Ask India's Congress party. Pummelled by the upstart Bharatiya Janata Party (BJP) in 2014, and trounced again in a marathon general election that wrapped up on May 23rd, the grand old party that dominated Indian politics for a generation after the country gained independence in 1947 is now in even deeper trouble than it was five years ago.

With Congress's rank and file demanding accountability for the party's defeat, its president, Rahul Gandhi—who lost his own traditional family constituency—has sworn to resign. But the Nehru-Gandhi family has dominated Congress for five generations, and many wonder who else can hold it together. Seeking patronage, smaller, allied parties are drifting towards the orbit of the prime minister, Narendra Modi, and his BJP, which is actively sniffing out potential defectors. Small wonder they are attracted. In constituencies where it faced Congress in a straight one-on-one race, the BJP won 92% of the contests.

Already reduced to a rump opposition in India's capital, Congress now risks losing remaining provincial toeholds. Along with allies, it controls just six of India's 31 states and territories. Local elections in four of them—Rajasthan, Madhya Pradesh, Chhattisgarh and Karnataka—had only recently brought Congress to power. But voters seem to feel differently about state and national elections. All four states have just voted overwhelmingly for the BJP. Congress must now struggle to keep its tenuous hold on its handful of state assemblies as the BJP tempts its legislators with money or future cabinet posts. Without weight in

the states, Congress's sources of income and influence would shrivel.

It is not just Congress that is hurting. The just-concluded elections to the Lok Sabha, or lower house of parliament, saw the BJP make deep inroads in states that had been seen as resistant to its charms, because they either had strong local parties or felt culturally distant from its emphasis on the Hindi language and a narrow version of Hinduism. Even politicians who had been friendly to Mr Modi, such as the powerful chief ministers of Telangana and Odisha, found his party eating away at their electoral bases. In Andhra Pradesh a rising political star, Jagan Mohan Reddy, had signalled willingness to join a BJP-led coalition. His plan was to extract concessions, including more central revenue for



Down but not entirely out

▶ in the Rajya Sabha sometime towards the end of 2021. At that point, Mr Modi will be able to legislate at will.

Whether untrammelled power in the hands of such a politician proves good for Indian democracy remains to be seen. Many Indians relish the idea of a muscular leader with a proven record of pushing far-reaching change. In the past five years, however, many of the balancing institutions that temper overzealous governments, such as the press, courts and regulatory bodies, have come under pressure to bend to Mr Modi's will. Despite the impres-

sive scale and enthusiasm of elections, Indian politics remains less than honest or efficient. Among incoming MPs in the Lok Sabha, some 29% have criminal cases against them serious enough to merit five years in prison, up from 21% in the outgoing parliament and 14% in the one before.

This trend is not encouraging for India, but it may be consoling for Congress. The growing number of criminals in office shows that the cost of entry into politics is rising. This makes joining a party such as Congress, with a long-established brand, more attractive than starting a new one and

campaigning to establish its name. After all, despite winning a mere 52 Lok Sabha seats, Congress did win some 125m votes, around 20% of the total. It is still a big fish among the opposition minnows, and the only likely rallying point for a serious challenge to the BJP. The party may also note that in numerous constituencies across the country, the BJP won by pluralities solely because the opposition failed to stitch together timely alliances to fight Mr Modi. Perhaps Congress will learn such lessons and play better next time. But just now 2024 looks an awfully long way away. ■

Banyan What makes you “kkondae”



A new word for “condescending geezer” reveals a lot about hierarchy in South Korea

DO YOU FEEL that nobody around you shares your commitment to work? Do you offer unsolicited advice on the fashion choices or love lives of your younger colleagues? Are you irked when a junior office-mate fails to fetch you coffee? Beware: you are well into *kkondae* territory. South Korean youngsters suggest that you engage in quiet reflection to help you overcome your inflated sense of self-importance. You have to earn their respect. You cannot take it for granted just because you are older.

Kkondae is a modern word of uncertain origin—perhaps an adaptation of the English word “condescend”. It means an older person, usually a man, who expects unquestioning obedience from people who are junior. A *kkondae* is quick to criticise but will never admit his own mistakes. He retaliates against people who challenge his authority. South Koreans apply the word to everyone from narcissistic bosses to overbearing uncles and corrupt politicians. There are websites offering tests of *kkondae*-ness and tips on how to avoid the condition. A television channel recently dedicated a talk show to discussion of it.

South Korea is notorious for its suffocating workplace hierarchies based on age, sex and length of service. Many South Koreans are outraged when younger colleagues or relatives fail to use the correct honorific to address them. It is difficult for office workers to decline invitations to after-work drinking sessions or weekend hiking expeditions with the boss. During the lunar new year and autumn harvest festivals, women grudgingly spend days cooking and cleaning at their husband's parents' homes, with no help from the men. “I have to help my mother, and my brother just sits there doing nothing,” says Park

Ji-soo, a 24-year-old student. “Everyone thinks this is completely normal.”

However, the popularity of *kkondae* as an insult is a sign of change. Open rebellion against hierarchical strictures is still rare and frowned upon. But young people are beginning to question authority. Ms Park says she stands up to her brother, if not her older relatives. Women report that they feel a bit less pressure than before to defer to men. Mothers can even persuade their husbands to hold their babies in public and (less frequently) to help with housework. Some youngsters, nudged along by the recent introduction of a 52-hour legal limit to the work week, are starting to say “no” to boozing after work. In private they are also paying more attention to their individual needs and less to gaining society's approval, says Cho Han Hae-joang, an anthropologist at Yonsei University in Seoul.

Education partly explains this shift. Younger people tend to have more of it than their elders. That gives them greater power to challenge the *kkondae*, says Moon Seung-sook of Vassar College in America.

But like their peers elsewhere, young South Koreans also feel insecure. Lee Do-hoon, a sociologist also at Yonsei University, thinks that those who have come of age in the past two decades have a sense of precariousness because of the Asian financial crisis of 1997-98 and the global one a decade later. They fear that even a good education will not guarantee them security or status. That makes them chafe all the more at a social order which some think is rigged against them.

South Korea's evolving political culture has been making an impact, too. Since democracy began to take hold in the country in the late 1980s, belief in universal rights, including people's right to be treated equally, has become stronger. This has encouraged people to question their deference to others. The death of 304 people when a ferry sank five years ago also caused soul-searching about the dangers of blind obedience. Most of the victims were high-school students who drowned after following instructions to stay put (most crew members abandoned ship early on). The government's botched response to the disaster triggered mass demonstrations which led to the impeachment and conviction for corruption of Park Geun-hye, who was then South Korea's president.

An ancient culture of authority is unlikely to disappear overnight. Young people are becoming more willing to challenge hierarchy, but what will happen as they get older? Some of today's young upstarts will not achieve the success they dream of. They may find themselves yearning for the kind of deference their elders once automatically enjoyed. Today's *kkondae* critics may grow up to be *kkondae* themselves. But whether tomorrow's young people will let them get away with that is doubtful.



Politics in Papua New Guinea

A departure unmourned

Massive energy deals trigger the resignation of a prime minister

POLITICAL TRANSITIONS are rarely plain sailing in Papua New Guinea (PNG). The country's prime ministers like to cling to office regardless of mass desertions of their political allies to their opponents' side. Its parliamentary speakers defy the rules to keep their jobs. Governments sometimes put pressure on the judiciary and office of the governor-general to help them stay in power. So it was in 2011 during the political turmoil that eventually resulted in Peter O'Neill taking over as PNG's prime minister. And so it has been again recently, as he has fought to keep his job. Finally, on May 29th, he tendered his resignation to avoid the humiliation of defeat in an impending vote of no-confidence.

While in office Mr O'Neill presided over a boom in the export of minerals. A \$19bn project, launched in 2014, involved the extraction of liquid natural gas in the Southern Highlands, a province. It is the biggest ever private-sector investment in PNG. But Mr O'Neill's opponents say it has brought little benefit to local people. Paul Flanagan, a former treasury official in PNG, says the country's living standards have been falling in the past five years.

A no-confidence motion against Mr O'Neill was originally due to take place in February. But he avoided it by declaring a three-month suspension of parliament. In April discontent grew over another natural-gas deal, worth \$13bn, with ExxonMobil, Total and Oil Search, a local firm in which the government has a big stake. Some politicians alleged that its terms were too opaque, and appeared to favour the foreign companies. Some of Mr O'Neill's cabinet colleagues agreed. First the finance minister, James Marape, resigned. Others soon followed.

On May 7th Mr O'Neill suspended parliament for another three weeks. When it reconvened it became clear that he could no longer stem the tide. By resigning before the no-confidence motion, Mr O'Neill allowed ministers and pro-government legislators to regroup behind Mr Marape as his replacement. Mr Marape won the resulting election by 101 votes to eight. He is unlikely to push for big changes in policy.

Australia may have reason to miss Mr O'Neill. He won much favour there for accepting unwanted seekers of asylum in Australia, many of them from war-afflicted regions, on a remote island. Other countries will wonder how the leadership

change in PNG will affect their interests. Both China and America have been trying to court favour there to strengthen their influence in a region of strategic importance. They have been pouring money into infrastructure. America has pledged to help rebuild a mothballed naval base.

But Mr O'Neill's departure will be little mourned at home. He came to power in 2011 pledging to fight corruption. There has been little progress. His remote, mountainous country remains mired in poverty. Nearly 90% of its 8m citizens live in rural areas. Many of them are subsistence farmers with negligible access to state services. His successor faces a colossal challenge. ■



Local government in Japan

No contest

SUZUKA, MIE PREFECTURE

Local assemblies are running out of members—and voters

ARMS ALOFT, Noriko Suematsu three times chants her victory cry: “Banzai!” She has just won a third consecutive term as mayor of the city of Suzuka in Mie, a prefecture in central Honshu, Japan's main island. To pose for the cameras recording her triumph, she is given a lobster and a red sea-bream—auspicious celebratory props often used by politicians. This time is different from her two previous wins. “It was my first time winning the race uncontested,” she confesses. “It felt strange.”

Odd perhaps, but such walkovers are far from uncommon. In the most recent nationwide local elections, held in April, 30% of city mayors ran uncontested, up slightly from the previous poll in 2015. A whopping 45% of mayors in towns and villages were elected unopposed. A record number of local-assembly members, elected in each

municipality, also won seats with zero votes. In some rural areas there were more assembly seats than candidates.

The number of uncontested races has been climbing since the early 1990s, particularly in the countryside. One reason is that the population is falling and the pool of candidates is shrinking. The National Institute of Population and Social Security Research, a government think-tank, reckons about 95% of local municipalities will have fewer residents by 2045. Already, 80% are experiencing declining populations.

At the same time, interest in local elections is sagging. In the 1950s more than four-fifths of the electorate would vote in local races. But in April turnout sank to record lows, under 50%. Voters have been put off by frequent scandals, from petty corruption to sexual harassment. Moreover, “people don't understand what these local lawmakers do,” says Ken Victor Leonard Hijino of Kyoto University.

Despite a small increase in young and female lawmakers—like Ms Suematsu, who is in her forties—local politics is still dominated by old men. “In these municipalities, candidates are so old they have a hard time putting up election posters,” says Shigeki Uno of the Nippon Institute for Research Advancement, another think-tank. Indeed, three-quarters of town and village assembly members are over 60. The oldest, aged 91, holds a seat on a city assembly in Shizuoka, in central Japan.

Young people are loth to stand because local politics is not a financially rewarding profession. The law bans assembly members from holding other jobs concurrently. Their pay averages around ¥300,000 (\$2,740) a month, hardly enough to support young families. “It's basically a job for the retired,” sniffs Mr Uno. And for little pay, the workload is onerous.

There has been talk of allowing local lawmakers to hold second jobs and to convene meetings out of office hours. Some towns have raised wages. One almost doubled salaries for assembly members under 50, from ¥180,000 a month to ¥300,000. A couple of depopulated villages on Shikoku island are thinking of abolishing the elected assembly in favour of a system of direct democracy based on referendums.

None of this on its own, however, seems likely to end the spate of uncontested polls. “We need to spread the word about the appeal of being involved in local politics,” says Ken Nakamura, a former mayor who now leads Waseda University's Research Institute of Manifesto. Local politicians have a lot of say in policies relating to everything from child care to road safety. He hopes that, when children are asked about their dream job, more of them will say “politician”. That might make Japan unique. At least it might encourage more to become voters when they grow up. ■



Personal bankruptcy

A way out

BEIJING

China is clamping down on people who default on their debts. It should accept that some of them also need help

THE CASE of Mr Ke, a carpenter from the eastern city of Taizhou who fell deep into debt, may one day be noted in histories of China's financial evolution. On May 9th a local court announced that it had arranged for Mr Ke's liabilities to be written off. This was made possible by what state media described as the country's first ever regulations concerning the clearing of personal debt. Sadly, for now, they only apply in Taizhou.

Mr Ke—the court did not reveal his full name—had fallen victim to fraud eight years ago. By last year the 54-year-old's debts totalled 480,000 yuan (\$70,000), owed to three banks. But the court took account of Mr Ke's predicament. He has no income, a home with only one room and less than 100 yuan in savings—the equivalent of what he would earn in under seven hours on the local minimum wage.

In America, Europe and many other countries Mr Ke's problems would have been swiftly handled according to national regulations on bankruptcy. China, however, still has no such rules for discharging

penniless people's debts. Officials in Taizhou say Mr Ke is the first beneficiary of a procedure the city's own judiciary devised for dealing with such cases. It is modelled on China's law relating to the winding-up of insolvent firms.

For an individual in China, it is easy to fall into debt without being spendthrift. Most at risk are the many millions of people who run small businesses. They often have to give a personal guarantee for their business-related borrowings. Medical bills are another common cause of ruin, as are natural disasters. After an enormous earthquake in the south-western province of Sichuan a decade ago, thousands of families who had lost their homes were asked to pay off their mortgages.

In recent years easier access to consumer credit has been creating new risks for

many people. The Chinese government has been cautiously promoting such borrowing because it wants people to spend more and thereby give the economy a boost and reduce its reliance on investment. The amount of household debt in China was about half of its GDP at the end of last year, up from less than one-third in 2013. In America the ratio of such debt to GDP is a little over 75%. China is catching up fast as its citizens make increasing use of mortgages, credit cards, bank loans and online lenders of varying repute. There may be much lending through the internet that is not captured by official statistics.

Debtors who cannot keep up with payments can face horrors. First, there are the debt collectors. Agencies that employ them are becoming more professional. But late payers are still prone to abuse, especially if they have borrowed from shady people. State-controlled media say the collectors' tactics have included threatening debtors with red liquids while claiming to have HIV. Two years ago a 22-year-old man was jailed for life after stabbing and killing a collector who, he alleged, had exposed himself to his mother (after an outcry, his sentence was cut to five years). Some collectors have worked out how to track their targets by hacking their instant-messaging apps. In February police said they had arrested a man who was selling people's locations for one yuan per pinpoint.

Then there are the lenders themselves. Disreputable ones have required borrow- ▶

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ers to surrender the contacts stored on their mobile phones, so that family and colleagues can be hassled if payments are missed. Others have asked female borrowers to submit photos of themselves with no clothes on, to be released if they default. Reports abound of suicides by women in debt who fear being subjected to such humiliation. Some have been forced to provide sexual favours in return for having their photos kept under wraps.

The government could do more to reduce unnecessary suffering. It is already trying to educate the public about the risks of borrowing and to eradicate the most shady lenders. But a personal bankruptcy law is also urgently needed. Reformers had hoped to create one during an overhaul of China's corporate insolvency laws, which was completed in 2006. In the end lawmakers balked, fearing it would encourage the country's legions of debt-dodgers. Such people could easily hide assets from creditors by transferring them to friends and relatives, or by means as simple as burying their cash.

Since then, however, better property-registration systems have made it harder to conceal the ownership of assets. The spread of non-cash payment services has enabled people's spending to be tracked more readily. The growth of credit-rating services has given lenders more confidence that those with bad histories can easily be identified.

Lately the government has introduced tougher measures to make sure that individuals and legal representatives of businesses comply with court orders to repay debts. It is placing defaulters on blacklists. Those named are barred from taking flights or high-speed trains, staying in luxury hotels or sending their children to fee-paying schools (because, if they have money to spend on such things, they should be using it to service their debt). They can also be denied certain kinds of business licences and some state-sector jobs. In 2017 a county in the eastern province of Jiangsu introduced automated messages that would be heard by people who made phone calls to blacklisted debtors, telling them to "urge the person to fulfil his legal obligations".

Many people support the use of these sweeping and intrusive sanctions. However, honest-but-unlucky people whose borrowings are genuinely unmanageable urgently need help getting out of their predicament. The supreme court reckons that, in nearly one-fifth of civil and commercial lawsuits that are dealt with by courts, defendants are incapable of paying the sums required of them by judges.

Introducing a personal bankruptcy system would help those who need a respite as well as reduce financial risks, says Li Shuguang of the China University of Political Science and Law. It might also help the

economy by getting people swiftly back into business. An opportunity could arise in June, when lawmakers in Beijing will start discussing yet another round of changes to the country's corporate bankruptcy law. Legal scholars hope that regulations concerning personal bankruptcy can be bundled with these amendments. Otherwise a separate law will be needed, says Chi Weihong, a lawyer and former judge. That could take several years.

The government seems unsure what the scope should be of any rules on personal bankruptcy. Should they apply to overspending consumers or only to unlucky entrepreneurs? They worry about moral hazard, and whether China's courts have the capacity to handle a flurry of individual bankruptcy cases. Drafting such rules is complicated by widely held prejudices against people who fall into debt, says Hui-fen Yin of Shanghai University of Political Science and Law. The government should start by accepting that people can make innocent mistakes. ■

Land reclamation in Hong Kong

The Lantau row

HONG KONG

Some people grumble about plans to build massive artificial islands

HONG KONGERS have less residential space than the people of any other big city: 15 square metres each. That is barely double the size of a standard prison cell in Hong Kong. The Chinese territory is also the world's most expensive property market. The average price of a home is \$1.2m, around 40% higher than the nearest competitor, Singapore. To be fair, 45% of Hong Kongers live in government-subsidised housing. But the average waiting time for such flats is five-and-a-half years.

Carrie Lam, Hong Kong's chief executive, has taken note. Last year she unveiled a colossal project, called Lantau Tomorrow Vision. It involves reclaiming 17 square kilometres of land off the coast of Lantau, Hong Kong's largest island. That is about five times the area of New York's Central Park. It is the biggest infrastructure project ever proposed in the city (see map). Housing on the artificial islands would accommodate up to 1.1m people, about one-seventh of the current population. The new flats would be bigger than average and 70% of them would be subsidised. On May 25th Hong Kong's quasi-parliament, the Legislative Council, approved the launch of a feasibility study. Reclamation work is unlikely to start before 2025.

The estimated price tag, including the

cost of transport links, is at least HK\$624bn (\$80bn), officials say. That is equivalent to more than half of Hong Kong's fiscal reserves. The government, citing a report by a professional body of surveyors, says land sales will recoup the full cost of initial outlays on reclamation and infrastructure-building. The idea is to turn part of the new land into a "core business district" which will be used by multinationals as their "global headquarters". Officials hope that will create hundreds of thousands of new jobs and generate plenty of tax.

Public opinion is divided. Nearly 60% of about 3,000 respondents to a government-commissioned survey supported, in principle, the construction of artificial islands east of Lantau. But many people worry about the project's cost and environmental impact. Shortly after Mrs Lam announced the idea, thousands of people took to the streets in protest. Activists say they are planning more demonstrations.

Chu Hoi-dick, a legislator who opposed even conducting a feasibility study (which will cost an estimated HK\$550m), agrees that the government should do more to increase the supply of housing. But he says there are cheaper ways to do it, such as developing old industrial sites. Mr Chu is "not at all" convinced by official financial projections, which, he says, take for granted that land prices will continue to rise.

In March seven local conservation groups called on the government to abandon the scheme. Chief among the risks they cited was the potential threat to endangered marine animals, such as the city's iconic pink dolphins. Debbie Chan, a volunteer for one of the groups, Save Lantau Alliance, says the government often makes the right noises about protecting the environment but fails to monitor how its infrastructure-building affects it.

But these worries are unlikely to stop Mrs Lam. Wu Chi-wai, another legislator who voted against the feasibility study, says he has never come across one commissioned by the government that concluded a project would not work. ■



Chaguan | Tiananmen, 30 years on

What if China's rulers pay no price for the massacre in Beijing?



THREE DECADES after troops used murderous force to clear protesters from Tiananmen Square and central Beijing, covering up that crime has become a bit of a chore. China's security machine is ready to censor, arrest and imprison those who speak too candidly about events in 1989. But 30 years on this work of repression is carried out with cold, bureaucratic efficiency—a far cry from the terrors of June 3rd and 4th when soldiers and tanks shot and smashed their way into the ceremonial heart of Beijing, as loudspeakers metallically intoned that the army “loves the people”.

The most recent jailing linked to the Tiananmen protests occurred on April 4th this year. A court in the south-western city of Chengdu sentenced an activist, Chen Bing, to three-and-a-half years in prison for “picking quarrels and provoking trouble”. His offence: labelling bottles of *baijiu* alcohol with the iconic image of the lone protester who stared down tanks near the square. That picture, and any other reference to Tiananmen in 1989, is politically taboo in China. Each year, as the anniversary approaches, the relatives of those killed by the army, including the mothers of school pupils gunned down in cold blood, are placed under surveillance or taken on enforced trips out of town.

The cover-up is a headache for internet and social-media companies, which are obliged to employ armies of people to erase banned content. In order for these 20-somethings to be able to spot and delete references to Tiananmen, they must first be taught what happened there, the *New York Times* reported in January from one “content-reviewing factory”.

Such ignorance was once thought impossible. In all, hundreds of people, if not thousands, were killed in Beijing and some in other cities. Tens of thousands, at a minimum, were arrested for involvement in what was declared a “counter-revolutionary riot”. Suspects were snatched from homes and workplaces, or off the streets. The protests had drawn students and workers, magistrates in court uniforms and police cadets, and journalists from state media who marched beneath banners reading “We want to print the truth”. None was safe. Many endured re-education meetings. The unlucky were jailed. A few, having suffered horrors in prison, were exiled. Millions witnessed these terrors or their aftermath.

Zhao Ziyang, the Communist Party's leader in 1989, was ousted

during the unrest for opposing military action. In internal debates Zhao had called the protesters patriotic and endorsed their demands for a more accountable government, tougher anti-corruption measures and the observance of constitutionally guaranteed freedoms. He was purged and detained until his death in 2005. In a letter written from house arrest in 1997, he warned that the people would not forget the protests or the party's demonisation of them.

Yet there has been much forgetting, some of it the work of parents who see no good in filling children's heads with politics. It is not hard to imagine the dream of modern party leaders: that all China should forget the passions, fears and dashed hopes of 1989, so that future anniversaries pass without a flicker of dissent. The same party leaders surely hope that foreigners let go of memories of 1989, too. Even as blood was being scrubbed from Beijing streets, Communist officials argued that they had crushed the protests to avoid civil conflict, and to restore party unity so that China could be stable and prosperous. Their argument today, in essence, is that China has succeeded because of that use of force, not despite it.

It frustrates party officials that so many in the West doubt that claim, and suggest that China is weakened to this day by that legacy of violence, paranoia and intolerance of debate. It angers them that foreigners pay such heed to independent-minded people, whether religious believers, feminist campaigners, environmentalists or left-wing students working with unofficial trade unions.

China's leaders want the outside world to believe that they rule in a majoritarian compact accepted by almost all their citizens. They would include in that social contract the grim dystopia that they have built in the far-western region of Xinjiang, where perhaps a million members of the Muslim Uighur minority have been sent to re-education camps and millions more endure unsleeping high-tech surveillance. Party leaders insist that most Chinese approve of this, believing it a price worth paying for eliminating radical Islam and the threat of terrorism.

Communist bosses should be careful what they wish for. Nobody knows how stable their support is because China is so secretive, and because the broad contentment of a country enjoying economic growth is easy to mistake for informed consent. But if a Tiananmen anniversary ever does pass without a flicker of dissent, that would be a dangerous moment, setting up the Chinese nation, and not just its rulers, for a backlash across the democratic world. For the party's swaggering, authoritarian ways are a challenge to the universal values which help to define the West. That is true even though President Donald Trump is a disturbing outlier. He has described the violence in Beijing 30 years ago as a “strong, powerful government” quelling a “riot”, albeit with horrible force.

Made reality, the party's dreams would make the world recoil

For sure, foreigners have been guilty of a certain narcissism in imagining that ordinary Chinese, as they grow richer, will aspire to Western freedoms. But dissent in China matters. It allows Western governments to say that their disputes are with China's leaders, not its people. It is because not all Chinese are seen as agents of the party-state that they are welcomed in the West as students and business partners. The party should be grateful that some citizens want a more transparent, accountable government, and distrust propaganda. They should welcome intra-party disagreements that pit reformers against hardliners. They should be glad that the chore of censorship never ends, on June 4th or any day. For a serenely unified, nationalist Chinese autocracy, unequivocally backed by its people, would be a terror to the world. ■



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Israeli politics

Back to the ballot box

JERUSALEM

Unable to form a government, Binyamin Netanyahu calls an early election. His failure could prove costly

IT WAS NOT EVEN two months ago that Binyamin Netanyahu declared “a great victory” after his Likud party took 35 seats in a hard-fought election. The voters seemed to have given the prime minister an unprecedented fifth term; soon he would become Israel’s longest-serving leader. His bloc of nationalist and religious parties held a 65-seat majority in the Knesset (see chart). All that was left was the haggling, over cabinet posts and policies, before Mr Netanyahu announced his new government.

The haggling, though, got the better of him. Bedevilled by the demands of Avigdor Lieberman, a rival on the right, Mr Netanyahu was unable to form a government by the deadline on May 29th. To stop the president from asking the opposition to have a go, he and his right-wing colleagues (along with the Arab parties) finally agreed to dissolve the Knesset and call a new election. Many members had yet to make a speech when they voted to give up their jobs. For Mr Netanyahu it is an unusual failure—one that threatens his political survival.

The situation is unprecedented. Every

other election since Israel’s founding in 1948 has resulted in the formation of a government. The finance ministry says there is no money for a new election, which has been scheduled for September. (It will surely find the shekels.)

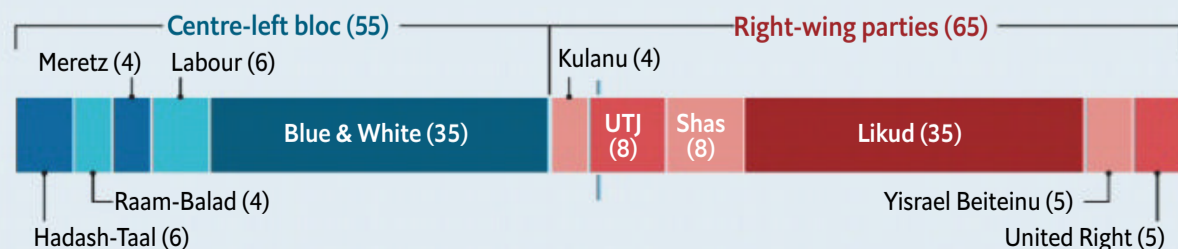
The ostensible cause of all the chaos is legislation, drafted by the previous government, that would cut into the exemption of religious students from compulsory military service. Under the bill an increasing (though still small) number of such *yeshiva* students would be required to serve. Mr

Lieberman, who leads Yisrael Beiteinu, a secular nationalist party, insisted that it be passed by the new Knesset without any amendment. But United Torah Judaism (UTJ) and Shas, ultra-Orthodox parties, oppose the measure. Mr Netanyahu needed the support of all three in order to have a majority. He could not bridge the divide.

The exemption for *yeshiva* students has long been a political hot potato. Mr Lieberman insists that for him it was “a matter of principle”. But he is also positioning himself for the day after Mr Netanyahu. The two go back three decades. Mr Lieberman, a former Likudnik, served as his political aide and director-general of the prime minister’s office. He was Mr Netanyahu’s defence minister until last year—when he (unsuccessfully) tried to bring down the government by withdrawing his party from the ruling coalition. He again senses weakness and by choosing an issue popular with secular voters he believes he can increase ▶▶

The coalition that wasn't

Seats in Israel’s Knesset by party and political stance, 2019, 120 seats available



Source: Haaretz.com

► support for his party in the next election, while hastening his rival's downfall.

Mr Netanyahu normally exudes confidence. But as the deadline to form a government approached, he looked desperate. He tried to tempt Labour to join him by offering it the defence portfolio—even though he has spent years branding the party as weak on security. Perhaps he was just trying to scare Mr Lieberman into a compromise. Perhaps he was scared himself. Mr Netanyahu has been indicted, pending a hearing, in three corruption cases. He was counting on his new coalition to pass laws that would grant him immunity from prosecution and limit the Supreme Court's power to overturn legislation.

Prosecutors accuse Mr Netanyahu of taking gifts from wealthy benefactors in return for favours, and offering help with regulatory matters to publishers in exchange for positive coverage. He denies wrongdoing. The allegations did not seem to hurt him during the last election. But even if he wins the next one, he may not have time (or a majority) to pass his desired laws before pre-trial hearings begin in October. His lawyers have tried to delay the proceedings. They are now ploughing through piles of evidence.

Mr Lieberman is the first right-wing politician to rebel against Mr Netanyahu. Will others follow? Within Likud there are grumbles, but only one senior member, Gideon Saar, a former interior and education minister, has criticised the effort to grant the prime minister immunity. The party has never deposed its leader and Mr Netanyahu is still popular with the rank and file. Other potential rivals seem not to share Mr Lieberman's assessment of the prime minister's vulnerability. That Mr Netanyahu was able to convince a majority of lawmakers to fire themselves shows the hold he still has over the right wing.

It is also a testament to the weakness of the opposition. Benny Gantz, the leader of Blue and White, which also won 35 seats in the last election, demanded that he be allowed a shot at forming a government. But he could not muster the votes to block Mr Netanyahu's move. During the latest election he was unable to cut into the prime minister's support, instead taking votes from other centre-left parties. Turnout was down. Mr Gantz may have trouble convincing voters to show up in September if he seems likely to lose again.

Much can change between now and then. In late June the Trump administration will unveil the economic portion of its plan for peace between Israel and the Palestinians. It had delayed the announcement in order to keep it from becoming an issue in the last election. But the new vote will probably turn into another referendum on Mr Netanyahu, who has four months to convince voters to increase his mandate. ■

Tribes in Iraq

Rent-a-sheikh

BAGHDAD

With tribes settling more disputes, sheikhs are in high demand

AFTER DISCOVERING that one of his employees had embezzled \$800,000, Saif took him to a court in Baghdad and won. When the thief still did not return the cash, he was thrown in jail. But he was soon released, probably after paying a bribe. Fearing he would never see his money again, Saif began negotiating with the thief's tribe—or, rather, his rental sheikh did. Saif, who grew up abroad, was unfamiliar with tribal practices, so he hired a tribe to back him and its leader (the sheikh) to represent him.

Iraq is home to around 150 tribes, whose sheikhs long helped resolve disputes. Saddam Hussein tried to weaken them, but after he fell in 2003, sheikhs filled the vacuum left by a fragile and corrupt state. Today even some corporate lawyers advise their clients to use tribal councils rather than courts, especially if the sheikhs involved have links to powerful militias. This has led to a booming new business: sheikhs who rent out their services. Only some are real.

It is often hard to tell, especially in cities, where tribal bonds have weakened. Certain restaurants in Baghdad are known as meeting spots for rental sheikhs. Sometimes people on the wrong side of the law seek out the fake sort because they are too embarrassed to go to their real sheikhs. Saif, by contrast, didn't know his own sheikhs. He found his rented tribe through a friend. It cost him thousands of dollars in meals and attendance fees, as the rental sheikh and his counterpart mulled over the case. As often happens, both sheikhs demanded a commission for a successful settlement.

Relying on tribes to settle disputes has advantages. Courts dawdle; tribal negotiations can lead to deals in a matter of days. They are good at settling community or family feuds. But there is growing abuse of the system, especially as it takes on more commercial disputes. In rural areas tribes often extort money from oil and gas firms that operate nearby. In cities impostor sheikhs take money without producing results. Seven months into tribal negotiations, Saif had recovered only a fraction of the money that was stolen from him.

One reason could be a recently passed law declaring tribal intimidation tactics, such as the *degga ashairiya* (tribal knock), acts of terror. The *degga* involved shooting (or "knocking") at someone's house. It was a useful way to get people to the negotiating table. It was also abused. Many Iraqis welcomed the ban.

They complain, though, that the government has not also strengthened the legal system. After years of war Adel Abdul-Mahdi, the prime minister, has vowed to boost investment to bring down unemployment. But few investors dare inject money into a country where sheikhs and militias wield more influence than judges. Take the case of Muhannad, who turned to the tribes when a commercial tenant refused to vacate his building—then stuck an AK-47 in his face. According to a hand-scribbled tribal agreement, Muhannad must pay the tenant \$140,000 to leave. "The government isn't strong enough to finish the case," said Muhannad. "So we prefer to buy our peace and safety with money."



Let's sheikh on it



Nigeria's economy (1)

More misery ahead

LAGOS

Nigerians got poorer in Muhammadu Buhari's first term. A revenue crisis looms in his second

LONG LINES of lorries stretch like tentacles from Apapa port, the largest in Nigeria. Drivers doze in their cabs, feet flung over dashboards; some sling hammocks beneath the chassis. Musa Ibrahim, an ebullient trader, says he has been queuing for two days. He gestures at empty buildings. "Most of the companies you see here they done close," he sighs.

The Nigerian economy is stuck like a stranded truck. Average incomes have been falling for four years; the IMF thinks they will not rise for at least another six. The latest figures put unemployment at 23%, after growing for 15 consecutive quarters. Inflation is 11%. Some 94m people live on less than \$1.90 a day, more than in any other country, and the number is swelling. By 2030 a quarter of very poor people will be Nigerian, predicts the World Data Lab, which counts such things.

Nigeria's engine was already sputtering when President Muhammadu Buhari took the wheel in 2015. The price of oil, which makes up 9% of GDP and more than 90% of export earnings, had crashed. But "Baba Go Slow", as Nigerians took to calling him, made a bad situation worse. Instead of letting Nigeria's currency slide, which would have stoked inflation, policymakers rationed dollars to maintain the naira's long-standing and artificially high peg to the dollar. To do so the central bank refused to release foreign currency for a long list of imports, ranging from toothpicks to shovels. Without dollars for equipment or sup-

plies, factories closed and workers were laid off, leading to a recession in 2016.

The central bank confused things further by introducing several exchange rates. First was the official one of 305 naira per dollar, an absurdly low rate useful for importing petrol and massaging political egos. Its second rate, of 320 naira per dollar, was used to funnel artificially cheap greenbacks to favoured importers. Naturally, there were not enough dollars to go around, so most Nigerians (especially those importing toothpicks) had to pay as much as 500 naira for one on the black market. Most of these rates have converged of late, at about 360 per dollar. But the confusion arising from having so many discourages foreign investment.

The government thinks the answer to the "dollar shortage" is for Nigerians to make and grow more and import less (see next article). To this end it has slapped import taxes on rice and is giving tax breaks for a huge new oil refinery.

There is little sign of the kind of export-led industrial revolution that has lifted incomes in Asia. This is not only because the naira is overvalued. It is also because the state has spent decades neglecting basic public goods, like roads, schools and electricity. "In Nigeria if you set up a business you have to build your infrastructure, you have to build your power plant, you have to build everything," says Abdul Samad Rabi, the chairman of BUA Group, a conglomerate. Eghosa Omoigui, who manages

a tech fund, compares running a business there to "running a nation state".

Where urgency is needed, Mr Buhari offers only caution. Few are holding their breath for any more drive in his second term, which began on May 29th. "We are trying to avoid shocks," explains Adeyemi Dipeolu, his economic adviser. Sharp currency movements or hikes in electricity tariffs would be felt by ordinary Nigerians. Yet officials are postponing a crisis, not averting one. Consider borrowing. The debt-to-GDP ratio is 28%. But Nigeria collects so little in tax that interest payments swallow about 60% of federal revenues.

"We don't have a debt problem, we have a revenue problem," insists Udoma Udo Udoma, the budget minister in Mr Buhari's first term. The government plans to raise funds by selling off some of its share in joint-venture contracts with oil companies and might hike taxes on luxury goods. Revenues are rising, but fall far short of budget targets. Some of the gap is probably being filled by running up an overdraft with the central bank, which now holds more assets than all other banks in Nigeria combined.

Public finances would be healthier if the government raised the price of fuel, which is imported by the state oil company and sold on at a loss. Last year this subsidy was worth at least 0.5% of GDP—as much as the government spent on health care. Politicians are scared to end it. An attempt to do so in 2012 led to massive protests. Although the government has expanded school-feeding programmes and is working on a safety-net for the poor, most citizens get few benefits from the state. Oxfam, a charity, ranks 157 countries on their commitment to reducing inequality, based on social spending, taxes and labour laws: Nigeria comes last.

For Nigeria to prosper, the state could harness the vim of its 200m citizens. Instead it ignores them, except when politicians need votes. People have come to expect nothing from government, says Chika Okeke, who owns a small stationery shop in Lagos: "you struggle yourself." ■

Over a barrel

Nigeria, GDP, % change on a year earlier



Brent crude oil price \$ per barrel



Sources: IMF; Datastream from Refinitiv

Nigeria's economy (2)

Protection racket

KANO

Tariffs help only a lucky few

SUNLIGHT POURS onto yellowing cloth in the Gaskiya textile factory in Kano, northern Nigeria's largest city, through gaping holes in its tin roof. Chickens in the carcass of a van pierce the silence. Before this textile mill closed in 2005, says Yau Muhammad, one of 4,000 former employees, it was among West Africa's largest.

In 1985, when Muhammadu Buhari—then Nigeria's military ruler—cut the ribbon on this factory, industry was thriving in Kano. In the decades since many others in the city have suffered its fate, crippled by power shortages and cheap imports. More than 300,000 jobs have vanished from the textile industry alone. Mr Buhari, who was elected president in 2015, wants to promote manufacturing by getting Nigeria to make more and import less.

His central bank governor has withheld foreign exchange for some goods (see previous article) or slapped hefty import duties on them. This has been excellent news for industrialists such as Aliko Dangote, a billionaire who grew rich selling cement at eye-watering profit margins that reached as high as 60% behind high import tariffs. It has not been so good for Nigerian consumers, who must pay more for their groceries and their homes, or for productivity. Companies must pay more for buildings; the government, for roads and bridges.

Officials insist that protectionism works. They point to rice farming, which is booming thanks to a 60% tariff on imported rice. At the Umza Rice Mill on Kano's outskirts, workers feeding machines with sacks of rice lifted from burlap mountains do not have time to stop and talk. Muktar Khaleh, the factory's managing director, says its capacity has more than doubled since 2014 and that he has little sympathy for failed textile firms. "They need to modernise and try to compete with China, the way we compete with rice-producing countries like Thailand," he says, ignoring the role tariffs play in nobbling the competition. Tariffs encourage smuggling, too. Thai rice exports to Nigeria have slumped since the tariffs were raised in 2016, but those to neighbouring Benin mysteriously more than doubled between 2015 and 2017. This tiny country of 11m people is now the world's largest importer of Thai rice.

For manufacturers who are not protected by tariffs, things are grim. This is especially so if they cannot get subsidised foreign currency from the central bank to

import raw materials. A plastics-maker in Kano says he and most of his neighbours are operating at less than 10% of capacity. Many may be sunk by a planned two-thirds increase in the monthly minimum wage. Other managers complain that electricity supplies are unreliable and expensive. Even successful firms like the Umza Rice Mill rely on generators for their own power. "There is no way anyone in Nigeria can produce without them," says Mr Khaleh. A Chinese textile importer laughs when asked if he would ever move production to Nigeria.

The government says it is tackling the power shortage. To its credit, factory owners in Kano say power cuts have become slightly less frequent in the past year. It has extended loans to power distributors to help expand their capacity and has loosened regulations to allow companies to buy power from independent producers at whatever price they want, instead of the one set by the regulator.

Even so, Nigeria's electricity firms produce about as much power as the city of Edinburgh. Without a huge increase in capacity—let alone literacy rates—Nigeria has little chance of expanding its industry, says Charlie Robertson, an economist at Renaissance Capital, an investment bank.

This is harsh news for the millions of Nigerians who will reach working age in the next few years. For many, like those laid off by Gaskiya textiles, the government's manufacturing push comes far too late. Mr Muhammad gets a stipend from his union to guard his former workplace, so that its owners cannot sell off the land and machinery until they have settled unpaid wage bills. But, he says, most of his ex-colleagues are still out of work. "Muhammadu Buhari," he sighs, "was our last hope." ■



They lost their shirts

Liberia's lurch

A yellow card for the government

DAKAR

Brazen corruption is testing donors' patience and threatening the peace

GEORGE WEAH has usually had luck on his side. To be sure, skill and hard work propelled him from a west African slum to playing for the top teams of European football. But fortune also smiled on him. Take the award he won for "fair play" in 1996—just weeks after headbutting a player.

Now president of Liberia, Mr Weah's luck seems to be running out. Less than 18 months after being sworn into office he faces a wave of protests on June 7th. Some of the unhappiness with his government is caused by a stumbling economy. The IMF reckons that growth will slow to 0.4% this year, from 1.2% last year, and that annual inflation will have more than doubled over three years, to 22%.

But people are also furious about corruption. About half of Liberians polled by Afrobarometer last June said they had been forced to pay backhanders for help from the police or to get public services. A similar proportion said graft had grown worse over the previous 12 months.

It is not just Liberians who are fed up with corruption. A recent letter to Mr Weah from nine ambassadors—including those of America, Britain, France and Japan—raised concerns that his government was taking money from programmes funded by foreign donors, the accounts for which are held at the central bank. The letter, which was leaked to *The Economist*, demands that the money be returned without delay and that "such unacceptable practices cease immediately".

The World Bank has a similar gripe. In a separate leaked letter to Samuel Tweah, the finance minister, the bank complained about millions of dollars that had been taken out of accounts earmarked for providing drinking water or for projects such as responding to Ebola, a deadly virus that ravaged west Africa in 2014-16. It, too, demands that the money be repaid.

The self-styled Council of Patriots, which is organising the protests, says it is demanding cleaner government as well as justice for atrocities committed during Liberia's civil war. For many Liberians the very thought of unrest evokes memories of a conflict that raged almost continuously from 1989-2003 and destabilised the region. A succession of bigwigs from the African Union, UN and ECOWAS, a club of countries in the region, have flown in to mediate and call for calm. Mr Weah needs to get his eye back on the ball. ■

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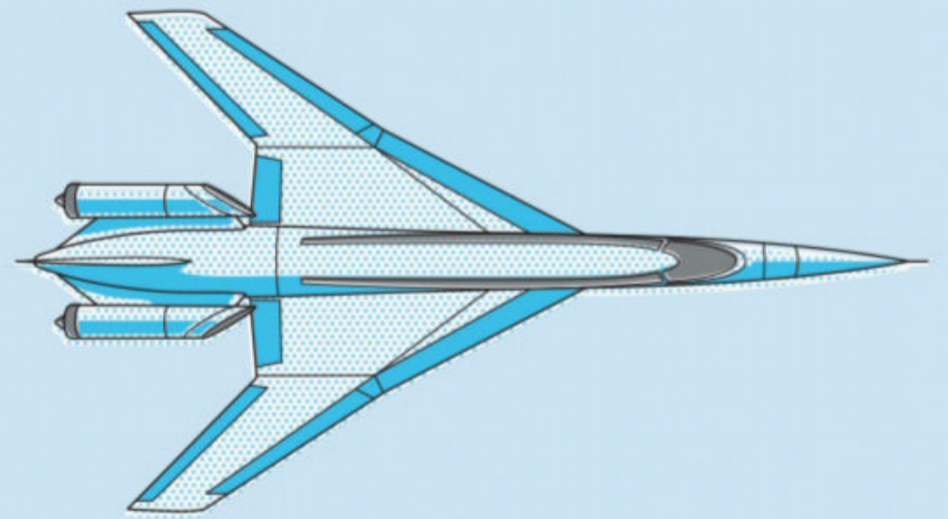
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The future of flight



OCEAN

THE PROTECTORS

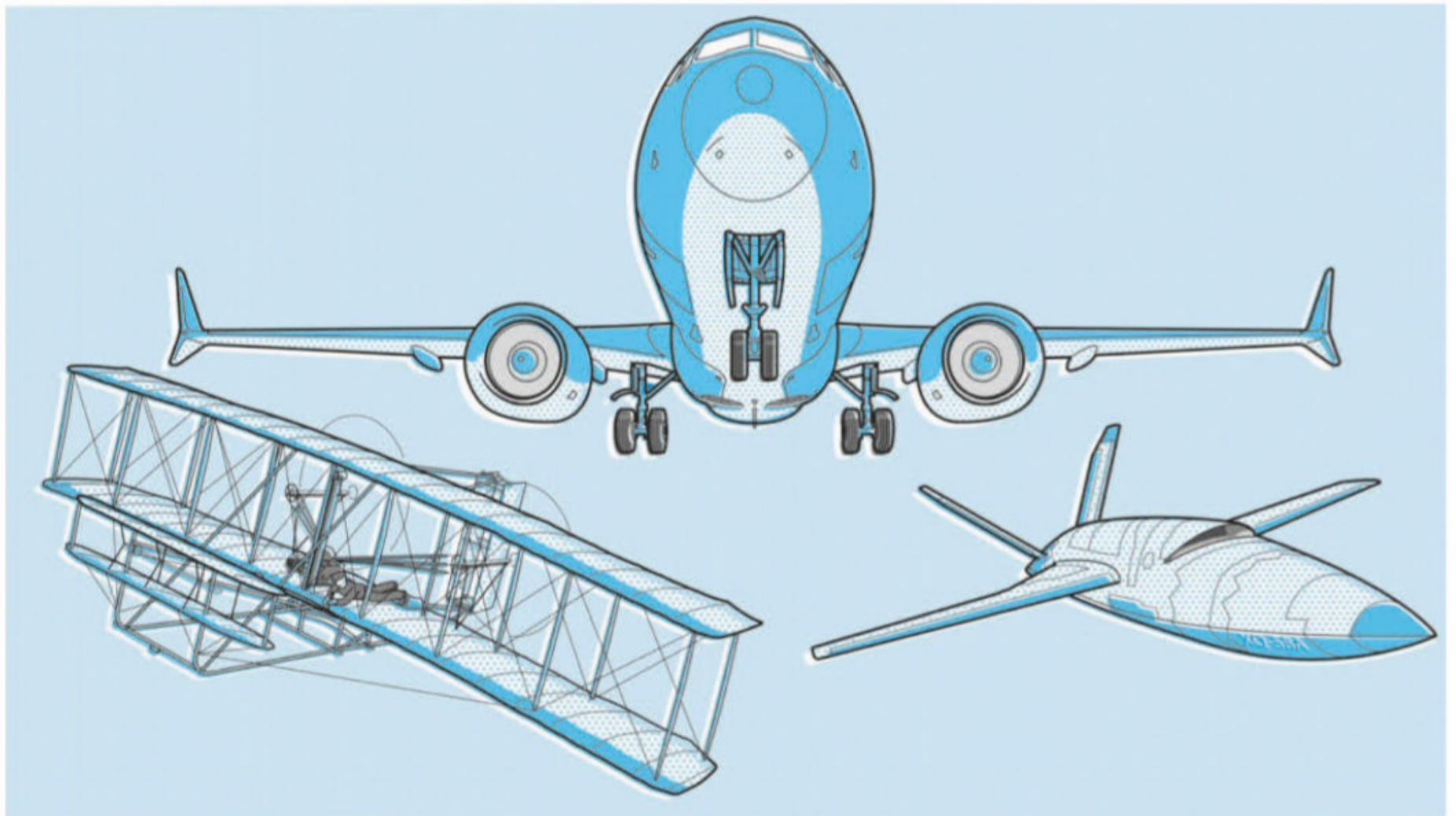
A series of films exploring the crisis facing the world's seas



To watch this film please scan the QR code using the camera on your Apple iOS 11 or Android 8.0 device and tap the link



WATCH:www.woi.economist.com



Aviation

The future of flight

Despite appearances, aircraft have changed a lot—and will soon change more, writes Geoffrey Carr

ON MARCH 10TH a Boeing 737 MAX, the latest version of that firm's bestselling narrow-bodied airliner, fell from the sky in Ethiopia. All 157 souls on board were lost. This followed the crash off the coast of Java, less than five months earlier, of another 737 MAX. The death toll then was 189. The immediate cause in both cases seems to have been a faulty sensor feeding false data to an avionic flight-management system that had, in turn, had new software which pilots had not been briefed about. The flight-management system insisted on overriding the actions of the pilots, who did not know how to respond. This precipitated a stall rather than, as intended, preventing one.

These two tragedies illuminate the tension between conservatism and innovation that lies at the heart of civil-aviation technology. As a character in "The Leopard", a novel about the revolutionary events of Italy's unification in the 19th century, declares: "If we want things to remain as they are, everything needs to change." Attempts by the industry to follow that advice seem to have been what ultimately caused these crashes.

The 737 goes back many years. It was conceived in the 1960s, when engines were smaller and passengers generally embarked and disembarked using staircases wheeled in for the purpose rather than airbridges connected directly to a terminal building. Small engines allowed, and staircases encouraged, a design that kept the fuselage close to the ground.

By the time the 737 MAX was being planned, this had changed. Modern turbofan engines with wide air intakes required, and airbridges permitted, alterations to the airframe that also altered its

handling characteristics (its trim, to use the jargon). To keep things as they were, and avoid pilots having to recertify to fly the new version, its avionic software was tweaked to make the new plane's trim feel, to a pilot, like the old plane's. That would have been fine as long as the sensors feeding information to those avionics worked properly and the pilots themselves knew what was going on. But they did not.

The case of the 737 MAX is an extreme example of conservatism at work in aircraft design. But retaining the familiar is a recurring theme. A Boeing 707, the plane that ushered in mass intercontinental air transport in the 1950s, appears to the untutored eye much like the current offerings of Boeing and Airbus, the world's principal makers of airliners. Both old and new are portholed tubes that have two swept-back wings sticking out of their sides about halfway along. They have three stabiliser fins—two horizontal and one vertical—at the stern. Pods containing their engines hang on pylons from their wings.

Festina lente

Attempts to change this arrangement have been proposed—most notably Boeing's delta-winged Sonic Cruiser in the early 2000s. But apart from Concorde, a supersonic aircraft in which the delta-winged arrangement was imposed by the laws of physics, such changes have never got anywhere. Engineers know how to keep it safe, and the world's airports have grown in synergy with it. Beneath this conservative geometry, however, airliner technology has improved enormously and is still improving. Better materials ►►

▶ are making planes lighter and more comfortable to fly in. Better engines are making them quieter and cheaper to run. And better avionics are, despite exceptions of the sort seen so recently, making them safer (see chart).

Those better avionics also point inexorably in one direction: to a day when most aircraft will no longer require a pilot. Airlines and their passengers and regulators may take a while to come to terms with this, so it is likely that pilots will sit in cockpits long after they are needed for anything other than the reassurance of the paying public. But armed forces are embracing a pilotless future. Surveillance and missile-carrying drones have been around for a couple of decades. The 2020s will see robot military helicopters introduced and pilotless fighter jets starting to emerge, even though these jets will, at least to begin with, be parts of squadrons that have a human leader in control. Cargo aircraft—military probably and civilian possibly—will be robotised as well.

New technology is also extending the concept of civil aviation. The idea of supersonic transport (SST) for civilians is back on the cards, 16 years after Concorde's last flight. Three firms in America, in particular, have plausible designs for SSTs, appropriate commercial partnerships, and, they hope, sufficient money to get prototypes flying over the next few years. And another old fantasy, flying cars, seems likely to become real in the next few years, as firms both new and old rush to build electrically propelled one- and two-seater aircraft of novel design. Some will act as remotely controlled taxis. Some will be the SUVs of the sky—piloted by their owners over city traffic jams and winding country roads alike.

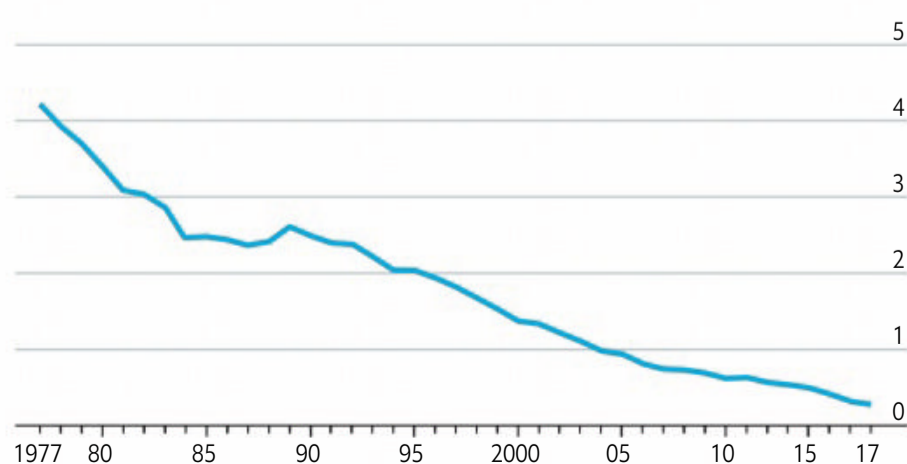
They all laughed at Wilbur and his brother

In these two areas, SSTs and flying cars, change is happening that is reminiscent of the glory days of aeronautics—the half-century after 1903, the year that the Wright brothers made the first widely recognised, heavier-than-air powered flight, at Kitty Hawk, North Carolina. Flying cars especially, if they can be proved safe and manageable by air-traffic-control systems, may change transport networks almost as much as their ground-based brethren did a century ago, by being able to avoid the congestion that the multiplication of those brethren has brought.

Conventional civil aviation is also growing fast. The number of jet airliners flying may double by 2040 as people, particularly those in Asia who do not fly now, get richer. That will bring environmental problems, for aviation is the least tractable of industries to decarbonisation in order to reduce greenhouse-gas emissions. Aviation fuel packs more energy per kilogram than batteries do. And, so far, attempts to make such fuel synthetically, rather than from petroleum, have foundered on cost. The embrace of, or resistance to, the growth of aviation may depend on whether that, too, can change. ■

Safer

Global passenger flights, fatalities per million flights*



Source: Aviation Safety Network

*Aircraft with more than 14 passengers

Manufacturing

Some assembly required

Composites and electronic twins are transforming construction

THE A350 is a twin-engined airliner that is the top of the range of Airbus's offerings, rolling out of the company's factory in Toulouse, France, at the rate of ten a month. Each of the finished planes sits at the apex of a system of supply chains which fans out across the world, bringing 3.5m components together into a single product. An A350's airframe is composed of seven sections. Three are assembled into the fuselage, two being made at another site in France and the third in Germany. The two wings are made in Britain, then transferred to Germany to be finished. The tail fin and the horizontal-stabiliser assembly are made in Spain.

All of these pieces are flown to Toulouse in special transport aircraft called Belugas—after the whale, which they resemble, rather than the sturgeon, which they do not. They are made, mostly, of carbon-fibre-reinforced plastics (CFRPs). These are composite materials that cannot be riveted in the way metal is because of the damage this causes to the fibres. They are therefore held together by lock-bolts inserted through 10,000 specially drilled holes in the flanges where the sections overlap.

Connecting the sections involves fitting them together, drilling the holes (a process less damaging than riveting), unfitting them, cleaning the holes and surrounding areas of debris, applying a sealant to the flanges, fitting the pieces back together again and then inserting the lock-bolts. At this point the myriad cables which keep a modern aircraft flying, and which have been pre-fitted into the airframe sections, are linked up.

Before their final bonding, however, the fuselage sections have had what are known as "monuments" installed. These are bits of equipment—galley, crews' quarters and so on—that would be too big to carry through the cabin doors later. Afterwards, the rest of the fitting-out is done, the plane is painted in the customer's livery and the crucial finishing touches, a pair of engines, one under each wing, are added. The whole process takes about a month.

Airbus and its American counterpart Boeing dominate civil aviation and have done so for decades. Airbus was formed in 2000, though it acquired its current name only in 2014, having previously been known as EADS. Boeing took over McDonnell Douglas, its last American rival in the civil-aviation business, in 1997.

That domination has been enhanced yet further by Airbus's recent absorption of part of the business of Bombardier, a Canadian company, and Boeing's purchase of a large chunk of Embraer, a Brazilian one. These two were the last firms in the West with even a nominal claim to be independent makers of airliners. A Chinese rival, COMAC, may eventually muscle in. And, in the wreckage that was once the Soviet Union, the United Aircraft Corporation, a merger of Soviet-era firms, clings to life. But, to all intents and purposes, making airliners is at the moment a duopoly.

Dirty tricks

The cockeyed nature of Airbus's supply chain, spread across much of western Europe, might be seen as a consequence of the firm's multinational antecedence and a desire not to put noses out of joint by politically awkward closures of peripheral plants. But Boeing is no better. The supply chain for its 787 Dreamliner, a competitor of the A350, is even more convoluted than for the A350s, as a result of a decision early in the plane's history to outsource manufacturing of airframe sections to other firms. Despite such self-indulgences, however, competition between the two firms is ▶▶

fierce. The jurisdictions in which they operate are each acutely aware of any knavish tricks by the authorities in the other intended to support the home team, and are willing to challenge such arrangements in the World Trade Organisation. All this helps drive technological improvements.

In the case of airframes, the biggest technological shift going on is an invisible one, from metal alloys to composite materials—mostly CFRPs. The A350's airframe is 53% composite. The resulting lighter weight, Airbus claims, makes it 25% more efficient, in terms of fuel consumption, than predecessor planes. That is a huge saving for the world's airlines. According to the International Air Transport Association, an industry body, fuel accounts for almost a quarter of airlines' operating expenses—\$180bn in 2018.

Boeing, naturally, matches these claims with claims of its own. The Dreamliner is 50% composite—and again around 20% more efficient than its predecessors. Composites bring advantages beyond lightness. Unlike metals, they do not corrode. Nor do they crack from metal fatigue. They therefore need less maintenance. They do bring problems, though. One is that damage to them is less obvious than to metal, because they do not bend or dent. This is one reason why Airbus fits hundreds of sensors, ranging from voltage meters to strain gauges, all over its A350s. These can warn of problems invisible to the eye. Another disadvantage of composites is that they are not as malleable as metals. Bit by bit, however, that disadvantage is disappearing.

Parts made of composites are constructed by a process called laying up. This builds a component from ribbons or small sheets of carbon-fibre fabric applied to a forming mould together with a resin that hardens when the whole thing is baked in an autoclave. Originally, laying up was done by hand. Then automatic tape-laying machines made things faster and more reliable. These days, matters have improved still further. Giant looms are used to weave carbon-fibre ribbons into huge sheets. These looms can vary the tension in warp and weft in a way that does the job of the forming mould, creating sheets that reflect from the start the shape of the component of which they will become part. This makes laying up much easier, speeding up production even more.

Now boarding

In civil aviation, that speeding up of production is going to be crucial. Airbus, in a forecast published in 2017, predicted that air traffic will grow at 4.4% a year over the next two decades, requiring some 36,600 new passenger and 830 cargo aircraft at a total value of \$5.8trn (see chart). Boeing's forecasts are, if anything, more bullish: a 4.7% annual growth in traffic, more than 41,000 new aircraft and a total value of \$6.1trn.

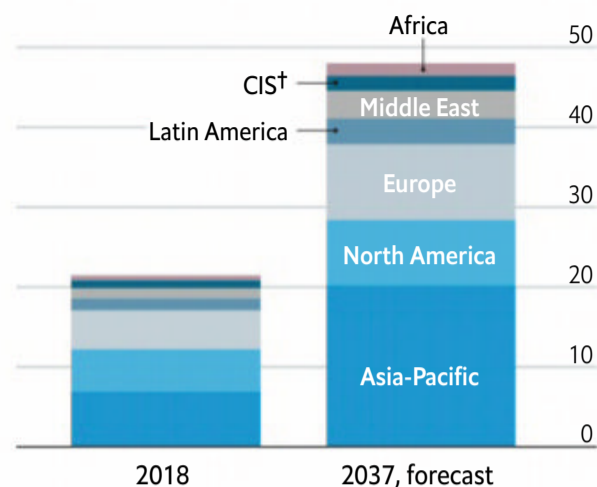
To meet such demand, both firms will need to up their game, and they are doing so. Oliver Wyman, a consultancy, said in a report last year that it expected production of Airbus's A320 and Boeing's 737 each to jump from around 40 a month in 2015 to 60 a month this year. Those figures may need to be adjusted a bit after the recent 737 accidents, but the trend is clear.

Techniques like using looms to improve the manufacture of parts contribute to this growth. But grander plans are afoot. According to Grazia Vittadini, Airbus's chief technology officer, the key to the future is connectivity.

It would be easy to dismiss that as a buzzword invented by the marketing department if it were not for all those sensors aboard every A350. The 30 giga-

The world takes flight

Global aircraft fleet*, '000



*Passenger aircraft with 100+ seats and freighter aircraft above ten tonnes †Former Soviet Union, excluding Baltic states
Source: Airbus

bytes of data they transmit every day—and similar, if not quite so abundant, quantities of data from other types of Airbus aircraft—are the basis of a system called Skywise that allows both the firm and its customers to track what is going on across entire fleets of aircraft.

Eventually this will lead to every plane having an electronic twin on the ground. This system is already established for jet engines. Manufacturers create a computer model of each engine they make, and then update it during or after every flight, using data collected by sensors on board the real thing. That way, the electronic simulacrum can keep an eye on its physical counterpart, flagging up potential problems and predicting better than an arbitrary maintenance schedule when parts need replacing. What works for engines can easily be extended to entire aircraft—and even to a

time before an individual plane is born, tracking its components as they are put together. This way, the process of assembly can be monitored, integrated and speeded up.

Further off into the future, plans for new generations of aircraft are already being laid. There is talk, for example, of CFRPs having a serious makeover. The resins currently used to bind the sheets and tapes of fibre together are what are known as thermosetting plastics. Once baked, these hold their shape for ever. Most of the materials that a layman would think of on hearing the word “plastic”, though, are different from this. They are thermoplastics, and can be softened by heating and then remoulded an indefinite number of times. They behave, in other words, like metals. And, like metals, they can be riveted—a process easier than assembling things using lock-bolts. They can also be recycled, which saves money and burnishes a firm's green credentials.

Natural fabrics

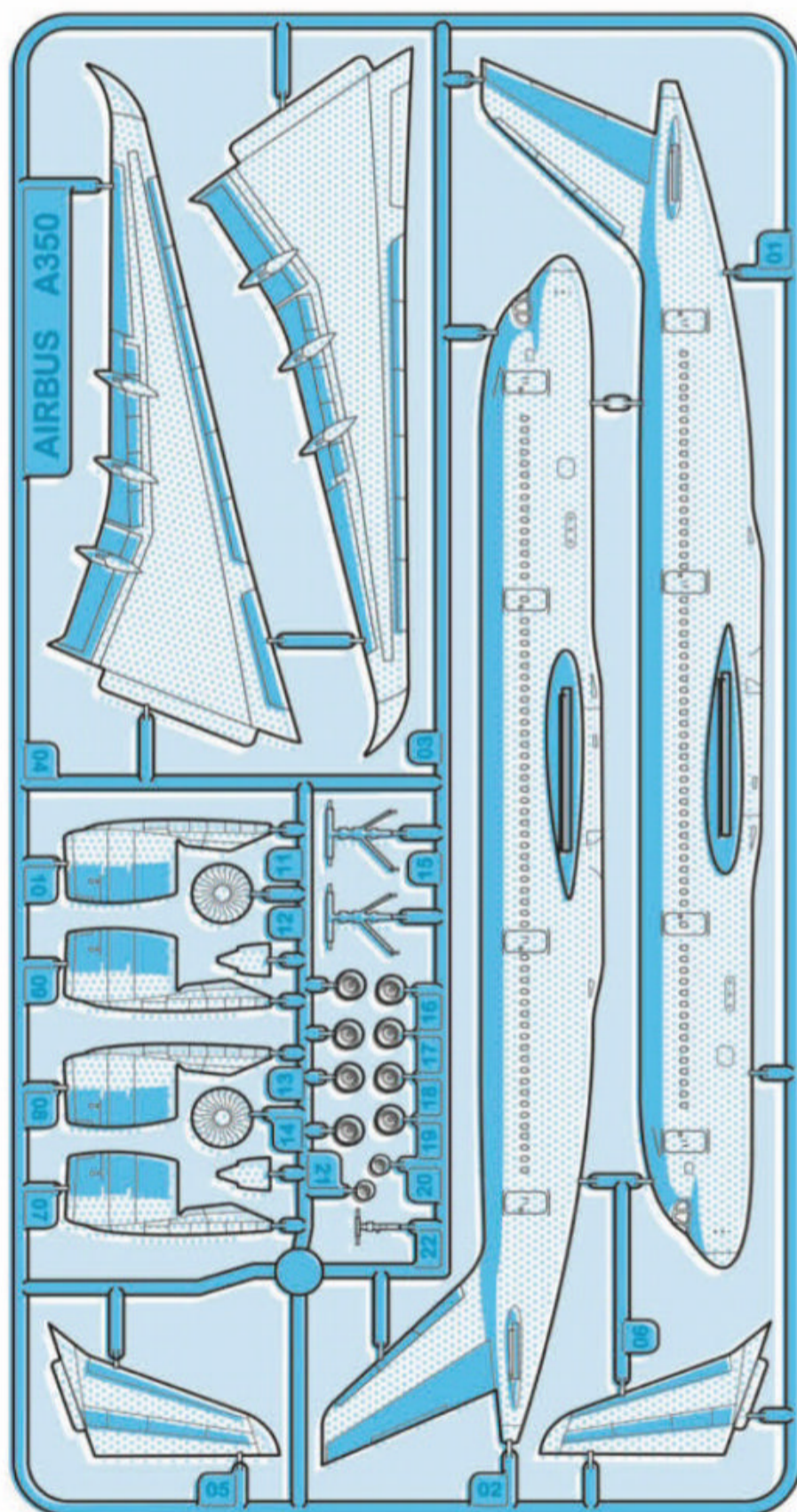
Looking even further ahead than that, Airbus is now experimenting with spider silk, produced on an industrial scale by genetically modified micro-organisms, for making aircraft components. Such silk is stronger, tougher and lighter than almost any man-made material. Work on it is still at an experimental stage. But Airbus is collaborating with AMSilk, a German biotechnology firm, to develop silk-reinforced polymers that might one day become substitutes for CFRPs.

As to the design of airframes themselves, cautious improvement rather than radical change is the order of the day. No one has forgotten the lesson of the Sonic Cruiser. Though the design for that unbuilt aircraft retained a cylindrical fuselage for passengers to sit in, it had delta wings aft and a pair of canards at the front for stability. It would, as the name suggests, have cruised at Mach 0.98, just below the speed of sound.

It bombed. No one wanted it, mainly because its fuel consumption would have been too high (most passengers seem to prefer cheap tickets to speedy arrival). There was also a problem with its awkward shape, which would have made it difficult to fit into the existing infrastructure of global airports.

That does not mean that the design of airframes—and wings, in particular—cannot be improved. In January, for example, Boeing announced it was working on a proposal that will change the look of aircraft quite a lot if it is implemented. The Transonic Truss-Braced Wing, as the firm calls it, will have a pair of wings fixed above the fuselage, each supported by a brace that is fixed below the fuselage. This arrangement allows the main wings to

Airbus is now experimenting with spider silk for making aircraft components



Propulsion systems

The jet set

Old engines are improving. New ones are coming.

JET AIRLINERS are not, in fact, jet airliners. Though the first of the breed, the de Havilland Comet, really was powered only by sleek turbojets that fitted elegantly into its wings, it did not take engineers long to work out that a turbojet works best not by itself but as part of a bigger whole.

A turbojet takes in air through a revolving compressor, mixes the compressed air with fuel, burns the mixture in a combustion chamber and ejects the exhaust out of the back to provide thrust, having first run it through a turbine which, via a shaft running along the engine's axis, turns the compressor. Modern engines, however, also use the jet's revolving shaft to spin either a propeller, creating a turboprop, or a ducted set of blades, creating a turbofan (see diagram overleaf). Both of these arrangements—and particularly turbofans—move more air, and thus create more thrust, than the turbojet within is capable of generating by itself. For long-haul flight, therefore, turbofans are preferred.

As with making large aircraft themselves, the business of building turbofans is confined to a few big firms. According to Market Research Future, a consultancy, General Electric (GE) and United Technologies (trading under the Pratt & Whitney brand) in America, Rolls-Royce in Britain, and CFM International (a collaboration between GE and Safran, of France) account collectively for almost 93% of the turbofan market. And each is intent on upping what is known as the bypass ratio of its engines.

Top gear

A turbofan's bypass ratio is the amount of fan-driven air it expels from the rear divided by the amount of exhaust from the combustion chamber. The bigger the bypass ratio, the more efficient the engine. More efficiency means lower costs. It also means less environmental impact.

The GE9X, as fitted to Boeing's new 777-9X, which was rolled out on March 13th, shortly after the second of the 737 MAX crashes, is currently the world's largest turbofan. It has a bypass ratio of 10:1. The latest iteration of Rolls-Royce's Trent, the 7000, will also have a 10:1 ratio. And CFM, which specialises in engines for narrow-bodied jets, and thus avoids treading on GE's toes in the wide-bodied-jet market, has an engine called LEAP with a bypass ratio of 11:1. The daddy of the field at the moment, though, is Pratt & Whitney's PW1000G (branded "PurePower"). Its best-performing version has a bypass ratio of more than 12:1.

Pratt & Whitney's lead is the result of a gamble. Turbofans are complicated beasts, put together from about 25,000 component parts. The company's engineers decided to make them more complicated still, by adding a gearbox. This reduces the speed at which the fan blades spin, relative to the shaft. The shaft needs to spin rapidly because it also drives the compressor, but that high rate of revolution puts a strain on the fan blades. Reducing this strain allows the blades to be longer, meaning the engine can have a wider air intake that is able to gulp in more air and thus to achieve a bigger bypass ratio.

Gearing is not, though, the only way to make engines more efficient. Better materials also help. As with airframes, replacing metal alloys with composites saves weight, which saves fuel. And composites also offer a way to deal with an engine's intense heat.

Two composite materials are particularly pertinent to aircraft engines: for fan blades, carbon-fibre-reinforced plastics similar to ▶▶

▶ be both thin (saving weight overall) and long (which reduces drag). The upshot is the eternal desideratum of better fuel economy.

Airbus, meanwhile, is working on BLADE (Breakthrough Laminar Aircraft Demonstrator in Europe), an experimental wing design that is being test-flown this year. BLADE is an attempt to create a wing that has no irregularities to disrupt the smooth flow of air over its surface. This, too, is intended to reduce drag. BLADE wings have no joints, and therefore no rivets or fasteners, and have smooth, glossy surfaces. They may also be fitted with flaps that deflect insects during take-off and landing.

The delta-wing dream will, nevertheless, not quite go away. In theory, the optimum shape for an aircraft that relies on fixed wings to provide its lift is such a delta, with wings and body blended together so that the whole structure provides lift. Designs for such vehicles pop up from time to time, and might make effective freighters. Whether passengers would like them, though, is moot. Most seats would be a long way from a window, and evacuation in an emergency might be hard. ■

▶ those used in airframes; and for components that need to be heat-resistant, ceramic-matrix composites, in which both fibres and matrix are made of a material such as silicon carbide. At the moment, GE leads the way in the use of these materials in engines. It has been making carbon-fibre blades for its turbofans since the 1990s. In the case of LEAP this halves the number of blades required, compared with its predecessor, the CFM56, from 36 to 18. GE also makes extensive use of additive manufacturing, commonly known as 3D printing, which permits the manufacture of shapes—including weight-saving voids—that conventional manufacturing can manage only with difficulty, if at all.

Rolls-Royce, meanwhile, is planning to go the whole hog, using a gearbox, carbon-fibre blades and a range of ceramic-matrix composites in what it calls its “ultrafan” technology, which it hopes will permit bypass ratios above 15. Ultrafan will also make use of additive manufacturing. And, naturally, every component in an ultrafan engine will have its digital twin in Rolls-Royce’s computers, keeping track of what is happening to it and flagging up any maintenance-related issues.

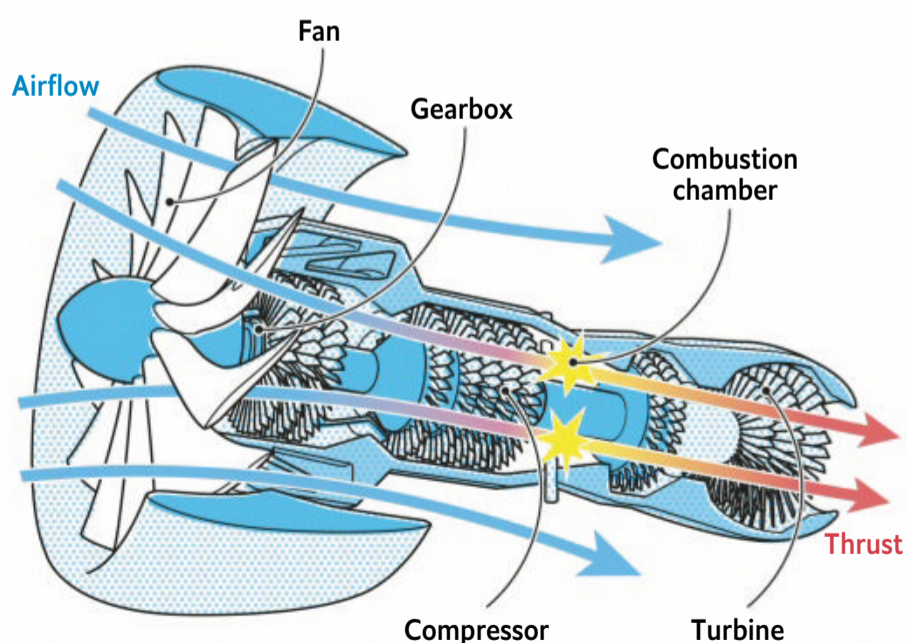
Our friends electric

In the end, though, all these improvements to turbofans lead simply to better turbofans. The propulsion systems of large passenger aircraft seem unlikely to change radically from this arrangement in the foreseeable future. But that is not the case for small passenger aircraft. There is now a real possibility that many of these will be converted to electric propulsion.

The aircraft in question are those driven by propellers. Replacing piston engines, or even turboprops, with electric motors would have several advantages. One is that such motors are easier and cheaper to maintain. Another is that they are quieter, which would make planes using them popular at urban airports with a lot of neighbours. A third is that, depending on how the electricity is generated, electric propulsion sometimes offers a saving in greenhouse-gas emissions.

As is also true of electric road vehicles, the terminology of electric aircraft has become confused. An electric motor is an electric motor regardless of where the electricity comes from. There is a tendency, however, to refer to motors supplied only by batteries as

Replacing piston engines with electric motors would have several advantages



Geared turbofan

A gearbox allows a bigger fan to rotate more slowly than the rest of the revolving components, to push an even larger volume of air around the jet’s core

Source: *The Economist*

“pure” electric systems, whereas those that employ both batteries and an on-board generator are known as hybrids.

In an aerial context, where weight is everything, a large or long-distance electrically propelled aircraft will, for the moment, have to be a hybrid. Existing batteries cannot store enough juice per kilogram to allow otherwise—though, as Grazia Vittadini of Airbus observes, lithium-ion batteries are improving by one or two per cent a year. And, like compound interest, such incremental change adds up.

For small, short-haul planes, however, today’s batteries will suffice. One airline running such services has already announced that it is going down the electric route. On March 26th Harbour Air, a firm in British Columbia, Canada, made public a deal with magniX, an aspiring manufacturer of electric motors for aircraft. Harbour Air will, if all goes according to plan, fit its fleet of around 40 seaplanes with magniX’s motors, using lithium-ion batteries as the power pack. The first in line for conversion is a six-seater, but the largest plane in the fleet has three times that capacity.

Harbour Air may not be alone for long. Ampaire, a firm in Hawthorne, California, hopes, later this year, to do something similar in collaboration with Mokulele Airlines, a Hawaiian company. Mokulele’s planes, unlike Harbour’s, touch down on runways.

Fitting existing airframes with electric engines is clearly the quickest way of getting electricity-driven aviation airborne. But it may not, in the longer run, be the best. Most of the firms that plan to launch electrically powered regional aircraft are starting from scratch, using airframes made from carbon-fibre-reinforced plastics as well as specially designed motors.

Alice goes to Paris

The most advanced of these startups is Eviation, an Israeli firm. Its proposal, called Alice, is a pure-battery system intended to carry nine people 1,000km. Alice has three engines, supplied either by magniX or by Siemens, a German engineering firm, at the customer’s choice. These are mounted, one on each wing tip (where they also serve to reduce drag) and one at the stern, with the propellers facing backwards to push the plane through the air. A prototype, built in north-west France, awaits certification. Eviation hopes to fly it thence to the country’s capital and show it off at the Paris air show in June.

Several other firms, mostly American, are following in Eviation’s wake with proposals to build aircraft of similar range and capacity. Most of their designs, however, differ in one important respect from Eviation’s. They use ducted fans rather than propellers. These are more efficient at producing thrust, and also quieter.

Ampaire, for example, has a proposal it calls “Tailwind” that would be pushed along by a single such fan at the stern. Zunum Aero, in Seattle, proposes two ducted fans mounted on the sides of the fuselage, near the rear. And Wright Electric, a firm in Los Angeles, backed by Larry Page, a co-founder of Google and now boss of Google’s parent company, Alphabet, has teamed up with easyJet, a British airline, with the aspiration of producing a nine-seater with enough range to be able to fly from London to Amsterdam.

Just how far electrification can be pushed is unclear. Airbus seems to think it could be quite a long way. It has teamed up with Rolls-Royce and Siemens to electrify an example of a 100-seater regional aircraft called the BAe146. This project is intriguing, not least because the plane is not even a propeller aircraft to start with. It is powered by turbofans.

The consortium is proceeding cautiously, and will replace only one of the 146’s four engines on the test runs planned for next year. If those go well, a second will be swapped, too. It is hard to imagine an electric version of a plane like a 146 being purely battery-powered. But even a hybrid version of a plane that large would demonstrate that electric engines could have a big future in aviation. ■

Avionics

Drop the pilot

There will be resistance, but crewless planes are on their way

LAST YEAR Boeing's Pilot Outlook report estimated that civil aviation will require 790,000 new commercial pilots over the next two decades. Of those, 261,000 will be needed in Asia and 206,000 in North America. One approach to this problem is to open more flight schools. An alternative is to need fewer pilots. And that requires better technology.

The first autopilot was invented surprisingly early in the history of aviation, in 1912, less than a decade after the Wright brothers' original flight. It used a gyroscope and altimeter to operate a plane's control surfaces to keep it flying straight and level. Since then, autopilots have evolved into flight-management systems that can run almost every part of an aeroplane's journey except taxiing and take-off, and even those are starting to come under automatic control. As recent events have shown, flight-management systems are still not good enough to be trusted completely when lives are at stake. But in a world where automated drones such as America's Global Hawk reconnaissance vehicle routinely fly military missions, and self-driving vehicles are talked of as if they were just around the corner, the question of how large a civilian flight crew needs to be is clearly open for debate.

It is also a pertinent question for the armed forces. In particular, pilotless aircraft can be sent on missions too dangerous for people, and possibly ones that piloted craft would be incapable of performing. This could change how future wars are fought.

Both Airbus and Boeing are preparing for at least a single-pilot commercial-aviation world. Such a world will require not only reliable flight-management systems, but also a redesign of the cockpit for one-person operation. Both firms are now testing simulators of such cockpits. Airlines are keen. A report published last year by UBS, a bank, suggested that moving to single-pilot operation could save the world's civil-aviation companies \$15bn a year. Going fully pilotless would increase that figure to \$35bn.

Moving to single-pilot operation would require an aircraft's flight-management system to be good enough to take over in a medical emergency that incapacitated a lone aircrew, flying the plane to a nearby airport and landing it safely. For all practical purposes that is true already. It is only during take-off that the human touch is still widely regarded as necessary. Pilots' unions say they are worried about the ability of a single pilot to handle an emergency brought about by a problem with the aircraft itself, such as an engine failure. But how necessary it is to have two crew members to deal with such exceptional circumstances is moot.

Cargo flies itself

Even so, automated flight systems are an area where the innate conservatism of aviation technology manifests itself. For example, flight-control software for civil aviation cannot easily take advantage of the "deep learning" capabilities of artificial intelligence. Regulators are loth to license anything they cannot understand. But the whole point of deep learning is that it reprograms itself in unpredictable ways in response to circumstances. That would be of huge benefit, for it would permit the autopilots of individual planes to learn from each other's experiences.

In civil aviation, then, passenger aircraft are likely to remain twin-crewed machines for some time. But that may not be true of freighters. There would be no customer resistance here either to single-pilot operation or even to full dronification, as soon as that

is possible. And if pilotless freighters proved safe, in a world in which self-driving cars had also become commonplace, passengers' attitudes might change.

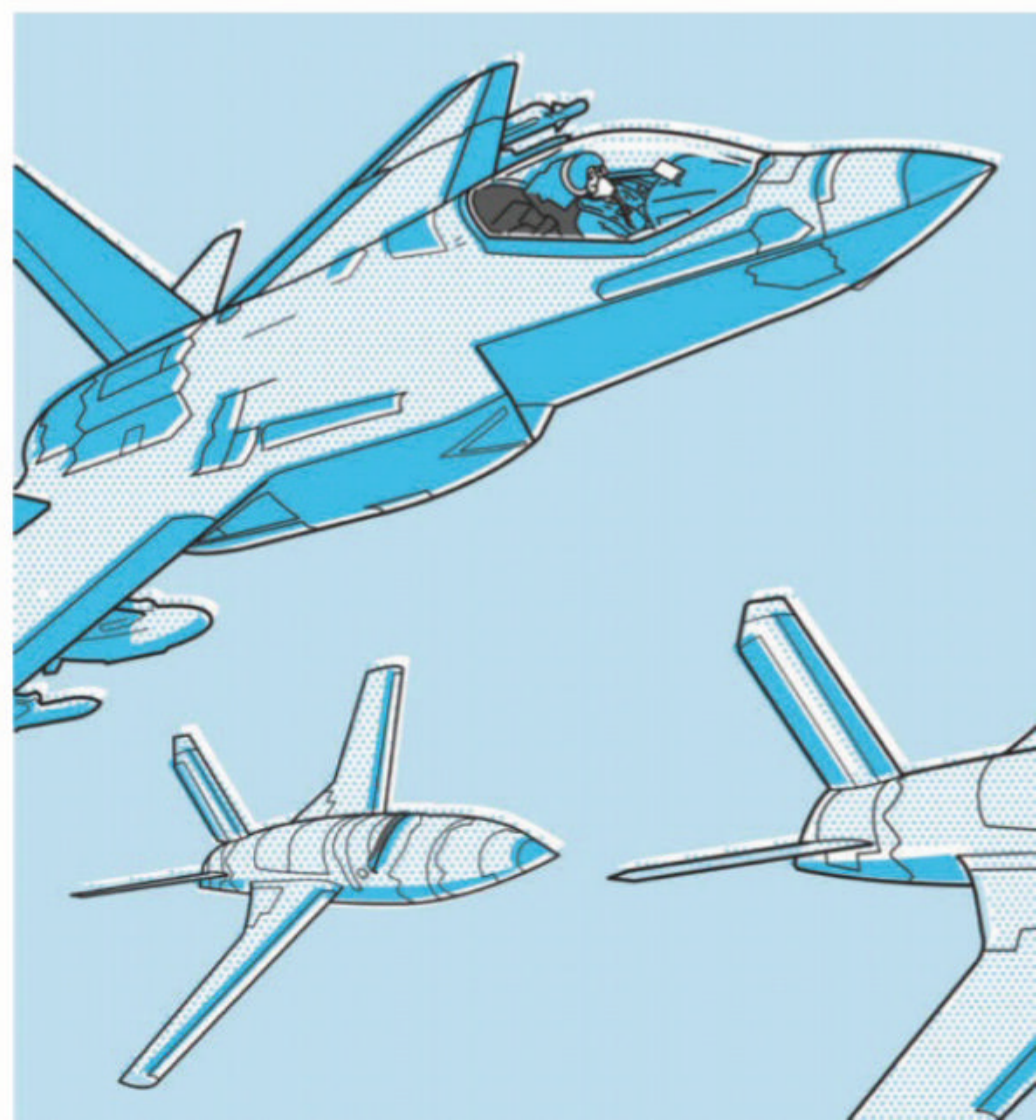
In America's armed forces the next set of aircraft likely to drop the pilot is helicopters. Much of the work is being conducted under the aegis of the Defence Advanced Research Projects Agency, or DARPA, a research arm of America's defence department. As part of its ALIAS (Aircrew Labour In-Cockpit Automation System) project the Sikorsky Aircraft Corporation, which is the helicopter division of Lockheed Martin, has refitted one of the firm's S76-B commercial models to be able almost to pilot itself.

As Chris Van Buiten, vice-president of innovations at Sikorsky, observes, flying a helicopter is far harder than flying a plane. Helicopters are aerodynamically unstable, so simply keeping them straight and level is a challenge. But the whole point of a helicopter is that it does not just fly straight and level. It can dodge around to avoid obstacles, meaning it can hug the ground—all of which adds to the mental effort of controlling it. And it is often deployed in weather that would make a fixed-wing pilot think twice.

MATRIX, as the company dubs its experimental helicopter copilot, has a central processor that receives signals from a range of sensors, and combines these with data from the Global Positioning System and a map of the local terrain stored in its memory banks. The processor then sends appropriate signals to actuators located in various places around the craft's airframe, to control its mechanical systems. The mission-instructions themselves come from MATRIX's human commander, via a tablet computer, but Mr Van Buiten hopes that voice-recognition systems will soon become reliable enough for those instructions to be spoken.

One of the advantages of MATRIX is that it can respond much faster than a human pilot. This is valuable in normal circumstances. In an emergency, it may be crucial. It can, for example, react to an engine failure, assess a score of options for a forced landing, and recognise which is safest, all within a hundredth of a second. A human pilot would need a couple of seconds just to work out what was going on.

The next step on its journey, which should happen in the au- ▶▶



turn, is to test the system on Sikorsky's Black Hawk helicopter. Here it really will, on many occasions, be in sole charge. Field commanders will, as Mr Van Buiten puts it, have the option of two, one or no human pilots on board.

The ideas behind ALIAS are not confined to helicopters. Until 2017 DARPA followed a twin-track approach—the other track being to sponsor Aurora Flight Sciences, a subsidiary of Boeing, to make a system that would physically replace the co-pilot in the cockpit of a fixed-wing aeroplane. Aurora came up with a pair of devices to do the job. One was a specially designed manipulator that operates the aircraft's control yoke and pedals. The other was an adaptation of a commercially available robotic arm that pulled appropriate levers and flipped relevant switches. The system also had vision. Rather than being wired to an aircraft's sensors, it read the instrument display directly and then reacted.

The advantages of this arrangement are obvious. With appropriate programming it would permit the dronification of any existing aircraft. Aurora tested it on two types of fixed-wing plane and also a UH-1 Iroquois helicopter. It was even put through its paces at the controls of a Boeing 737—though those controls were installed in a flight simulator rather than a real aircraft.

Into thin air

What has happened to all this hard work is a mystery. Although DARPA has stopped paying for Aurora's part of ALIAS the firm will not comment on how it is pursuing the matter. The project, now branded Robotic Copilot and described as a "concept development programme", is still on its website, however. And the idea of something that could take the controls of an existing plane with little modification seems an attractive one in the civilian world as well as the military one.

As to future pilotless aircraft, significant benefits come from designing people out from the beginning. Such craft require neither cockpits nor life-support systems. Moreover, freed from the need to sustain a human pilot, they could accelerate faster and

The idea is to have strike aircraft fly in small squadrons, with a single human acting as squadron leader



manoeuvre more nimbly than is possible for a crewed plane.

That manoeuvrability and acceleration would be particularly advantageous for a fighter jet. And, although autonomous robot fighters are not here yet, something close to that will soon be flying. The idea is to have strike aircraft fly in small squadrons, with a single human acting as squadron leader.

Lockheed Martin tested this idea in 2017 by converting an F-16, an ageing fighter jet, to act as a drone under the command of a piloted lead aircraft. These tests, conducted at Edwards Air Force Base in California, were deemed successful, and one possible version of the future would be to fit out and deploy the American air force's fleet of increasingly obsolete F-16s in this way, while a human master of ceremonies sat in a more modern craft—presumably an F-35—conducting the escorts' actions. Another version of the future sees the robot craft involved in these formations, known as "loyal wingmen", as being purpose-built. Boeing, indeed, seems to have appropriated and capitalised the term Loyal Wingman to describe its Airpower Teaming System, which was unveiled on February 26th.

Boeing's offering will be 12 metres long, about three-quarters the length of an F-35. Prototypes should fly next year. Intriguingly, the announcement was made, and the prototypes will be built, in Australia—for the Airpower Teaming System is being developed in collaboration with Australia's air force and is intended from the beginning to be available to America's closest allies, Australia apparently being top of the list.

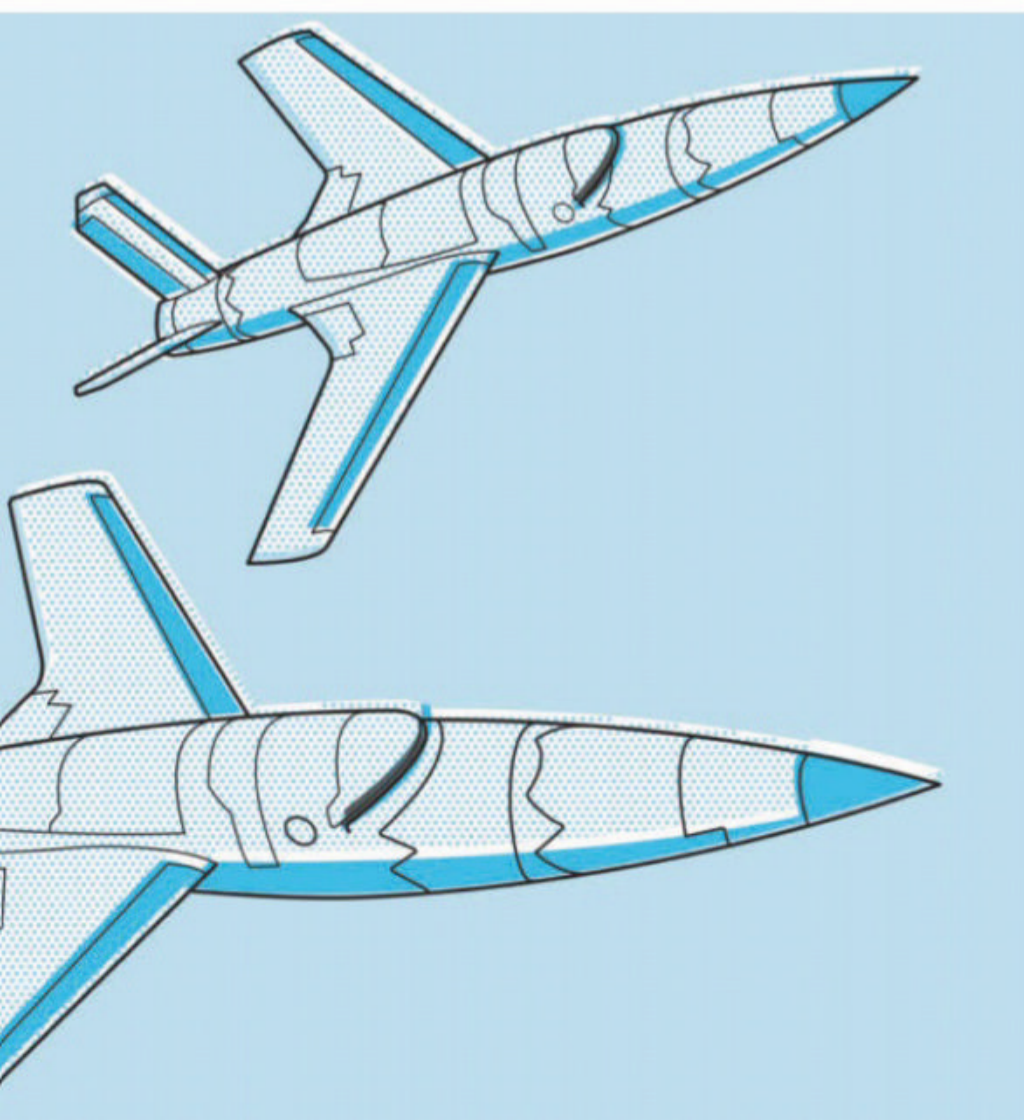
Boeing's loyal wingmen are not the only ones in development. Kratos, a Californian firm that builds drones used by pilots for target practice, is also working on them. Its first test craft, the UTAP-22 MAKO, based on a target drone, has been flying since 2015. A more advanced vehicle, the XQ58A Valkyrie, took to the air on March 5th, making a successful test flight at Yuma in Arizona. Details of Valkyrie are scarce, but pictures of it suggest the extensive use of stealth technology by its designers.

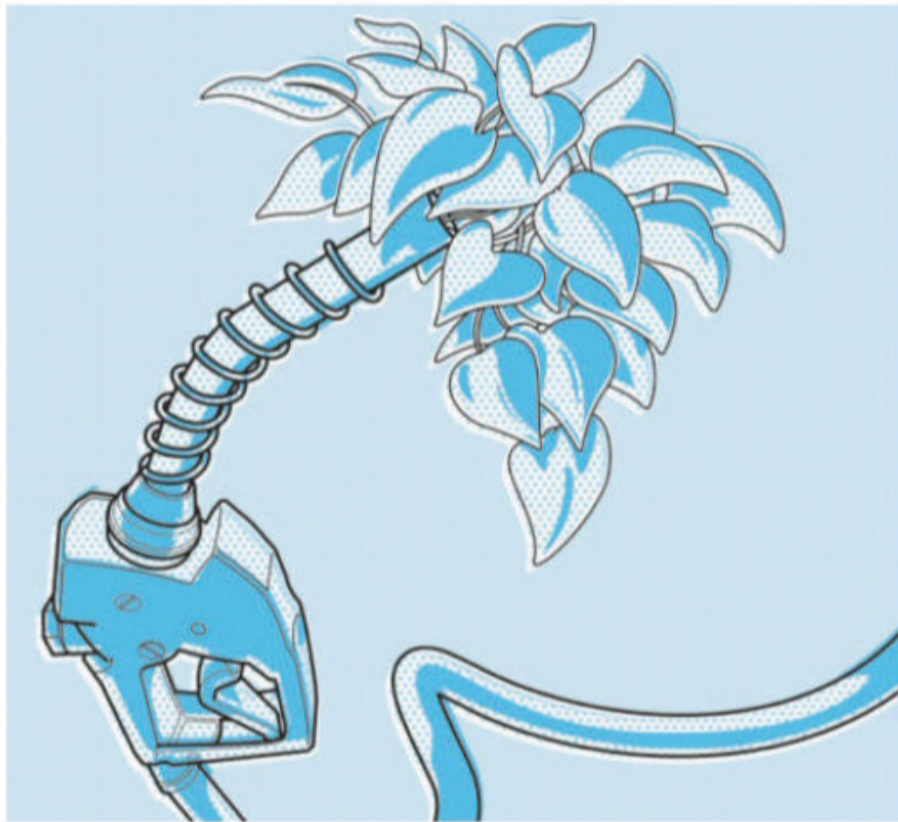
In the field of military drones, America has only one open rival at the moment: Israel. Its state-run arms firm, Israel Aerospace Industries, produces a reconnaissance drone called Heron. Europe, by contrast, is playing catch-up, and China has said little.

Europe's competitor to America's drones, the snappily titled European Medium Altitude Long Endurance Remotely Piloted Aircraft System, is being put together by Airbus, in collaboration with Dassault Aviation of France and Leonardo of Italy. It should be ready for deployment by 2025. There are no European plans, though, for loyal wingmen. China's military-drone programme is the purview of the Shenyang Aircraft Corporation, a subsidiary of the Aviation Industry Corporation of China, a state-owned company that is based in Liaoning province. This firm has developed a series of experimental drones with names like Wind Blade, Cloud Shadow and Sharp Sword. As far as is known, however, China has no production-model military drones.

America, meanwhile, is looking beyond the vision of loyal wingmen. Both DARPA and the American air force seem to be trying to scale down the size of unmanned aircraft, in favour of numbers. DARPA calls its programme Gremlins. And it is at the heart of the air force's Small Unmanned Systems Flight Plan, published in 2016.

Gremlins will be drones about four metres long, with a wingspan of 3.5 metres, that are dropped, mid-air, from transport aircraft and then picked up again, mid-air, by that mother ship or a similar one, if they survive their mission. DARPA's contract for the Gremlins programme is held by Dynetics, a firm based in Alabama, and the first test of the craft, pushing some of them out of the back of a C-130, is scheduled for later this year. What they lack in size, Gremlins will make up for in quantity—the idea being to overwhelm enemy defences as a swarm of wasps overwhelms a picnic. If it works, that will create a whole new form of aerial warfare. ■





Aviation and the environment

Smoking grass

Aviation biofuel is a nice idea, but is unlikely to fly for now

COMPARED WITH electricity generation (44%), road transport (17%) and even cement-making (4%), aviation, at about 2%, is not a huge source of man-made greenhouse-gas emissions. But it is a source, and it is growing fast. The International Civil Aviation Organisation, an arm of the UN, forecasts that such emissions could rise between three- and seven-fold by 2050 if nothing substantial is done. More efficient engines (see chart) and the introduction of a certain amount of electrification will help, but will only cut into this growth rate, not reverse it. To do that would require the fuel itself to be made “carbon-neutral”.

That is not the same as carbon-free. The chemistry of what went into an aircraft’s fuel tank would change little, if at all. Rather, the idea would be to borrow the carbon in the fuel from the air, in the form of carbon dioxide. Then, add energy and hydrogen and remove the oxygen to turn it into appropriate hydrocarbons, and release the energy added in the same way that the energy in conventional fuel is released—by burning the fuel in a turbojet that then turns a turbofan or a propeller. As long as the added energy was not itself derived from fossil fuels, this would not add to the natural stock of atmospheric CO₂.

Though plans exist to build machines which would suck the carbon for this process directly out of the air, doing so on an industrial scale would be a heroic endeavour. Such carbon-capturing machines already exist in nature, though. They are called plants.

Chemically, there are at least half a dozen ways of turning plant matter into aviation fuel. Two stand out. One is called HEFA

(Hydroprocessed Esters and Fatty Acids). The other is the Fischer-Tropsch process.

The raw material for HEFA is plant oils. One of the attractions of this is that the oils in question can be cast-offs, like used cooking oil, that would otherwise be thrown away. At small scale, HEFA can therefore rely on recycled waste products as its raw material. Plant oils and their derivatives (the esters and fatty acids in the process’s name) are similar to the hydrocarbon molecules in petroleum-based aircraft fuel, but need to be stripped of their oxygen atoms to become identical. HEFA does that by getting them to react with hydrogen, in the presence of a catalyst. The oxygen atoms are carried away either in water molecules or in molecules of carbon monoxide or carbon dioxide, depending on the details of the process.

Just how green HEFA is depends on the source of the hydrogen. Ideally, it would come from the electrolysis of water, the electricity involved having, in its turn, been generated by some fossil-fuel-free method such as solar, wind or nuclear power. Unfortunately, the main source of industrial hydrogen at the moment is steam reformation, a two-stage operation in which methane and steam react together to make hydrogen and carbon dioxide.

The Fischer-Tropsch process is a well-established set of chemical reactions (it was invented in 1925) that have, in the past, been used to convert both coal and natural gas into liquid fuels. It takes carbon-rich material from whatever source and reacts it with steam in a manner identical to the first stage of steam reformation. This produces a mixture of hydrogen and carbon monoxide known as syngas, which can be further reacted, using appropriate catalysts, to produce hydrocarbon molecules of the desired size. To make aviation fuel, for example, those molecules should have between eight and 16 carbon atoms in them.

Both of these approaches work chemically. But they also have carbon footprints of their own, and therefore reduce global warming by different amounts. According to a report published in 2017 by Imperial College, London, preparing and burning aviation fuel made by HEFA from used cooking oil yields a 69% saving of carbon-dioxide emissions compared with those created by refining and burning aviation fuel made from petroleum. Used cooking oil is, however, in finite supply. Start with fresh oil, as would be needed if a significant fraction of aviation fuel were to be made this way, and the saving drops to 20-54%. For the Fischer-Tropsch process, using fast-growing grasses known as energy crops, the saving is 85-90%, rising to 95% if leftover wood from forestry is the feedstock.

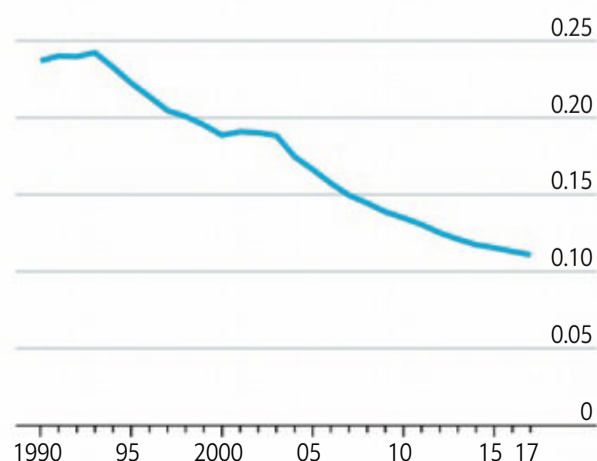
On the face of things, then, the Fischer-Tropsch route looks the better one. It may also be the cheaper. For HEFA, the price of the vegetable oil alone, unless it is waste, already exceeds the cost of petroleum-based aviation fuel. And waste oil is a drop in the ocean of the raw materials that would be required for biofuels to make a

dent in CO₂ emissions. Energy crops are a lot cheaper than that. The Fischer-Tropsch process does, however, require enormous capital investment in the necessary plant. In this regard HEFA is cheaper.

Unfortunately, if they are to meet a significant fraction of the demand for aviation fuel, both of these methods will require a lot of land to grow their raw materials. But this could change. In particular, there are hopes that the new field of synthetic biology will come up with ways of generating esters and fatty acids in fast-growing micro-organisms—or even arrange for those micro-organisms to synthesise the relevant hydrocarbons directly. That would reboot everyone’s calculations, and have ramifications far beyond the field of aviation. For the moment, though, the outlook for bio-aviation fuel is glum. ■

Getting there

Global passenger flights, CO₂ emissions
kg per revenue passenger kilometre



Source: IATA



Faster than sound

Tomorrow never dies

Breakfast in London, dinner in Sydney

ON OCTOBER 24TH 2003 Concorde made its last commercial flight. It carried a full load of passengers, 100 of them, from New York to London. And it did so in three and a half hours. It was able to make the journey so rapidly because its top speed was Mach 2.04—just over twice the velocity of sound.

In its day, Concorde was a superb piece of engineering. But it was also a vanity project, cooked up in the early 1960s by the British and French governments. Issues like profit were ignored. However superb the engineering, with the technology then available the profitable operation of such a plane was impossible.

Technology moves on, though, and several truly commercial undertakings think the time is now ripe for something similar. Most of the running is being made by three American firms, Aerion, Boom and Spike. Aerion's offering, the AS2, is a 12-seater intended to fly at Mach 1.4. Overture, the aircraft planned by Boom, will get to Mach 2.2. It will carry 55-75 passengers. Spike's proposal, the S-512, lies between these extremes. It is intended to carry 18 passengers at Mach 1.6. All three firms think that improvements in materials, engine design and the understanding of aerodynamics mean their proposed craft can be operated profitably and without too much discomfort, in the form of sonic booms, to those on the ground below.

In February Aerion signed a development deal with Boeing. It also has an arrangement with GE to develop a supersonic engine called Affinity, capable of operating efficiently both subsonically and supersonically. The plan is to attach these, three at a time, to an airframe built by Spirit AeroSystems, a large manufacturer of airframe components. And all this will come to pass, Aerion claims, by 2023—the current target for the AS2 to take off.

Boom has yet to announce a propulsion system for Overture. But it, too, has development money, having received a tranche of \$41m in venture funding in 2017 and a further \$100m this January. And it will soon have a prototype, a one-third-scale aircraft that it calls Baby Boom. This is powered by three of General Electric's J85-15 engines—the military versions of the CJ610, an established workhorse of business jets. All being well, Baby Boom will take to the air early next year and fly at Mach 2.2.

Like Boom, Spike has yet to pick an engine, though it plans to do so by the end of the year. It also plans a subsonic demonstration flight in June, and a supersonic demonstration next year. Whether supersonic commercial aviation really will work this time should thus be clear by the mid 2020s. A few visionaries are, however, looking beyond the merely supersonic. They want to go hypersonic—beyond Mach 5. That would make it possible to fly to an airport's antipodes in less than four hours.

At this speed the physics get scary. Air entering a hypersonic jet engine would be travelling at more than 1.7km per second. Slowing this air down sufficiently for it to be manageable would convert its kinetic energy into heat so intense that it would melt most of the

materials of which such an engine might be made.

All this explains why existing hypersonic vehicles—namely satellite-launchers—are rocket-propelled. A rocket carries its own oxidant and so does not need to breathe air. The only alternative that has been tested experimentally is called a supersonic-combustion ramjet. This does not require the incoming air to be slowed down to the same extent as a turbofan. But it has to be accelerated to Mach 5 to start operating, usually by a rocket.

A small British company called Reaction Engines does, however, have an alternative on offer. Skylon, as it calls its design, would be powered by engines able to switch between air and liquid oxygen. They are known as Synergetic Air Breathing Rocket Engines (SABRES) and would be fuelled by liquid hydrogen, which has a temperature of less than 20 degrees above absolute zero. The trick, when a SABRE is in air-breathing mode, would be to use this coldness to absorb heat generated by the inrushing air before it could cause damage. A heat-exchanger intended to do this was tested successfully in April.

At best, the chances of a tiny team working in the metaphorical equivalent of a garden shed cracking the problem of air-breathing hypersonic flight are slim. But perhaps they are not zero. The fundamental design looks sound, and there has, over the years, been enough interest from outsiders such as Boeing, Rolls-Royce and BAE to keep the dream alive.

If Skylon does eventually fly, its first use is likely to be as an unmanned space plane carrying objects into orbit. But one day, perhaps, it or a successor will—for those rich enough—make popping over to Sydney for a weekend break seem just the thing. ■

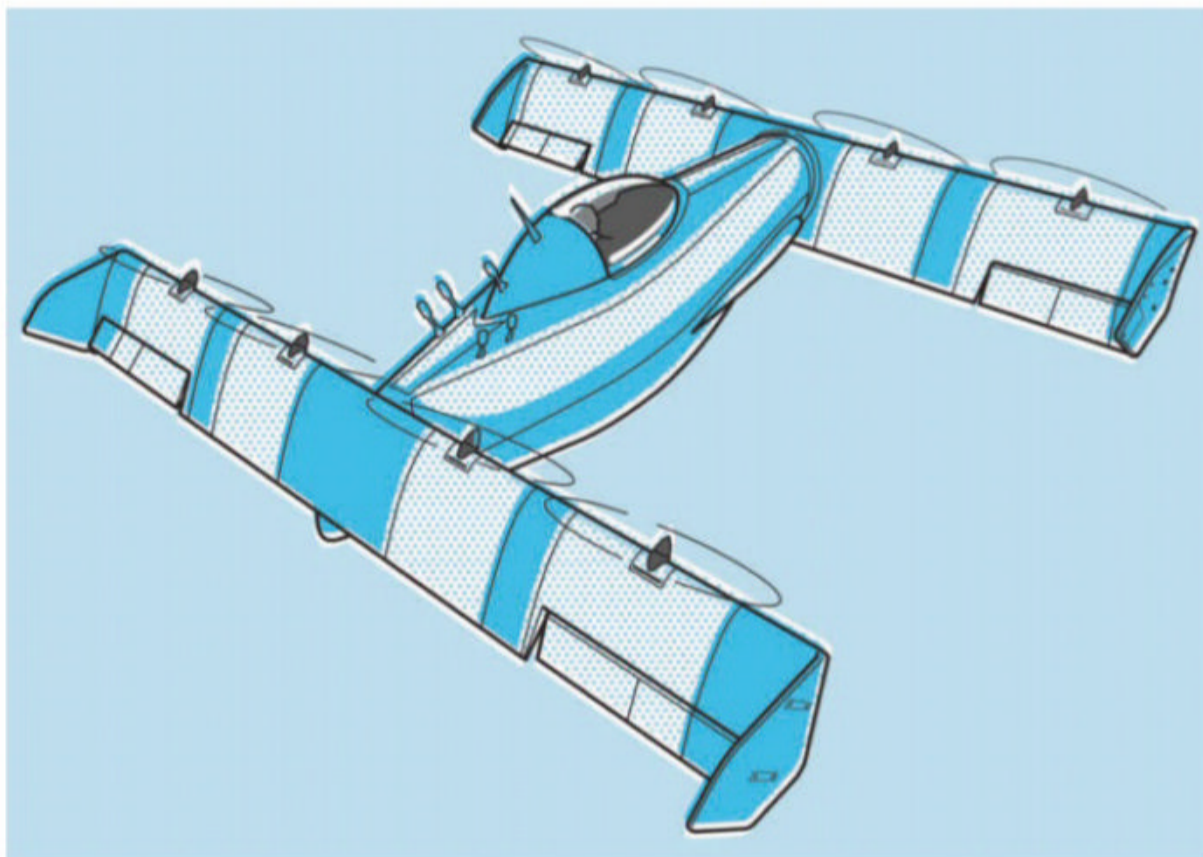
Urban air mobility

Where's my flying car?

It's almost here, but not quite as you expected it

BLACKFLY IS ONE of the strangest flying machines yet built. Its body resembles a small whale—though, when flying, the whale is facing backwards. Attached to its nose and tail are two wings, angled to the horizontal. Each wing sports four propellers. Seen from below when airborne, the thing resembles a slightly flattened letter H (pictured, overleaf). Its inventor, Marcus Leng, and its sponsor, Larry Page, co-founder of Google, hope it will spawn a transport revolution.

People have talked of flying cars for years, with little to show for it. In part that is because they took the idea of being car-like too literally. In part it was because the technology was not yet available to build them. Blackfly in no physical way resembles a car. It is a single-seater, and wheelless (its convex belly means that it can land on most surfaces, rocking its way to stability after landing so that it needs no undercarriage). Yet it is aimed at the car-owning classes. It has a car-like cruising speed of 100kph (62mph), and a range of between 40 and 60 kilometres. More than 95% of domestic car journeys undertaken in America are shorter than 50km, and a majority involve only the driver. ▶▶



- ▶ As to technology, Blackfly has a carbon-fibre airframe, electric motors for propulsion, lithium-ion batteries to provide the power, and smart software to stop the pilot accidentally killing himself or anyone else. Moreover, Blackfly has been designed so that it qualifies, in America, as an ultralight. That means the person flying it is required to have neither licence nor training (though the firm will, in practice, insist on customers undertaking an induction course before they take delivery).

Urban air mobility is the buzz phrase behind Blackfly. And the firm is not alone. A bunch of companies, many of them, like Opener, founded specifically for the purpose, have come up recently with a plethora of designs for single or two-seat personal air transport. That is catnip to technophiles like Mr Page.

Like Blackfly, most of the new designs derive their motive power from arrays of electrically driven propellers, an arrangement pioneered by the small, “multicopter” drones that took to the air a decade or so ago. Some firms have simply scaled drones up. One such is eHang, a Chinese outfit that was already in the drone-manufacturing business before the idea of urban air mobility took off. eHang’s two-seater, the 216, was unveiled on April 4th at a show in Vienna. It has a cabin that sprouts eight struts, each fitted with two propellers. Unlike Blackfly, which is piloted by its occupant, the 216 will be, at least to start with, a robot, for eHang’s initial plan is to run the craft as taxis rather than private vehicles.

Another firm building a scaled-up drone is Volocopter, a German startup. The two-seat cabin of its eponymous vehicle is attached below an 18-propeller structure that resembles a spider’s web built of curved strands of silk. This, like eHang’s craft, will offer a preprogrammed point-to-point service for avoiding traffic jams. A second German company, Lilium, has another approach. Its prototype, which has rear-mounted wings, a pair of canards and is propelled by electrically powered ducted fans rather than propellers, made its maiden flight in May.

Back in Silicon Valley Kitty Hawk, yet another firm part-owned by Mr Page, has also added wings to provide extra lift. Its two-seater, Cora, has 12 small lifting propellers and a single, large, rear-mounted one to drive the thing forward when in flight. And Airbus’s special-projects unit, A³, also based in Silicon Valley, has come up with Vahana, a craft that has four rotatable propeller-laden wings. These point upwards for take-off and landing, and forwards for level flight. Even Boeing has belatedly joined the party,

having unveiled its own, so far nameless, offering in January.

Unlike everything else discussed in this report—even the return of supersonic passenger aircraft—urban air mobility has the potential to change the way society works. It is not exactly a disruptive technology, at least not yet. Planes, trains and automobiles will continue to run more or less as now. But if flying cars really take off, as it were, it would be a transformative technology, for local transport networks would surely change quite a lot.

As with supersonic passenger planes, the private firms involved in this field have a tendency to make optimistic claims. But some really are getting close to commercial operation. In April eHang received permission from the Chinese government to begin test flights, such as island-hopping, with passengers. Volocopter will be conducting trials of its craft in Singapore later this year, also with a view to starting an air-taxi service. And Opener plans to start making Blackfly commercially by the end of the year. One city to keep a particular eye on is

São Paulo, in Brazil, where the authorities already permit taxi journeys by helicopter to avoid the crowded streets below. Success there would be a model for other large cities, particularly ones in middle-income countries that also have inadequate roads.

Coming, ready or not

Integrating such taxis into air-traffic-control systems should not be too hard. One model of the future is that, as has been suggested for ground cars, increased automation will mean people just call for a flying car when they need one, and it will fly in to pick them up, flight plan filed and ready. Moreover, there are fewer obstacles and surprises in the sky than on the ground, so pilotless flying cars may be easier to build than driverless road cars. If firms like Opener have their way, though, private pilots will buy them for the sheer joy of being in control. That will require new air-traffic-control systems, perhaps ones in which craft talk directly to one another, rather than being centrally managed.

Back in the more mainstream part of aviation, too, the future looks bright. Fleets are growing as more people in more parts of the world can afford to travel. To pluck another analogy from the unification of Italy, it was said then that “railways will serve to sew up the Italian boot.” The growth of air transport is doing something similar to the planet. Despite recent tragedies, flying is getting safer. It is also getting cheaper and, at least on a per passenger-kilometre basis, greener. The Hegelian synthesis of technological conservatism and innovation that governs the field is, both literally and metaphorically, delivering. ■

ACKNOWLEDGMENTS A list of acknowledgments and sources is included in the online version of this Technology Quarterly

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The European Parliament elections (1)

All the colours of the rainbow

BRUSSELS

Fragmentation comes to the European Parliament. It might improve it

THE MOST eye-catching political development in Europe recently has been the surge of nationalist populism. The Brexiters in Britain, Marine Le Pen in France and the Alternative for Germany (AfD) have transformed their countries' political landscape. Italy and Poland are both governed by anti-establishment Eurosceptics. Viktor Orbán's political dominance in Hungary is undermining liberal democracy and enriching the strongman's friends and cronies. Many European nationalists have borrowed tactics from President Donald Trump. Steve Bannon, Mr Trump's one-time strategy chief, even toured the continent hoping to turn the five-yearly European Parliament election into a repeat of his ex-boss's triumph in 2016.

The four-day election, the world's second-largest democratic exercise after the Indian one, concluded on May 26th. Some 214m Europeans cast their ballots. At first glance, the results looked good for the Bannonite tendency. The Northern League of Matteo Salvini, Italy's deputy prime minister, saw its share of the 751 seats in the EU's

legislature rise from five to 28. The Brexit Party triumphed in Britain to become the largest national party in the new chamber. Ms Le Pen's National Rally beat Emmanuel Macron's liberal slate to win in France. A closer look, however, reveals a more mixed pattern. The populist advance in Europe has slowed. Responsibility for that lies not with Mr Bannon, whom few of his hosts took seriously anyway, but with a broader trend: the fragmentation of the European party landscape.

The three nationalist groups in the parliament gained seats overall. But their joint share rose only very modestly, from 21% to 23%, far below the one-third predicted. Without Mr Salvini's Italian triumph they

would have lost votes overall, as they did in many member states. Relative to the previous election, in 2014, Ms Le Pen in France, the hard-right Freedom Party in Austria and the nationalist Danish People's Party all lost ground. So did Eurosceptic parties, taken collectively, in the Netherlands. In Germany the AfD only modestly increased its vote share, its disappointed leadership blaming a scandal in neighbouring Austria for the flop. Even in half-way-out Britain the Brexit Party—though seemingly coming from nowhere—was in fact largely cannibalising the old United Kingdom Independence Party's vote. It is led by Nigel Farage, UKIP's former leader.

The big losers, it is true, were the two groups or families that have long dominated the European Parliament and European politics more widely: the centre-right European People's Party (EPP) and the centre-left Socialists and Democrats (S&D). The seat tally of the EU's unofficial "grand coalition" fell from 412 seats last time (55%) to 332 seats (44%). But it ceded these seats primarily to liberals and greens, who together gained 57 seats, or eight percentage points of the total. This shift occurred particularly in western Europe—with Mr Macron's "Renaissance" list entering the parliament with 21 seats and Germany's Greens doubling their share, to 21. But there were also traces of it in supposedly reactionary central Europe. In Slovakia and Romania pro-European, anti-corruption forces came first and second respectively. ▶

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► The fragmentation follows the pattern of recent national elections. The decline of big-tent parties and the rise of smaller rivals have made forming governments harder. Take Spain, where a two-party system has become a five-party one and decades of stable government have given way to a spate of wobbly, short-lived governments that have struggled to pass important laws. Yet the picture at a European level is not nearly so gloomy. The European Parliament's problem has never been its inability to marshal deals and coalitions. No party alone has ever held a majority there, and yet the assembly passes about 90% of the legislation it considers in a process of "codecision" with national governments.

An end to squishy consensus

What the parliament has lacked is a visible political contest. But for the first time in the four-decade history of elections to the European Parliament, turnout has risen; from 43% in 2014 to 51%. This may be explained by a combination of factors. The election of Mr Trump, no fan of the EU, and the Brexit vote have both reminded voters of the union's vulnerability. New challenges that cross national borders, such as migration and economic disruption, have emphasised the EU's role. Support for the union has risen and even Eurosceptic parties talk less about leaving and more about change from within. Personalities like Mr Macron, Mr Orban and Mr Salvini—and activists such as Greta Thunberg, whose youth climate strikes have swept European cities—have become EU-wide political figures. The result is a more plural, varied legislature resting on a foundation of higher public engagement with the union.

In practice, three formations are possible in the new parliament. The first two are expanded grand coalitions. With either the greens or the liberals, the old EPP-S&D alliance would still wield a majority. But that would leave them vulnerable to rebellions, so a "super-grand coalition" could instead include all four parties for a solid majority of 131. Such an alliance would probably be

necessary to push through big votes such as that on the EU's next seven-year budget. But it would contain a vast ideological spectrum, ranging from quasi-Marxists on the left edge of the green bloc to hardened nationalists like Mr Orban (for now, though he may soon quit or face expulsion) on the right edge of the EPP.

So yet other permutations may be needed to pass some of the legislation to come in the next European parliamentary period, which could include contentious measures like budget reforms, new common border controls, a convergence of minimum wages and a carbon tax. The EPP might rely sometimes on some of the saner right-wing nationalists to forge majorities on certain economic issues where the centre-left disagrees. The S&D might rely on the hard-left to pass social and environmental measures that lack the EPP's wholehearted support. The liberal group's stance will probably decide a lot of measures. The anti-establishment right by contrast may be able to organise blocking minorities on certain matters—especially if Mr Salvini is able to forge a single dominant nationalist group—but it is divided and lacks the numbers to set the agenda on its own.

The first big test of the new arithmetic will be the parliament's vote on the European Commission president. The candidate for the EU's biggest job is nominated by national leaders but must secure the backing of a majority of the parliament—a first test of a super-grand coalition. It will also pit the union's emerging left-liberal bloc, gathered around Mr Macron, against a conservative one grouped around Mrs Merkel (see *Charlemagne*). With the decline of the EU's two big duopolies, the Franco-German alliance and the EPP-S&D majority in the parliament, this will be a first taste of the case-by-case deals and stark political differences that are bound to become more important. The European election had been billed in some quarters as a nationalist blow to the ideal of a Europe-wide politics. Instead it may come to represent the invigoration of that ideal. ■

The European Parliament elections (2)

Winners and losers

Across Europe, the elections have shaken up domestic politics, too

IT WILL TAKE weeks for the results of the European elections to take effect; the parliament does not convene until July. But in some countries events moved swiftly. Within days of the vote a chancellor was forced from office, a snap election called, a de facto leader sent to prison and some party chiefs left fighting to survive.

The ruling Christian Democratic Union (CDU) and its Bavarian ally took first place in **Germany**, but with a record low score of 29%. The Greens surged into second place with over 20% of the vote. A poor national result for the far-right Alternative for Germany masked a strong showing in the country's east, where the party came first in two of three states that will hold elections in the autumn. The biggest losers were the Social Democrats (SPD), the CDU's coalition partner, who slumped to 16% and lost a separate election in the city-state of Bremen for the first time in over 70 years.

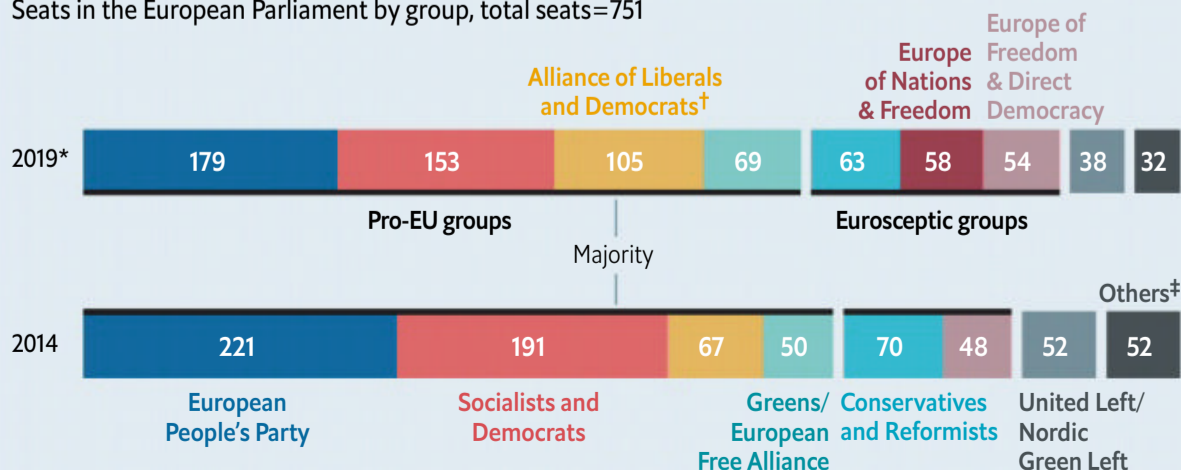
Germany's coalition is tattered but holding, for now. Yet a febrile mood has taken hold inside the ruling parties. Andrea Nahles, the embattled SPD chairwoman, has decided to flush out any internal foes by putting her leadership of the parliamentary group up for early election. But Annegret Kramp-Karrenbauer, leader of the CDU, managed to distract from the SPD's woes by appearing to suggest that YouTube commentators should be subject to regulation during election campaigns, exposing her to charges (which she denied) of opposing free speech. Inside the CDU some wonder if the gaffe-prone Ms Kramp-Karrenbauer has what it takes to succeed Angela Merkel, her mentor, as chancellor.

Elsewhere it was a mixed night for governing parties. The results in **Italy** reversed the roles of junior and senior partner in western Europe's only populist government. Matteo Salvini's nationalist Northern League doubled its tally from last year's general election to 34% of the vote; the anti-establishment Five Star Movement (M5S) crashed from 32% to 17%. The opposition centre-left Democratic Party beat expectations to take second, with 23%.

The League's triumph could tempt Mr Salvini, the deputy prime minister, to force an election and dump the M5S in favour of a coalition with other right-wing parties. But after the result he said that his loyalty to the existing arrangement had "never been in question". The bigger doubts are over the M5S. With the whip firmly in his hand, Mr ►►

The stalled insurgency

Seats in the European Parliament by group, total seats=751



Source: European Parliament

*At May 29th †Includes En Marche in 2019 ‡Includes non-attached and others



Bad news for Kramp-Karrenbauer, Dragnea and Tsipras....but Salvini triumphs

► Salvini has called for measures at which the M5S has balked, including immigration controls, infrastructure schemes and more autonomy for Italy's rich north. Alarming for Brussels, the League leader also urged a tax-cutting stimulus. Italy already risks breaching euro-area budget-deficit limits, and the European Commission is reportedly preparing to begin disciplinary proceedings. But a defiant Mr Salvini said he had been given "a mandate calmly to revisit old and outdated parameters".

In **Austria** the election provided only brief respite for Sebastian Kurz, the young head of the ruling conservative People's Party (ÖVP), amid a scandal that has shattered his government. On May 18th Mr Kurz ejected his coalition partner, the far-right Freedom Party, after a tape from 2017 surfaced showing its leader, Heinz-Christian Strache, promising government contracts to a woman he believed was related to a Russian oligarch. Perhaps benefiting from disillusionment with Mr Strache's party, the ÖVP went on to win a record 35% of the vote. But one day later Mr Kurz's government was toppled in a confidence vote. A caretaker government will take office before elections in September, in which Mr Kurz will hope to resume where he left off.

Not as bad as it seemed

Emmanuel Macron, the **French** president, will have been disappointed to lose to Marine Le Pen's National Rally (formerly the National Front), which took 23% of the vote. Yet the outcome was far from devastating. Despite 28 weeks of *gilets jaunes* (yellow jackets) protests, and Ms Le Pen's efforts to turn the election into a referendum on Mr Macron, she ended up with a slightly lower score than in 2014. Less than a percentage point separated the two lists.

Perhaps most importantly, the result confirmed the upending of politics that Mr Macron brought about when he seized the presidency in 2017 with a new party, En Marche. The mainstream parties on the left

(Socialists) and right (Republicans) together scored less than 15%. The only impressive gains came from the Greens, who took 13%. Mr Macron will now seek to reboot his presidency. He promises that policymaking will become more "human", but also to stick to reform plans for pensions, unemployment benefits and the public sector.

Nationalists struggled in the **Nordics**, especially Sweden and Denmark, against socialists and liberals. In the **Netherlands** the Labour Party secured a surprise win on the back of an energetic campaign by Frans Timmermans, a candidate to run the European Commission. But hard-right Flemish separatists did well in a general election in **Belgium**, held on the same day.

In **Poland** the ruling populist Law and Justice (PiS) party won 45% of the vote, putting it in good stead to win a general election due in the autumn. The European Coalition, an ad hoc group of anti-PiS parties led by the centrist Civic Platform (PO), will struggle to remain united after taking a disappointing 38%. With other parties in trouble, the PiS-PO rivalry will continue to dominate Polish politics. But PiS, under its leader Jaroslaw Kaczynski, is setting the agenda with generous handouts and popular slogans. PO and others are struggling to find a coherent pitch to voters.

It was a dreadful election for Liviu Dragnea, head of **Romania's** ruling Social Democrats (PSD). Voters at home and abroad turned out in droves against a government widely perceived as corrupt. The PSD took just 23% of the vote, and 80% of Romanians backed a referendum opposing the government's judicial reforms. A day after this drubbing Mr Dragnea, the architect of laws designed to reduce penalties for corruption that sparked huge protests, was handed a three-and-a-half-year prison sentence for abuse of office. With Mr Dragnea's career surely over, the opposition will now seek to turf his party from office.

Centrists enjoyed modest success elsewhere in central Europe. In **Slovakia** a co-

alition backed by Zuzana Caputova, a liberal who won March's presidential election, came first. Viktor Orbán's Fidesz won half the vote in **Hungary**, though two small opposition parties did better than expected.

Beyond MEPS, **Spaniards** also chose 12 regional governments and 8,131 mayors. A month after winning a general election, Pedro Sánchez's Socialists took 33% of the vote in the European election, confirming them as comfortably the largest party. The results were also a relief for Pablo Casado, the new leader of the conservative People's Party (PP). After a drubbing in the general election Mr Casado tacked towards the centre, winning 20% and hanging on to Madrid's regional government. Other parties struggled. Ciudadanos, a centre-right outfit, slid to 12%. The far left and right faded. The two wings of the Catalan separatist movement secured 49% of the vote in the region. But legal troubles may prevent their two MEPS from taking up their seats.

Mr Sánchez still needs to build a parliamentary majority. Albert Rivera, Ciudadanos's leader, will face pressure to stop his veto of deals with the Socialists in protest at their conciliatory approach to the Catalan problem. Weeks of haggling lie ahead.

The next to go?

Alexis Tsipras, **Greece's** prime minister, called a snap election for July after his left-wing Syriza party suffered a crushing defeat at the hands of the centre-right New Democracy (ND). Nationalist voters punished Syriza for Mr Tsipras's biggest achievement: resolving a 28-year dispute over the name of Greece's northern neighbour, now known as North Macedonia.

ND looks set to win the general election. That will reassure other euro-zone governments worried about Greece sticking to its post-bail-out reform plan, after Syriza embarked on a burst of pre-election spending. But Kyriakos Mitsotakis, ND's leader, may struggle to form a coalition. And Mr Tsipras is unlikely to go into docile opposition. ■

Traffic policy

An enemy of the people-carrier

OSLO

Norway's capital curbs cars

CONCERNED ABOUT pollution and congestion, a growing number of local governments are trying to reduce the number of drivers in Europe's big cities. Some, like London and Stockholm, have imposed congestion charges to discourage driving during peak hours. Paris has tried banning cars from driving on certain days, depending on whether they have even or odd number plates. Perhaps the most ambitious plan to curb cars comes from Oslo.

The most visible change in Norway's capital has been the removal of public parking. Late last year, the government removed some 700 parking spaces from the city centre, replacing them with benches, bicycle docks and more pavement. The mere 50 or so spots that remain are largely reserved for handicapped residents and local businesses that rely on deliveries.

Another big change has come in the form of zoning reform. Some roads in the city centre have been closed off to private cars; others have been changed so that traffic can only flow in one direction. Enforcement has been lax, though. The city government has placed signs informing drivers of the new rules, but not everyone has paid them much heed. It did not help that Google maps was rather slow to take in the new laws. The city council is due to vote on further reforms later this summer.

Oslo's plans have often been billed as a "car ban" by the press and driving enthusiasts. This overstates the magnitude of the



changes. For one thing, the city's new anti-car policies mainly affect only the compact city centre. Moreover, cars are hardly banned—walk through the streets of Oslo today and you will find there are still plenty zipping about.

The reforms have not come easily, however. Norway's conservatives are deeply wedded to the idea of car ownership, and shopkeepers worry that fewer cars might mean fewer customers. It is still too early to assess how effective the new measures have been. Still, early data show that pedestrian traffic in the city centre was up by 10% in the fourth quarter of 2018 over a year earlier, which suggests the reforms are working as intended.

Hanna Marcussen, vice-mayor for urban development and a member of the Green Party, notes that Oslo's most successful shops are on the high street, where most customers are pedestrians anyway. The government is busy compiling tax records to measure the economic impact of its reforms. Research on Stockholm's congestion-pricing scheme finds that the benefits from factors such as shorter travel

times and safer roads far outweigh the fees paid by drivers.

Oslo's new traffic policies represent a rare break for the Green Party. Although the left has dominated Norway's national politics since 1927, it is actually the Conservatives who have governed Oslo for most of the past three decades. A change came in 2015, when the city made a leftward turn. The Labour and Socialist parties form the biggest coalition on the city council, but they were only able to take power with help from the Green Party, giving it extra political clout.

The fact that the city's efforts to curb traffic have been so controversial has forced the government to take an incremental approach, constantly negotiating with suspicious business owners. Local elections are due in September, but the Greens are confident they will stay in power. Ms Marcussen likens her government's traffic reforms to Norway's public-smoking ban, which was enacted in 2004. Many grumbled before the law was passed, but few today would clamour to let people smoke in pubs again. ■

Europe's mini-Olympic games

Small is beautiful

BUDVA

Europe's tiniest states square off

THE RAIN clears and the lavish opening ceremony can begin. Princes and presidents, princesses and regents are greeted, dancers twirl and stomp and an Olympic flame is lit atop a 17th-century tower. For athletes from Europe's nine smallest countries the games, which opened in the Montenegrin resort of Budva on May 27th, are their chance to win gold. It is the only group of countries where Cyprus is a superpower and Liechtenstein, which has no coast, is a serious competitor at beach volleyball.

To be eligible for the Games of the Small States of Europe, your country needs an Olympic Committee and a population of less than a million. "But who is counting?" laughs Janez Kocijancic, president of the European Olympic Committees. Turks from northern Cyprus don't take part; if they did, Cyprus would be well over the limit. A majority of Monaco's athletes are actually French but to qualify must live in municipalities neighbouring the principality.

The Vatican's priests would like to participate, as would the Faroe Islanders. But although the former is independent, the Pope has no Olympic Committee yet. The Faroes are part of Denmark.

"Olé, allez Monaco!" whoops the crowd as their beach-volleyball players get one

over the Maltese. A six-car motorcade purrs to a halt and out hops the principality's Prince Albert, sporting a bright orange team shirt, to congratulate his players. They are cold, and the sand is sludgy. In a nearby sports hall the Icelanders have brought a drummer to whip up support as they play the Montenegrins, who take their volleyball extremely seriously. Beside the sea the sound of genteel clonks accompanies a knife-edge bowls match pitting Andorra against Luxembourg.

The games have been held every two years since 1985. This year they have cost €2.5m, and involve 835 athletes. Most of Europe's microstates get gold medals only for solving tricky tax problems for their wealthy residents, but the games give their athletes a chance to compete on a more even playing-field. Still, Gian Primo Giardi, the president of the San Marino Olympic Committee, makes clear there is a gulf between what he calls the city states and the "big" countries like Montenegro and Luxembourg. All involved belong to a matey circle though. After Budva many will meet again in three weeks in Belarus, where, at the European Games, they will compete with the rest of Europe and go back to winning only the very occasional medal.

Charlemagne | And they're off!

The race for the EU's big jobs shows what the bloc's new political era has in store



IT MAY NOT look impressive, but the Berlaymont building is the nearest thing the European Union has to a White House. Built on the site of a former convent on a hill above the centre of Brussels, the cross-shaped, 14-floor building houses the European Commission—the union’s executive, the guardian of its treaties and the sole institution that can initiate European legislation. Unlike the president of the European Council, the body comprising the 28 leaders of the EU member states, the commission president is more than a convener. His power (no woman has yet done the job) rests not in the fleeting politics of national capitals but in Brussels. It allows its bearer to set the EU’s long-term agenda. The view from the top of the Berlaymont has a big horizon.

The commission presidency is the most glittering of the jobs up for grabs in the EU’s big post-election turnover. The process by which it is allocated has changed. For decades national leaders dictated their choice, but in 2009 the European Parliament obtained the right to elect the president, and in 2014 came the so-called *Spitzenkandidat* convention, by which only the designated “lead candidate” of a parliamentary group—probably though not necessarily the largest—can take the job. That time Jean-Claude Juncker owed his majority to the two big groups: his centre-right European People’s Party (EPP) and the Socialists and Democrats. The council did not expect this, and was bounced into accepting him.

Again, after last week’s European elections, the EPP is the largest group. And again the socialists are second. But both suffered heavy losses. Manfred Weber, the EPP’s lead candidate, will need to win over not just the socialist group but also many liberal and green parliamentarians. Given his history of cosyng up to Viktor Orbán, Hungary’s authoritarian prime minister, that will be difficult. In the council he has the support of Angela Merkel, the German chancellor, but the Bavarian is strongly opposed by the French president, Emmanuel Macron, and others, who scorn his lack of executive experience.

The battle for the commission presidency will be fought on two fronts. First, it is a power struggle between the council and the parliament. MEPs have gained strength in recent years and were emboldened by increased turnout in the election. They fear that if they do not stand by the *Spitzenkandidat* process, they will lose it

and cede power back to the council—which has also gained stature over recent years, thanks to a succession of crisis summits that have made it the centre of attention.

The second front is the contest between France and Germany, whose partnership is fraying. Mr Macron wants to break the EPP’s conservative dominance of the EU and is forming an alliance to do so with a bloc of liberal- and socialist-led states and a new, enlarged liberal group in the parliament. Ahead of a post-election summit on May 28th, he had lunch with the leaders of Spain, Portugal, Belgium and the Netherlands. The gang disagree on many things—Mark Rutte, the Dutch prime minister, is horrified at Mr Macron’s federalist fiscal designs—but are united in their opposition to Mr Weber, as well as on matters like climate change where they want the EU to do more, faster. They are arrayed against the EPP, which is dominated by Mrs Merkel’s Christian Democratic Union and is strongest in central and south-eastern Europe. Mr Macron’s western European gang fears stagnation and opposes Mr Weber; the EPP most fears disintegration and supports him.

The upshot of these rivalries is that Mr Weber’s chances, though not negligible, are not great. “He will be shot down,” said one insider ahead of the summit: “whether diplomatically or not remains to be seen.” That leaves an array of alternative candidates, including three possible front-runners. Frans Timmermans is a multilingual Dutch vice-president of the commission who has tackled rule-of-law infringements. Margrethe Vestager, a Danish liberal, has won accolades as the EU’s competition commissioner for attacking uncompetitive practices and tax-dodging by American digital giants. And Michel Barnier is a moderate French conservative who has led the EU’s Brexit negotiations. Mr Macron name-checked all three as he arrived at the post-election summit. None is a “winning” lead candidate. But the Dutchman was the socialists’ lead candidate whereas Ms Vestager was one of seven leading candidates her group proposed. The election of one of the three would boost Mr Macron but all are probably acceptable to Mrs Merkel. Still, the process is likely to involve several stages of elimination and could even see a relatively unknown figure clinch the job.

Spitz happens

Whoever gets it, the choice will influence the allocation of the EU’s other big vacancies: those of European Council president, its “high representative” for foreign affairs, and the president of the European Central Bank, which is not attached to the EU’s political cycle but happens also to come up this autumn. Leaders will try to enforce some geographical and ideological balance. A liberal Nordic president of the commission like Ms Vestager might complement a leftish southerner, like Antonio Costa of Portugal, as president of the council, with a hawkish German ECB president to soothe Berlin and an easterner like Dalia Grybauskaitė of Lithuania as high representative. The permutations are almost infinite.

The horse-trading will last well into the autumn, and the EU’s new five-year political cycle will probably not get properly under way until early 2020. But various traits of that coming institutional phase will become clear in the battle for the big jobs. It will be marked by an increasingly dysfunctional Franco-German relationship and growing influence for middling moderate states like Spain and the Netherlands; by debates about whether the EU needs a vanguard or should proceed at a common pace; by new tussles between the institutions; and by a more genuinely politicised European civic sphere. A new era—more fragmented, more political, more fluid—is dawning in Europe. ■



Brexit and the Tories

Centre aground

Voters are ever more polarised between a no-deal Brexit and a second referendum. A new Tory leader may find compromise impossible

EUROPEAN ELECTIONS are rum affairs, but the latest were stranger than ever. On May 23rd voters went to the polls in elections nobody wanted, as Brexit was meant to happen in March. As expected, Nigel Farage's new Brexit Party stormed into first place, with 32% of the vote and 29 seats. It was a striking result for a party set up only in February, and was five points better than Mr Farage achieved as leader of the UK Independence Party in 2014. Adding in the rump UKIP vote makes the total for parties backing a no-deal Brexit 35%, a big number but less impressive when turnout, though higher than in 2014, was only 37%.

If hard Leavers had a good night, so did hard Remainers. The Liberal Democrats took 20% of the vote and 16 seats, while the Greens got 12% and seven seats. Adding in the new Change UK party, which had a terrible night and won no seats, and the Scottish and Welsh nationalists takes the combined score of pro-Remain, pro-second-referendum parties to 40%, more than the no-dealers.

The big losers were the Tories and La-

bour. Their combined vote share was just 23%, down from as much as 82% in the 2017 general election and less than half their share in 2014. In effect, the European elections saw the centre squeezed to the advantage of extremes on both sides. On Brexit, the country is more obviously split down the middle than ever.

For an opposition party, Labour's performance of coming third with just 14% of the vote and ten seats was abject (see Bagehot). But it is the collapse of the Tories to a mere 9% of the vote and four seats, the party's worst election result in 185 years, that will have more immediate consequences, because Theresa May, the prime minister, is resigning. A leadership race starts on June 10th. Some 11 MPs have already put themselves forward. These will be winnowed down by their colleagues to two, who will then be voted on by party members. The hope is that this process finishes by the end of July, with the winner immediately becoming prime minister.

The big question for all candidates is how best to respond to Mr Farage's success.

→ Also in this section

47 The Brexit Party

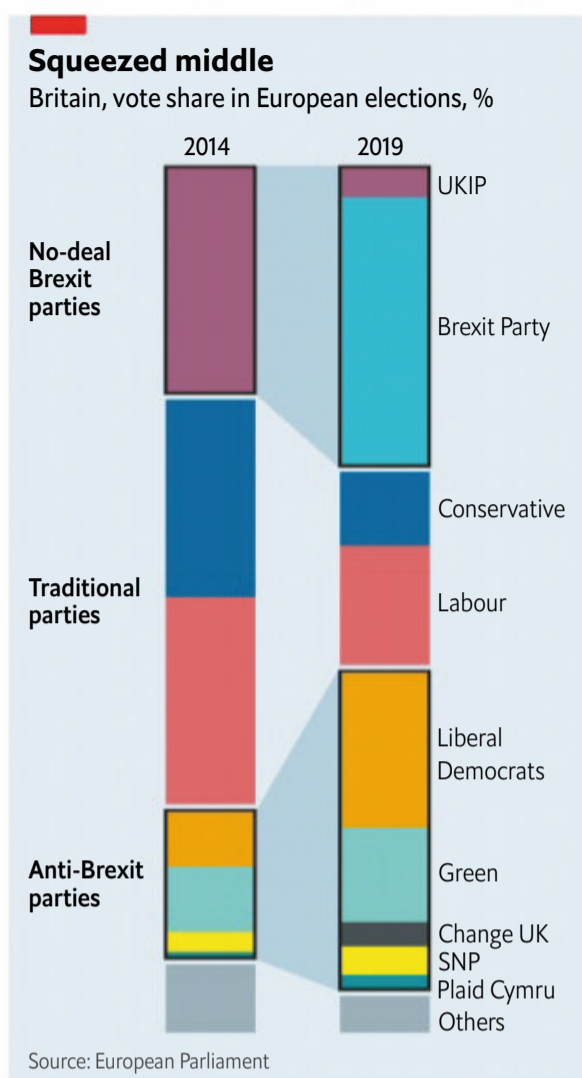
48 Bagehot: Enemies within

Many believe that the only way to defeat the Brexit Party now is to back leaving without a deal. Among others, Dominic Raab and Boris Johnson, the front-runner, prefer a deal but want to keep no-deal as an option. Both also insist that Brexit must happen on October 31st, with or without a deal.

Some are more nuanced. Most want to renegotiate Mrs May's deal, yet are also against no-deal. Michael Gove, the environment secretary, is in this camp. Jeremy Hunt, the foreign secretary, has said no-deal is better than no Brexit. But this week he called no-deal "political suicide". His argument was that trying to force it through could lead to a general election in which the Tories would be annihilated. Rory Stewart, the international development secretary and another candidate, has said he could not support a Tory prime minister who goes for no-deal.

A key point is that Parliament has already voted against no-deal. Yet hardliners say that, since leaving without a deal on October 31st is now the legal default, MPs cannot stop it. The Institute for Government, a think-tank, points out that the routes used before to prevent no-deal are no longer available. But John Bercow, the Commons Speaker, promises that Parliament will not be sidelined. Since he also has no intention ▶▶

Correction: In a leader last week we wrote that Britons are working 350bn hours a month. Hours are at a record high, but remain within the bounds of possibility. The correct figure is 4.6bn. Sorry.



The Brexit Party

Now for a real test

PETERBOROUGH

Having won the European elections, can the Brexit Party gain a foothold in Westminster?

WHEN NIGEL FARAGE took to the stage after his triumph in the European elections, he delivered a warning. “If we don’t leave on October 31st then the scores you’ve seen for the Brexit Party today will be repeated in a general election,” he said. “And we are getting ready for it.” His threat will now be put to the test in Peterborough, a small city in eastern England, which holds a by-election on June 6th.

The Brexit Party’s predecessor, the UK Independence Party (UKIP), has long struggled under the first-past-the-post system used in Westminster elections. Although 61% of constituents voted to leave the European Union in 2016, Peterborough has never been a UKIP stronghold. At the general election two years ago, Labour took the seat from the Conservatives. But Labour’s MP, Fiona Onasanya, was kicked out by voters a month ago, having been jailed for perverting the course of justice in attempting to dodge a speeding charge (she compared her conviction to the persecution of biblical figures, including Jesus and Moses).

Despite its lack of political infrastructure in the city, the Brexit Party is a narrow favourite to take the seat, according to bookies. To do so the party will have to win over both Labour and Tory voters. During the European elections, it was keen to point out that it had left- and right-wing candidates. As a former participant on “The Secret Millionaire”, a reality-TV show in which business owners go undercover to

hand out cash, Mike Greene, the party’s candidate, promises to attract jobs to the city, as well as to improve schools and build houses. Aside from a fervent desire to leave the EU without a deal, his priorities are not always those of a typical Faragist. “People talk of immigration as a huge problem. But look at Peterborough and it’s one of the things I love about it,” he says. “It makes us a great, multicultural city.”

An attempt by small anti-Brexit parties to select a single Remain candidate failed to get off the ground. And both the main parties are in bad shape, coming into the vote straight after a hammering in the European election. The Tories are in the unusual position of being unable to tell voters who their candidate will work under in Westminster. Labour has to win back support after the disaster of their last MP. “We can’t afford another Corbyn candidate in Peterborough,” insisted Paul Bristow, the Tory candidate, at a debate on May 28th.

The sparse attendance at the debate suggests that voter fatigue may play a role. The vote is the third in quick succession in Peterborough, after local and European elections. As such, the poll will be a big test for Labour, which relied on a surge of enthusiastic new voters last time round, and its new candidate, Lisa Forbes, is an uninspiring trade unionist. The party is unlikely to have a good night on June 6th. But all it wants is to do well enough to hold off the Brexit Party. ■

▶ of vacating his post as he previously promised, he will surely find a way for MPs to block a no-deal Brexit if they wish.

What of Brussels? EU leaders were categorical when extending the Brexit deadline that there would be no renegotiation of the withdrawal agreement, which includes the Irish backstop to avert a hard border with Ireland. That rules out a time limit on the backstop, which would negate its purpose. On this, EU leaders cannot overrule Leo Varadkar, the Irish prime minister. They may be open to another extension, but they will surely reject concessions to a hardliner like Mr Johnson, whom most dislike.

Yet that could change if a more emollient figure with a clear parliamentary majority emerged. The EU is happy to revise the political declaration that accompanies the withdrawal agreement. And, as Mujtaba Rahman of the Eurasia Group, a consultancy, notes, one reason that the EU refused to offer Mrs May even marginal changes to the agreement was that it still doubted she would get it ratified.

In her resignation speech, Mrs May talked of the need for compromise. Many retorted that her own Brexit problems were caused by her very refusal to compromise. The difficulty for her successor is that an increasingly polarised country is more inimical to compromise. That may point to further delays, but it also raises the risk of no-deal. The smart money increasingly backs another referendum as the solution. Whether it would deliver a clear answer is another question. ■



All thumbs

Bagehot | Enemies within

Jeremy Corbyn is increasingly isolated in his own party



H.L. MENCKEN is said to have defined a politician as “an animal that can sit on the fence and yet keep both ears on the ground”. By that definition Jeremy Corbyn is failing in his vocation. The European elections bulldozed Mr Corbyn’s fence by giving the Labour Party just 14% of the vote in the country as a whole and 9% in its former stronghold of Scotland. They unleashed a furious debate that was ostensibly about the party’s stance on Europe in particular but also about Mr Corbyn’s leadership in general.

Senior figures such as Tom Watson, the deputy leader, and Emily Thornberry, the shadow foreign secretary, were quick to blame Labour’s dismal performance on its refusal to offer wholehearted support for holding a second referendum and staying in the European Union. Others, particularly from the party’s working-class wing, were equally quick to push back. Gloria De Piero, MP for Ashfield, urged her colleagues not to let a single issue—Brexit—“wreck” the party. Len McCluskey, head of the Unite trade union, accused supporters of a second referendum of trying to launch a coup against the leader. Mr Corbyn did his best to rebuild his fence and climb back on it. He promised that “we are ready to support a public vote on any deal”. But he stopped short of offering Remainers what they want: unconditional backing for a second referendum whether or not there is an EU deal on the table, and a firm commitment to turning Labour into a Remain party.

There is actually a good strategic reason for Mr Corbyn’s position on Europe. Labour risks alienating large numbers of voters, particularly in its working-class heartlands, if it turns itself into an overtly Remain party (most of its MPs sit in constituencies that voted to leave). And fudging may be a much more successful strategy in a general election, which will be fought over lots of issues, than in a European poll. But the party’s Euro-failure is only one of many. Labour has failed to pull ahead of a Conservative government that is doing everything it can to commit suicide. The forthcoming Peterborough by-election may see a Labour seat go to the Brexit Party. Labour is also likely to waste yet another summer in a row over anti-Semitism that can only do it harm. On May 28th the Equality and Human Rights Commission announced that it is launching a formal investigation into whether the party has unlawfully discriminated against, harassed or victimised people be-

cause they are Jewish, a measure that it last took against the far-right British National Party. Mr Corbyn is in his weakest position since taking over as his party’s leader in 2015, and his problems are mounting by the day.

Senior Labour figures are increasingly willing to criticise his leadership. There is nothing new about Mr Watson’s hostility to Mr Corbyn. But the days when the deputy could be denied a platform at his own party conference are long gone. He has formed a centre-left group of 80 MPs and 70 peers to argue for more mainstream policies, and played a starring role at the People’s Vote march. Ms Thornberry harbours leadership ambitions of her own. She is also worried about the growing strength of the Liberal Democrats in her Islington South constituency. Sir Keir Starmer, the shadow Brexit secretary, is increasingly a force in his own right rather than just a lawyer for hire. For their different reasons close allies such as John McDonnell, the shadow chancellor, and Diane Abbott, the shadow home secretary, are critical as well. Mr McDonnell is determined to win power at any cost, and Ms Abbott represents a constituency that voted 80% to remain.

At the same time Mr Corbyn is becoming the prisoner of his closest advisers, who are odd creatures even by the standards of Britain’s increasingly eccentric politics. They are all, in various ways, closely allied to Mr McCluskey, Labour’s most pro-Leave trade-union baron. Two of them, Seamus Milne and Andrew Murray, are privately educated Marxists who have a soft spot for the Soviet Union. Mr Murray was a member of the Communist Party for decades before his recent conversion to democratic socialism. Mr Milne, a ruthless dialectician, exercises a particularly tight hold over Mr Corbyn, a man who managed only two Es at A-level and who, after four years of intense intra-party battles, is beginning to seem worn out.

In the bunker

Mr Corbyn is no stranger to challenges to his leadership: an attempt by MPs to remove him in 2016 only left him stronger. But the current wave of criticism is unusually damaging for two reasons. The first is that it undermines his claim to be a champion of the people against the elites. Mr Corbyn is in the uncomfortable position of resisting calls for “people power”, in the form of a second referendum, a ballot of all party members or a special conference on the Brexit question, and instead defending a policy of triangulation and prevarication cooked up by a sinister cabal of advisers. The second is that some of the fiercest attacks are coming from normally loyal allies on the left. Paul Mason, a commentator, has raised the possibility of a “Corbynism without Corbyn” and called for “the officials” who masterminded the party’s Euro-elections strategy to be “removed from positions of influence”, perhaps opening the way to Britain’s very own replay of the battle between the Mensheviks and the Bolsheviks.

In most ways Mr Corbyn could not be more different from Britain’s departing prime minister, Theresa May. She was the dutiful grammar-school girl who went to Oxford whereas he was the rebellious private-school boy who dropped out and plunged into the Islington of Che Guevara posters and Irish rebel songs. But Brexit makes odd bedfellows, and in strange ways he is beginning to resemble her. Isolated in a bunker of close advisers, criticised by former allies, determined to avoid alienating both Leavers and Remainers, he is beginning to look tired, tainted and out-of-touch. To survive, Mr Corbyn needs to prove that he is both more flexible and more ruthless than his fellow ageing baby-boomer. ■



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Anopheles' big adventure

PHUOC LONG

As malaria mutates to survive, its elimination is proving difficult

THESE SHOULD be hopeful days for those battling malaria. Deaths from the disease have fallen to around 435,000 a year, from perhaps five times that number a century ago. On May 22nd the World Health Organisation (WHO) declared Algeria and Argentina malaria-free, bringing to 38 the number of countries now officially rid of the disease. Algeria will be regarded as a particular success because it is in Africa. The continent suffered 90% of an estimated 219m cases worldwide in 2017. But two big clouds darken the outlook. One is the stubborn persistence of malaria south of the Sahara. The other is the emergence of new strains of the disease resistant to the available treatments.

Fewer Africans are dying from malaria but the estimated number of cases has barely changed since 2011. Ten African countries and India account for 70% of global cases. Numbers in India are falling, but not in the worst-afflicted African countries. Some places, such as Zambia (see box

on next page), are trying hard to tackle the disease. But malaria is proving resilient. One reason may be the declining share of families that use anti-mosquito sprays in their homes. Another may be resistance to the insecticides used in bed nets or sprays. And, though about three-quarters of the \$3.1bn the world spends to fight the disease each year goes to Africa, funding per person has fallen in recent years in the most malaria-prone countries. Perhaps most important, these countries also have shoddy public-health systems, especially in war zones such as northern Nigeria.

Such places are typically not equipped to cope with new treatment-resistant strains of the disease. More than 50 years ago, variants resistant to chloroquine, a past treatment, travelled around the world. And South-East Asia, where those variants appeared, is again suffering local outbreaks incurable by some of the main defences used against the disease, artemisinin-based combination therapies (ACTs).

Work at Phuoc Long Hospital in Binh Phuoc province in southern Vietnam, which borders Cambodia, is thus of global interest. The facility's 250 beds serve around 200,000 people. Funds are tight. As officials hold a morning meeting under a golden bust of Ho Chi Minh, Vietnam's first communist leader, a toothless former soldier, still in uniform, pushes his bicycle through a courtyard with peeling paint. Doctors proudly show off new equipment for researching malaria. One reckons the hospital sees only 100-odd cases a year. But the rate of failure for one conventional ACT treatment is already frightening—above 60%, says Professor Hien Tran Tinh of the Oxford University Clinical Research Unit. Two types of malaria parasite most trouble the Greater Mekong Region. *Plasmodium falciparum* kills the most people globally. *Plasmodium vivax* is to blame for many of the cases of malaria outside sub-Saharan Africa. Less deadly than *P. falciparum*, it can linger in the liver after recovery and trigger a relapse. Its debilitating cycles leave victims susceptible to other diseases.

Like any living organism subject to sufficient pressure, malaria parasites mutate to survive. In parts of the Mekong, the parasites Anopheles mosquitoes inject into the human bloodstream are resisting conventional treatment. By 2030, the WHO hopes to see malaria eliminated in the region before its resistant parasites spread. ▶

▶ ACTS work in two main ways. The artemisinin lowers parasite levels in the body within about three days. A partner drug then works to clear them entirely over time. Resistance can develop to both artemisinin and the partner—and both are failing in some areas. Of the six ACTS most used in the Mekong, three are failing in parts of Cambodia, Thailand, Laos and Vietnam, and two in Myanmar. No one is sure why the Mekong seems to spawn resistance—its tropical climate, forests and rubber plantations are all thought to play a role.

It also matters how locals behave. In Africa children and pregnant women are especially prone to malaria. In the Mekong it often affects young workers, sometimes engaged in dodgy practices such as illegal logging. Many fail to seek help quickly. Others turn to traditional healers before coming to clinics. Even when given treatment—which is free in countries such as Vietnam—victims often stop taking long courses of medication too soon.

Weak governance is another obstacle. Failures in one country can cause trouble for its neighbours. “Vietnam should have eliminated malaria years ago but it can’t because of Cambodia,” explains one regional malaria expert. Meanwhile, more careful spending among big donors, such as the Global Fund to Fight AIDS, Tuberculosis and Malaria, a public-private body, means less money for local officials. It is therefore harder to get them to go to the remote areas where people need help.

A prevention programme needs both to reduce the number of people bitten by infected mosquitoes and to shorten the time before infected people seek treatment. This requires adequate funding for rural health-care services and outreach programmes. Low-cost, rapid diagnostic tests remain one of the most important tools. Dr Hien slides one across the table in Phuoc Long, saying it is fairly easy and cheap to treat malaria if it is detected in the first three days. After that, “the outcomes are much more uncertain.” Real-time mapping platforms then allow authorities to track the disease and prepare accordingly. Thailand has created a notably successful one.

Joined-up government makes a big difference. Benjamin Rolfe, who runs an alliance of Asia-Pacific leaders to combat malaria, says 12 Chinese ministries have in recent years held regular meetings on tackling malaria. Not a single indigenous case was reported in China in 2017. If national governments are sluggish, subnational leadership can help. Officials from Binh Phuoc province and Kratie province, its Cambodian neighbour, agreed last year to tackle malaria in a more co-ordinated way.

Donors, drug firms and governments of rich countries are all working on multi-drug-resistant malaria. Pedro Alonso, the director of the WHO’s Global Malaria Pro-

Malaria in Zambia

Let them spray

MWANGA, ZAMBIA

Zambia has made malaria less deadly, but no less common

“IT’S BEEN a good day!” says Godwin Mathao, an elder in the village of Mwanga in south-west Zambia. Health workers have tested 34 locals for malaria. None has the disease. Such progress is difficult here—villagers often cross borders with Angola, Botswana, Namibia and Zimbabwe. It has also been hard, says Mr Mathao, to educate people about parasite-hosting mosquitoes. He points to a few houses where insecticide-treated bed nets are still used to protect vegetables from hungry chickens.

Africa is where malaria is most tenacious. Nigeria alone has 25% of global cases. Congo and Mozambique have 11% and 5% respectively. Zambia has tried hard to tackle the disease. It was the first African country to use artemisinin com-

bination therapy, the recommended treatment. Some 70% of Zambians have access to treated bed nets or indoor sprays. Most anti-malaria funding comes from the American government or via the Global Fund. Zambia’s government works well with foreign groups such as the JC Flowers Foundation, which funds efforts at border villages like Mwanga. But it also spends more of its own money per person at risk than its peers.

According to the WHO, reported deaths fell from 9,369 in 2001 to fewer than 1,425 in 2017. But the number of cases—3.5m a year—has barely budged since 2014. Zambia hopes by 2021 to become the first sub-Saharan African country to eliminate malaria. That goal is admirable, but wildly ambitious.

gramme, says the pipeline of treatments in research and development is “richer than ever”. The Medicines for Malaria Venture, which brings together donors and drug companies to develop new treatments, has had 19 new drugs approved for development over the past two decades and has trained 18,000 health workers. A new pill to treat *P. vivax* infections, Tafenoquine, may soon be available. It is used in a single dose, rather than as a 14-day course. Hopes are high that patients will take it appropriately. Phuoc Long hospital has a partnership with Novartis, a Swiss drug firm. Trials are being conducted into a new drug to fight malaria and two new ACTS.

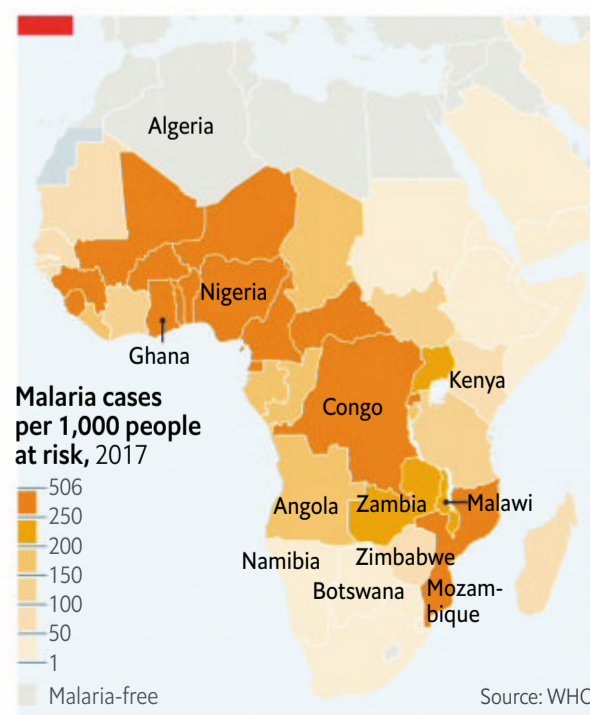
Dr Rolfe estimates that to register a new drug and conduct trials takes seven years. With drug-resistant malaria already

emerging, that is an age. In 2016, \$588m went into research and development globally—85% of the annual R&D spending the WHO estimates is needed globally by 2020 to cut both malaria cases and mortality rates by 40% by 2030. The total cost of meeting the goals is put at \$6.6bn a year.

Steady funding is essential to eliminating malaria. More than a third of the money spent on the cause around the world passes through the Global Fund. Meetings in October will determine how it spends its cash between 2020 and 2022. The hope is that the Mekong is not forgotten; its cases involving resistance remain dangerous. America provides more than a third of the funds for the global fight, so public-health executives are alarmed that the Trump administration plans to cut its anti-malaria spending by over \$100m in 2020.

Without political commitment and the cash to match, the world risks a relapse in the fight against malaria. Such backsliding occurred in the 1960s, squandering the progress in the preceding decade against the disease in many countries, including India and Pakistan. The hope is that this time success breeds greater commitment rather than greater complacency.

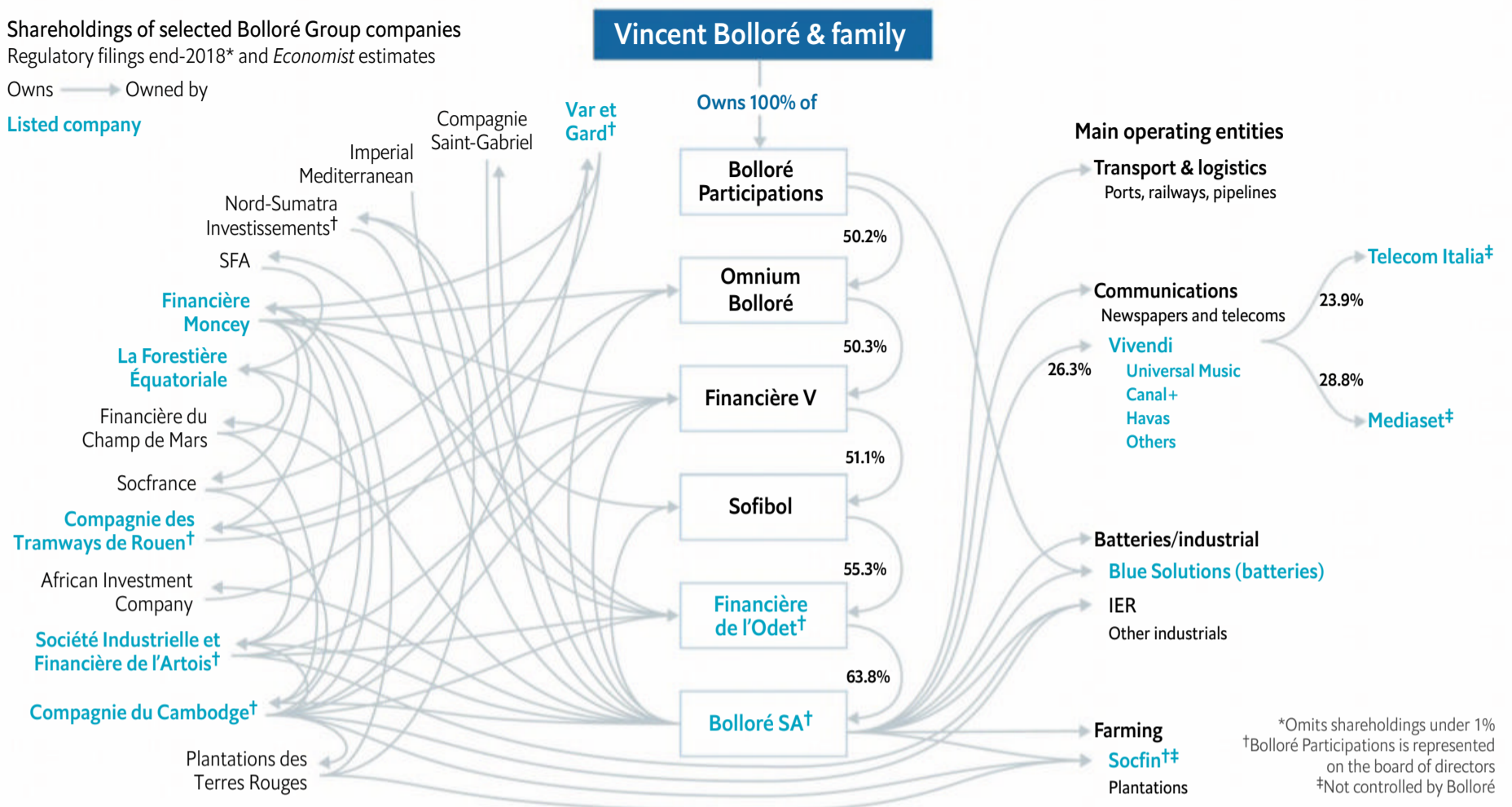
Promisingly, a pilot vaccine programme was launched in April. Over the next three years the vaccine, known as RTS,S will be given out in parts of Malawi, Ghana and Kenya. It is used only on young children and works in perhaps just 40% of cases. Still it could save a lot of lives. Scientists have been struggling for decades to produce a really effective vaccine. The battle to vanquish malaria remains extremely long and arduous. ■



Shareholdings of selected Bolloré Group companies
Regulatory filings end-2018* and *Economist* estimates

Owns → Owned by

Listed company



Vincent Bolloré Empire builder

PARIS
Untangling a French tycoon's complicated legacy

WHO IS FRANCE'S greatest capitalist? Americans might think this question is the beginning of a joke. Those who take it seriously may finger Vincent Bolloré, who over nearly four decades has built an empire spanning African ports and French pipelines, pay-TV, electric cars, the world's biggest music label and much else besides. On May 29th the 67-year-old stepped down from the board of Bolloré SA, the holding company at his complex empire's core. At an annual meeting outside Paris, he air-kissed fawning shareholders one last time and, as a parting gift, gave each one three bottles of wine (from a Bolloré vineyard).

With sales of €23bn (\$25.6bn) and 81,000 employees around the globe, Bolloré Group testifies to its boss's knack for business. A more sober assessment of his reign reveals a complicated legacy. The tycoon emerges as a flawed exemplar of capitalism. His heirs should draw lessons.

Though from 1822 five generations had built a Bolloré bible-and-cigarette-paper concern in Brittany, Vincent is what the French call *un self-made man*. In 1981, still in his 20s, he paid a couple of francs for the

family concern, which had fallen into the hands of its creditors—a quixotic move for an up-and-coming investment banker.

Mr Bolloré's dynastic industrial ambitions, admired in French business circles, were soon paired with stockmarket raids à l'américaine, which were not. Not for him the polite ways of Parisian business, nor its endless cocktail circuit. He is part activist investor, part private-equity financier in a country which has little love for either; a corporate "pirate" eyeing the shareholder registers of august companies, whose family owners did not appreciate it. Some fell under his control, such as a shipping group

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that then formed the backbone of a logistics operation which now runs 16 container terminals in Africa. Others, like Bouygues, a construction group, and Lazard, a blue-blooded bank, persuaded less outré parties to buy his stake at a hefty premium.

Stodgy French capitalism can use an outsider to shake it up. But Mr Bolloré's norm-flouting has a less laudable side. For one thing, his touch is not as golden as some make it out to be. He has on occasion ridden roughshod over the principles of modern corporate governance. Lastly, he and Bolloré SA face charges of corruption, which both deny.

Start with the business. Mr Bolloré is a risk-taker of the sort every economy needs. Investors who bought shares in Bolloré SA 30 years ago, soon after it listed, have made their money back 40 times over, compared with eight times for France's CAC 40 blue-chip index. Its market capitalisation is now €12bn. The empire around it comprises 457 businesses. A simple total of their market caps gets to nearly €70bn. The three main pillars are logistics, batteries and media.

The logistics and pipelines business has been the most successful. It includes ports in Africa, where Bolloré SA says it has invested €4bn, plus a freight-forwarding arm, three African rail concessions and French oil terminals. Analysts value it at €8bn or so, roughly half of Bolloré SA's value including debt. It faces stiffer competition than it did, but margins are healthy.

Those profits appear mostly to have been offset by losses from another tran- ▶▶

▶ sport bet: on a new type of lithium battery developed by a plastics operation which complemented the old paper business. Its only big customer has been a car-sharing scheme in Paris, Autolib', which was run by Bolloré before collapsing in a heap of debt last year. The battery venture is now eyeing electric buses. It is worth perhaps one-tenth of the €3bn sunk into it.

Vivendi, a media behemoth in which Bolloré SA owns a 26% stake worth around €8bn, has been a mixed bag. Mr Bolloré took control of the group in 2014, fulfilling a long-rumoured ambition to become a media baron. Universal Music Group, which is wholly owned by Vivendi but run at arm's length from California, has prospered as streaming revenues from Lady Gaga, U2 and its other stars have soared. Its value is thought to have swelled from \$8bn in 2014 to \$30bn—more or less Vivendi's market capitalisation. Vivendi has gained just €7bn in that period, reflecting poorer performance at other parts of the group. Canal+ has struggled to retain French pay-TV viewers in the age of Netflix; Havas looks too small to compete with PR-and-advertising rivals like WPP and Omnicom.

Mr Bolloré's expansion into Italy, in a bid to create a southern European content-and-distribution giant, has been costliest. Since 2015-16 Vivendi has tried to seize control of Mediaset, Silvio Berlusconi's broadcasting empire, and Telecom Italia, a mobile operator. These bets have misfired: Mediaset's share price has fallen by a quarter and Telecom Italia's by nearly two-thirds since Mr Bolloré built stakes in them. A €1.1bn hit in the value of its Telecom Italia holdings all but wiped out Vivendi's net profits last year (other holdings rose in value). As analysts at Morgan Stanley, a bank, recently put it, "great music story, unappealing wrapper".

As a result of these misadventures, Bolloré SA has lost shareholders money in the past five years, even as the CAC 40 has gained 40%. Such, Mr Bolloré's defenders might reasonably argue, is the nature of risk-taking. Fair enough. But the wrapper has other unappealing qualities.

Bolloré's corporate structure would put Byzantium to shame (see graphic on previous page). At its heart is a corporate *mille-feuille*, where Mr Bolloré and his family control a company that holds the majority stake in a firm that in turn owns most of another, and so on. Alongside this sit companies that do actual business, including Vivendi. Such a model, which is not unique in France, allows minority investors to be brought in while a central shareholder—in this case Mr Bolloré—maintains control.

What sets Mr Bolloré's layer cake apart from similar ones is that those minority shareholders are often other companies in it. Bolloré SA part-owns at least ten companies with direct and indirect stakes in its

own majority shareholder, Financière de l'Odéon, and its parents. When a company pays a dividend, the money loops through a few holding companies before some of it returns to its own bank account. Several of the holding companies are listed but at least 90% owned by Bolloré entities.

Analysts attribute over a third of Bolloré SA's market value to shareholdings in its parents; these parents are also worth around €12bn in total. That does odd things to Bolloré SA accounts. When its value falls (like last year, when its shares lost 24%), that of the holding companies above it dips too. Because Bolloré SA in turn owns them, its balance-sheet and income must be adjusted downwards. This then affects metrics used to calculate the value of its shares, whose fall prompts a further adjustment. Share-price rises cause upward revisions.

In 2015 Muddy Waters, a hedge fund which specialises in arcane companies, said the rococo empire was too complicated to be modelled in an Excel spreadsheet. Analysts and investors with the patience to track Bolloré SA disagree over basic things, such as who exactly is entitled to the profits generated by the underlying operations.

Universal income

All this makes it hard to gauge the Bolloré empire's financial condition. It reports net debt equal to a healthy 17% of equity. This, though, assumes debts owed by one company in the structure can be repaid with cash held in another part. Bolloré SA's accounts subsume all those of (much larger) Vivendi—not just the proportion, 26%, which it owns. Such consolidation is perfectly legal, for Bolloré SA controls Vivendi. But its claim on Vivendi's cashflows would be as owner of a 26% stake, not of 100%.

Information is patchy on where in the



Capitalist in the 21st century

organigram debts sit (Bolloré says all the holding companies contain cash). Pierre-Yves Gauthier of AlphaValue, a research house, has spoken of "looming potential stress" in the structure. With €10.3bn in gross debt and €4.8bn in cash at end of 2018, its position looks reasonable. Its earnings before interest, tax, depreciation and amortisation were just under €1bn last year even before adding in Vivendi's. The accounts of Omnium, near the top of the structure, paint a different picture. These consolidate the group but in effect strip out the cross-shareholding loops. They show net debt of €5.6bn supported by equity (excluding outsiders' stakes) of just €482m at end 2018—gearing of over 1,000%.

Such leverage is sustainable so long as cash keeps flowing into the system. Some observers suspect this is why Mr Bolloré has pursued ever-bigger companies with ever-bigger balance-sheets, like Vivendi. The company has been generating lots of cash by selling assets accumulated in an ill-fated acquisition spree initiated in the early 2000s. Under Mr Bolloré's leadership, Vivendi paid fat dividends, which helped service debts that paid for his takeover of it. It is now considering the sale of up to half of Universal. That would let Vivendi send as much as \$8bn to the Bolloré structure.

Critics who worry that Vivendi is run for the benefit of Mr Bolloré and not its other shareholders point to such machinations as evidence. In June 2017 the purchase by Vivendi of Bolloré businesses' 59% stake in Havas transferred €2.3bn in cash from Vivendi's coffers into those of Bolloré entities, which owned around 20% of Vivendi at the time. Analysts questioned both the deal's rationale and price. Independent experts have decried worsening corporate governance at Vivendi (to match Bolloré SA).

Other bits of the business have attracted the gaze of the authorities. In April 2018 preliminary criminal charges were brought against Mr Bolloré, other Bolloré executives, and later Bolloré SA, in relation to corruption in Togo and Guinea. French investigating magistrates suspect them of sending Havas spin-doctors to work in the countries' election campaigns. According to the charges, it was Bolloré businesses that footed much of the bill, not the politicians to whom the services were rendered. (Bolloré says it paid for bona fide work carried out.) Bolloré SA is said to have gained business after the politicians won. Mr Bolloré, who was briefly detained for questioning at the time, may face prison time if found guilty. Mr Bolloré, Bolloré SA and the other executives all deny the allegations.

Many Bolloré ventures—ports, broadcasting—depend on government goodwill. In Africa Mr Bolloré and his businesses have maintained close links with current and former politicians. "He is a friend. I favour friends. And so what?" Guinea's presi- ▶▶

dent, Alpha Condé, told *Le Monde* in 2016. Bolloré SA has recruited from France's network of former ministers, spooks and other grandees, often with tangled business ties in its former colonies. Critics allege Mr Bolloré has skewed the coverage of his TV channels and newspapers in favour of politicians vital to his business interests.

Mr Bolloré keeps close to French power, too. After winning the French presidential election in 2007, Nicolas Sarkozy holidayed on Mr Bolloré's yacht. "I've known Vincent Bolloré for 20 years," Mr Sarkozy explained at the time. Mr Bolloré's son,

Yannick, has called the current president, Emmanuel Macron, "a friend". Bolloré père has reportedly lobbied the French state to keep its 3% stake in Vivendi.

Mr Bolloré and Bolloré SA deny any impropriety in all these relationships. As for corporate governance, people close to Mr Bolloré dismiss concerns as specifically Anglo-Saxon. Family groups are lauded in Europe as long-term investors who see beyond quarterly earnings. Mr Bolloré has made no secret that his son Cyrille, 33, who chairs Bolloré SA, or Yannick, 39, who chairs Vivendi, will be in charge one day

(a third son is not active in the business; a younger daughter is in its lower echelons).

For now, despite stepping off the board of Bolloré SA, the patriarch remains the real boss. He retains positions—and influence—throughout the *mille-feuille*. He still calls the shots at both Bolloré and Vivendi. For years he has promised to relinquish all positions in 2022, when he turns 70 and the family business turns 200. Several Bolloré investors worry that the untested sons lack their father's track record. Given the elder Mr Bolloré's controversial tenure, others may see that as a virtue. ■

Bartleby Ask and you shall receive

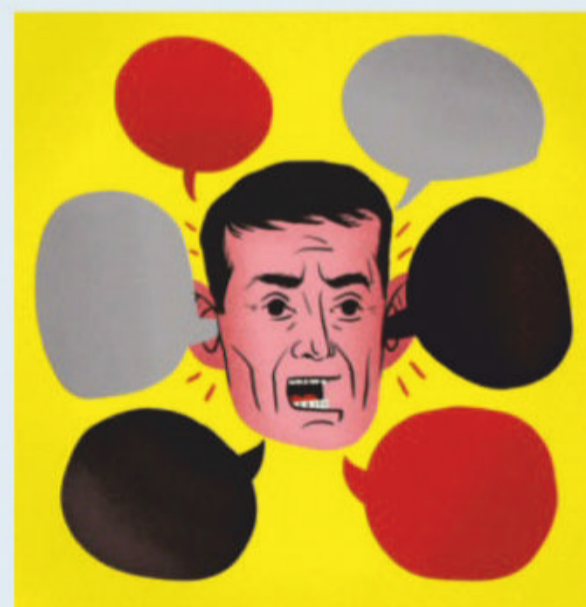
Why managers should listen to shareholders

ARTHUR BALFOUR was a British prime minister who did not think much of his party members. "I'd rather take advice from my valet than from the Conservative party conference," he said. Corporate executives, particularly in America, seem to take a similar attitude towards their shareholders, believing that, like children, they should be seen but definitely not heard.

Maybe managers should get their fingers out of their ears and start listening to their investors. That is the conclusion of a recent paper* by Clifford Holderness of the Carroll School of Management at Boston College.

In America and a few other countries, boards can issue more shares without shareholder approval. In some countries, shareholders must approve issuance above a certain threshold. And in yet others, investors must agree before any new stock can be created. So what happens to a company's share price when new shares are issued? Mr Holderness performed a meta-analysis of more than 100 studies of stock reactions around the world. He found that, when shareholders approved issuance in advance, the price tended to rise by an average of 2%. But when managers issued stock without shareholder approval, the share price declined by an average of 2%.

The simplest explanation for this lies in the agent-principal conflict between executives and investors. As Mr Holderness writes, if agency conflicts did not exist, "shareholder voting on equity issuance should not matter." However, managers may want to issue shares to fund expansion of the company, allowing them to control more assets and demand a higher salary. Investors, meanwhile, may worry about the impact of expansion on long-term returns and



dislike the dilution of their control.

Another sign of agent-principal conflicts are shares that are privately placed with selected investors or used to pay for takeovers. In Australia any offering of more than 15% of the equity must be subject to shareholder approval; in America the threshold is 20%. In both countries there is a clustering of share issuance just below the limit; managers go out of their way to avoid seeking approval. In April Occidental Petroleum promised \$10bn-worth of preferred shares to Berkshire Hathaway, Warren Buffett's conglomerate, should its bid for Anadarko, a rival oil firm, succeed. Mr Buffett's money helped it avoid asking shareholders to authorise the Anadarko deal.

This disdain for shareholder views contradicts the ethos of American capitalism. The system works, it is usually argued, because companies respond to shareholder pressure and because broad share ownership gives everyone, including workers, a stake in the American dream. One reason for the success of private equity is that investors enjoy closer

scrutiny over what managers do.

But when it comes to public companies, shareholders tend to be treated like an awkward uncle at a family gathering. Their only rights are to sell their shares or to vote against the reappointment of directors. In any other field this would be extraordinary. Imagine if you appointed a letting agent to look after your house and they decided to spend lots of your money on gold taps and chandeliers. When you complain, they respond that you are only entitled to sell the house or to fire them at the end of their contract.

Managers have long grumbled that shareholders want to interfere too much. A new complaint is that socially conscious investors may insist that firms concentrate on non-financial factors, like treating workers better or cutting carbon emissions. This concern seems ill-founded. For example, research** shows that companies voted the "best to work for" produce higher subsequent long-term returns.

More generally, most meta-studies have found that companies with better environmental, social and governance records improved their financial performance. Mr Holderness's work puts the tin lid on the argument that managers should ignore investors. When it comes to shareholders, managers should remember the words of Diogenes: "We have two ears and one tongue so that we would listen more and talk less."

* "Equity issuances and agency costs: The telling story of shareholder approval around the world", *Journal of Financial Economics*

** "Employee satisfaction, labour market flexibility, and stock returns around the world", by Alex Edmans, Lucius Li and Chendi Zhang, European Corporate Governance Institute Working Paper

Big Oil and climate change

Back to the well

NEW YORK

Shareholders test the limits of climate activism

INVESTORS CONCERNED about climate change have never been better organised, thanks to Climate Action 100+, a coalition with more than \$33trn in assets under management. Nor have they ever had more success. Last year shareholders of Royal Dutch Shell persuaded it to pledge emissions reductions from both its operations and its products. In May BP's shareholders voted to require the European oil-and-gas giant to disclose how its strategy matches the goals of the Paris climate agreement.

Edward Mason, the head of responsible investment for the Church of England, sees "a gulf opening between the European supermajors and the American ones". On May 29th the shareholders of ExxonMobil, the world's biggest listed energy company, and Chevron, another American major, voted against climate resolutions. Yet even in Europe green investors' impact is more a ripple than a wave.

In America oilmen have been shielded in part by regulators. Even before ExxonMobil's annual meeting, America's Securities and Exchange Commission (SEC) had sided with the company by agreeing that an emissions resolution brought by the Church of England and New York state's retirement fund amounted to micromanagement. This allowed the motion to be omitted from its proxy materials.

At the same time, some big asset managers have become more restrained. In 2017 BlackRock helped pass a resolution requiring ExxonMobil to disclose how climate change, or efforts to combat it with measures like carbon taxes, might affect its

business. It has seemed warier of the new campaigns at Exxon. After the SEC's decision, the Church of England and New York sought to split the roles of chairman and chief executive at ExxonMobil, hoping that a more independent board would set a greener strategy. Preliminary results show only 41% of votes in favour. ExxonMobil insists it shares green investors' concerns about climate change, pointing to investments in biofuels and carbon capture and storage. "Exxon seems stuck in time," counters Thomas DiNapoli, New York's state comptroller.

European firms seem forward-looking by comparison. Look closer, though, and they too appear grounded in the past. Shell aspires to halve its "net carbon footprint" by 2050. Shorter-term targets support the ambition—but leave room for emissions to rise so long as solar and wind power account for a growing share of Shell's energy production. BP opposed targets for total emissions, supporting instead the resolution focused on strategy disclosure.

Bruce Duguid of Hermes Investment Management, who worked with BP on behalf of Climate Action 100+, says that disclosure will help investors understand if the billions which BP continues to spend on oil and gas creates too much risk. BP will describe how big new capital projects stack up against the Paris goal of keeping warming "well below" 2°C relative to preindustrial times. Equinor, Norway's state behemoth, agreed to something similar in April. As with Shell, BP's resolution does not require it to cut oil and gas output. Greenpeace, a combative NGO, blocked entrances to BP's headquarters in London ahead of its annual meeting on May 21st.

Energy companies have made the right noises in other areas. ExxonMobil, Shell and BP have each devoted \$1m to support an American proposal for a carbon tax. In April Shell said it would drop its membership of the American Fuel & Petrochemical Manufacturers, describing the lobby

group's climate policies as being in "material misalignment" with its own. BP plans to review its membership of trade groups.

For the time being, though, Shell, BP and ExxonMobil remain members of the American Petroleum Institute, which has sought to ease rules on emissions of methane, a potent greenhouse gas. They also maintain links with the Western States Petroleum Association, which last year fought a carbon tax in Washington state. BP spent over \$13m directly to help defeat a ballot initiative in favour of the levy.

Some investors in America will continue to seek changes, including on company boards. "The story of the next year is, how do we increase the pressure for companies to act fast?" says Andrew Logan of Ceres, a consortium of investors that helps co-ordinate Climate Action 100+. Others are beginning to question the value of shareholder engagement. The Church of England has said it will divest by 2023 if no advances are made. "Investors' patience is not limitless," says Mr Logan. "It's going to be measured in years, not decades." ■

Opioids

An industry in the dock

NEW YORK

The first trial of an opioid manufacturer begins

"OVERSUPPLY AND people will die." That evocative line was at the heart of the opening argument laid out in a courtroom in Oklahoma on May 28th. Mike Hunter, the state's attorney-general, accused Johnson & Johnson (J&J), a pharmaceutical giant, of misleading doctors and patients about the dangers of opioids, prescription medicines used to treat severe pain. After a heart-wrenching description of addicted patients and the plight of babies with neonatal opioid syndrome, Mr Hunter asked, "How did this happen? I have a short, one-word answer: greed."

The opioid crisis claimed nearly 400,000 lives between 1999 to 2017, and rages on today. Americans want someone to blame and to pay for cleaning up the mess, so politicians are taking to the courts. A federal trial in Ohio will aggregate claims of nearly 2,000 cities, counties, Native American tribes and hospitals, against a number of opioid-makers and distributors, but will not start until October.

That is why all eyes are on Oklahoma this week. The J&J case is heavy with symbolism. It is the first of many against opioid manufacturers to reach trial. It is conducted in the same courtroom where Big Tobacco was humbled in 1998, which led to ciga- ▶▶



▶ **rette-makers** agreeing to pay states \$206bn over 25 years to settle lawsuits seeking to recover smoking-related health-care costs. Anti-opioid campaigners hope for a reprise. Wall Street is jittery—on the first day of the trial J&J's share price sank by 4%.

The campaigners should temper their expectations, for three reasons. First, Purdue Pharma, a middling drugmaker that, as opioids' most prominent promoter, has become synonymous with their abuse, is no longer on trial in Oklahoma. The firm, controlled by the Sackler family, reached a settlement for \$270m with the state ahead of opening arguments. Teva, an Israeli maker of generic opioids, settled for \$85m. That leaves J&J, a big company but a bit player in the opioids market, as the sole defendant.

J&J's stout defence, laid out in its opening argument, suggests a guilty verdict is no foregone conclusion. That is the second reason for caution. Larry Ottoway, J&J's lead attorney, fingered other culpable parties. He noted that America's Food and Drug Administration (FDA), which regulates all pharmaceuticals, has in the past declared that opioids "rarely caused addiction". The Drug Enforcement Agency strictly controls the import of precursor chemicals going into opioids and authorises doctors to prescribe them by issuing licences. In Mr Ottoway's telling, Oklahoma's medical supervisors were aware of opioid abuse as far back as the early 2000s but did not stop it. He summed up his opening remarks bluntly: "When you're right, you fight."

Third, and most curious, Oklahoma's case rests on a novel legal theory that has not been tested in a pharmaceutical context. Rather than allege fraud or product liability, Mr Hunter claims J&J infringed the state's law governing public nuisances. Usually that argument is used against transgressions like polluting waterways or interfering with the use of parks.

Richard Ausness, a legal scholar at the University of Kentucky, argues that "public

nuisance is not the strongest claim but they are stuck with it." Trying to litigate fraud may have proved problematic, he speculates, because the people allegedly defrauded were doctors and patients, not the state itself.

Whatever the outcome of this trial, its verdict seems likely to be appealed at the state Supreme Court. The federal judge in the Ohio mega-case is pushing all parties hard to reach a settlement, but this is proving difficult. If they do not, the trial will begin in five months. There are other state trials in the works, but many state attorneys-general are still weighing up whether to go it alone or to join hands.

These factors conspire to keep the legal outlook for the industry uncertain for the time being. But as the broader ramifications for all opioid-makers crystallise,

those for Purdue are already clear. The company and its owners have turned toxic. JPMorgan Chase, a big bank that provides payment services to Purdue, and McKinsey, a consultancy that advised it on how to market opioids, both said last week that they are dropping the drugmaker as a client. Museums around the world, which once welcomed Sackler money, are now turning it down. The firm is considering declaring bankruptcy.

For Americans angered by drugmakers' role in the opioid crisis, that may seem a fitting comeuppance. That is not the same as recompense. If Purdue ends up in bankruptcy court, those financial proceedings could cause every opioid case involving the firm to grind to a halt, cautions Andrew Pollis of Case Western University in Ohio. "Chaos is possible," he says. ■

Rocket Internet

Stage three

Europe's startup factory is struggling to spend its cash

ROCKET INTERNET is helping about 200 businesses reach for the stars, and has invested a total of €400m (\$445m) in them. When the startup incubator unveiled its first-quarter results in Berlin on May 29th, analysts focused not on these firms but on Rocket itself—specifically, the next stage in its trajectory.

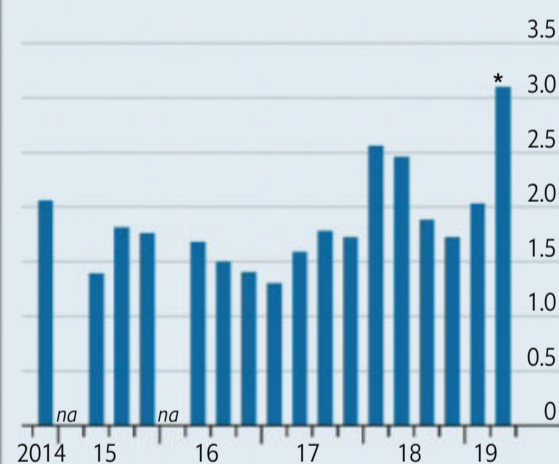
Rocket went public in 2014. Its business model gained notoriety: apeing successful American online firms in Europe and emerging markets. The idea was to create local market leaders—or force American originals to acquire them. Early knockoffs included Pinspire (Pinterest), Plinga (Zynga), Wimdu (Airbnb) and Citydeal (Groupon). Investors loved it.

Two years later the strategy stalled. Rocket proved better at launching companies than running them. Most of its startups lost money; a dozen folded. Its self-depiction as a "network of companies", not an investment firm, left shareholders unconvinced. It issued its first profit warning in September 2016, by which time its market value had fallen to just €2.9bn, compared with a peak of €8.7bn in 2015.

So Rocket changed course. It has jettisoned its previous hands-on approach and no longer has board seats at any of its listed companies. It is selling down its main holdings. That has proved lucrative: the sale in May of its remaining stake in HelloFresh, which markets meal kits, earned it €350m. It is set to make a killing on Jumia, an African e-commerce

Unused propellant

Rocket Internet, cash and cash equivalents, €bn



Source: Company reports

*At May 15th 2019

platform which has had a volatile listing this year in New York.

All this has left Rocket with €3.1bn in cash, little debt—and a problem. It invests small sums early, and brings in more outside capital later. Running down its cash pile at the current pace could take decades. Oliver Samwer, Rocket's boss, wants to spend more on its startups' later funding rounds. But its current crop of firms—in "property tech" and business-to-business marketplaces—looks years away from scale.

Rocket could use the cash to take itself private. Being public has not created value for shareholders. It has enough ammunition: even if it paid a 25% premium to buy out other investors, it would have €1bn in cash left over, says Sarah Simon of Berenberg, a German bank. That would be some re-entry.



Wheels of justice

Renault and Fiat Chrysler

The ultimate tribute show

Carlos Ghosn and Sergio Marchionne are no longer the kings of the car industry. But their vision lives on

THE RISE of the SUV shows that carmakers have persuaded many customers that bigger is better. Renault and Fiat Chrysler Automobiles (whose chairman, John Elkann, sits on the board of *The Economist's* parent company) are hoping to convince investors that the same is true of carmakers. On May 27th FCA, an Italian-American firm, said it was seeking a merger with its French counterpart, itself in a close alliance with Japan's Nissan and Mitsubishi. If a deal goes ahead, it will create an automotive colossus.

Together, the two companies sold nearly 9m cars last year and their combined revenues totalled €170bn (\$190bn), with €10bn in operating profits. Only Toyota and Volkswagen (vw), each making over 10m cars a year, are bigger. Add Renault's alliance partners, and the grand total of 15m cars would leave everyone in the dust.

The deal—still subject to approval by Renault's shareholders—can be seen as the legacy of two fallen giants of carmaking. Sergio Marchionne, FCA's charismatic boss who died last year, had called for consolidation of the mass market, where slender profits are partly the result of duplicated investment in similar technologies, such as engines, that do little to differentiate brands. Carlos Ghosn's Napoleonic personality helped him build and run the Franco-Japanese alliance. His plans for world domination were exploded by his arrest in Japan last year on charges of financial wrongdoing at Nissan (which he denies).

Mr Ghosn had previously invited FCA to join his alliance. Both he and Marchionne would doubtless have coveted the driving seat of a merged firm. With their rampant egos out of the picture, blunt negotiating style has apparently given way to civilised talks between Mr Elkann, scion of Fiat's founding Agnelli family, and Jean-Dominique Senard, who took over from Mr Ghosn as Renault's chairman in January.

Messrs Elkann and Senard appear to share Marchionne's vision. If they are to survive, incumbent carmakers will need to get bigger to ride out the sort of economic downturn that the industry now faces. Consolidation allows firms to cut costs and to spread inevitable and massive investments in electric vehicles (EVs), self-driving cars and mobility services (such as ride-hailing and car-sharing).

On paper, FCA and Renault look like perfect partners (see chart). They plug gaps in

each other's businesses both geographically and in terms of products. FCA's strength and profits come from America; Renault's from Europe. The French firm's cheap models and EV know-how complement FCA's pickups and upmarket brands such as Alfa Romeo and Maserati.

Can the tie-up defy the patchy history of carmaking megadeals? The list of failures is long: Daimler and Chrysler, BMW and Rover, anything to do with Ford. Fiat and Chrysler show that partnerships can work. Renault-Nissan-Mitsubishi works, too. Both groups had exceptional former bosses, who adeptly managed component firms' disparate cultures. But today the companies may be readier to overcome differences, since their prospects look so uncertain. And FCA believes the union could allow the combined firm to cut costs by €5bn a year—equivalent to around 3% of combined revenues and much more than Marchionne thought he could wring from the merger of Fiat and Chrysler, which in 2010 he put at 1% of revenues by 2014.

The trouble is that obstacles remain. Even if the firms can be engineered jointly, the same is not automatically true of ownership structures. This one is to be structured as a 50-50 partnership. This would hand the largest stake, of 14.5%, to Exor, the Agnelli family's investment vehicle, which

controls FCA through a 29% stake (Exor is also a shareholder in *The Economist's* parent company). It is unclear where the merger would leave Nissan. The Japanese firm's partnership with Renault looks creaky with Mr Ghosn out of the picture, and Nissan may worry that its influence will fall even further. But on the other hand its 15% non-voting stake in Renault will at least convert into a 7-8% voting share in the new firm. And the marriage to FCA may cool Renault's ardour for a full merger with Nissan, which does not want one.

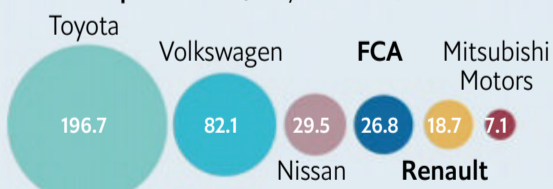
Then there are governments, which regard carmakers as national champions. Politicians fear plant closures, job losses and the unpopular symbolism of industrial decline. The French state, which owns 15% of Renault, will apparently give up its double voting rights and accept a board made up mainly of independent directors. The French and Italian governments may have been reassured by FCA's guarantee that no factories will close.

Lastly, running an alliance that makes 15m cars a year will be a feat. Even Marchionne or Mr Ghosn may not have been up to the task—not least because these superstars excelled in rescuing failing carmakers. Mr Senard, who is likely to lead FCA-Renault, has a different task—to steer firms that are already on the straight and narrow.

If size at the top of the industry moves from 10m to 15m cars a year, will others seek to follow? Ford and vw are in a partnership that could grow closer. PSA, which makes Peugeots and Citroëns, is open to offers. China's government is perpetually rumoured to be planning a merger of its state-run firms. If they were still in charge, Messrs Ghosn and Marchionne would have cheered the consolidation frenzy on. ■

Dual carriageway

Market capitalisation, May 28th 2019, \$bn

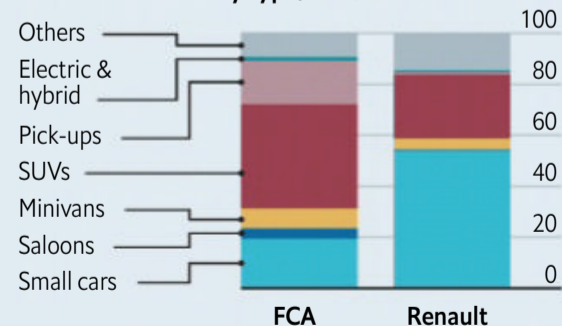


Share prices, October 13th 2014=100, € terms

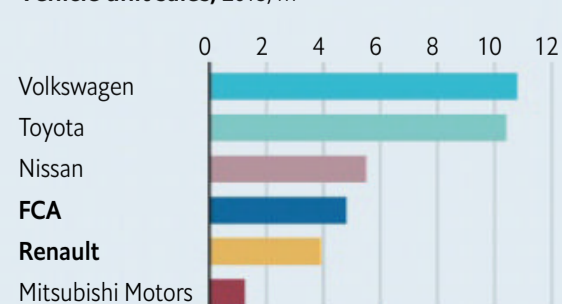


Sources: Datastream from Refinitiv; JATO; company reports

Vehicle unit sales by type, 2018, %

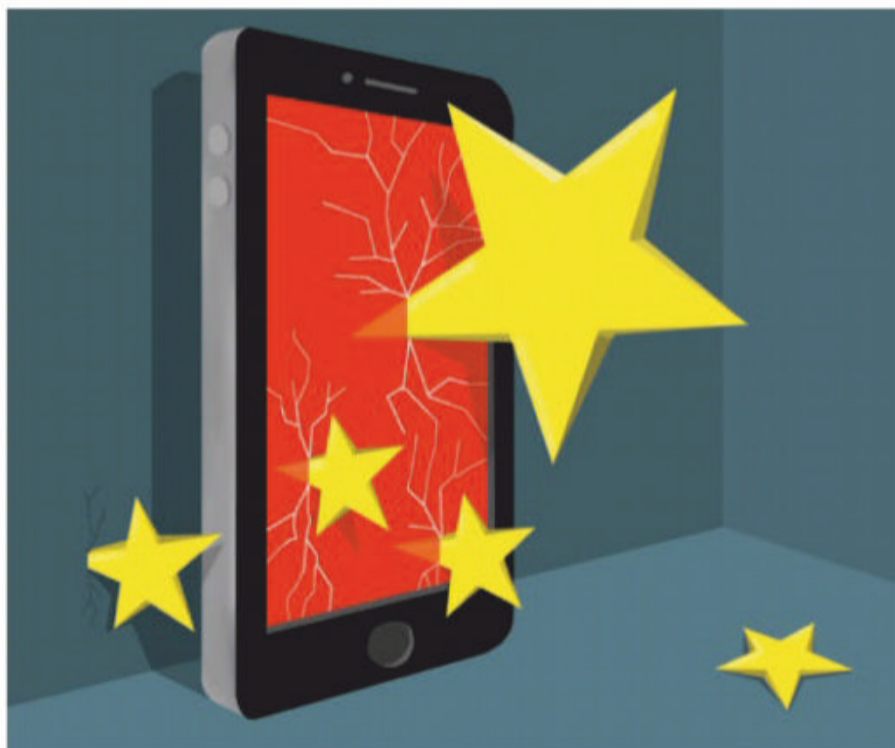


Vehicle unit sales, 2018, m



Schumpeter | iPhoney war

Does Apple's boss have a Plan B in China?



LONG BEFORE Tim Cook became Apple's boss, when his job was to wring costs out of the company's supply chain, he learned of a problem with a supplier in China. "This is really bad," he told his staff. "Someone should be in China driving this." Thirty minutes later he saw one of his executives sitting at a table. "Why are you still here?" he asked quietly. The executive stood up, drove directly to San Francisco's airport and bought a ticket to China.

This anecdote, recounted in Walter Isaacson's biography of Steve Jobs, Apple's founder, is one of only a few tales in print that offer an insight into the management style of Mr Cook, who took over from Jobs shortly before he died of cancer in October 2011. It is telling. While Jobs, the irascible creative genius behind Apple's bestselling products, stole the show, Mr Cook, who is both courtly and deeply private, plugged away behind the scenes to cement a relationship crucial to Apple's soaring success: that with China.

In the early days of Apple, Jobs wanted to make his Macintosh computers in America. With his trademark obsessiveness, he built a factory of pure white to produce them (and wore white gloves to check for dust). When Mr Cook joined the company in 1998 he changed all that, deploying his soothing Alabama lilt and a fearsome work ethic (he gets up at 4am) to forge an unrivalled supply chain running through Asia. Today labels on nearly all iDevices read, "Designed by Apple in California. Assembled in China".

Mr Cook's bet on China extended beyond its factories to its consumers. Sales to the region have risen from next-to-nothing in 2010 to \$52bn last year, or almost a fifth of Apple's revenues. Since Donald Trump's election in 2016, "Tim Apple" (as America's president once called him) has jetted to Washington and Beijing to try to ease rising trade tensions between the two superpowers. Horace Dediu, a technology analyst, says Mr Cook "knows how to navigate the political mind".

Given his reputation as a logistical mastermind, it is worth asking why he has ignored the first rule of supply-chain management: the risk of keeping too many important eggs in one basket. In Mr Cook's case, that basket is China. The trade bust-up is getting uglier. If it leads to an anti-American backlash in China, it could spell trouble for Apple—and for Mr Cook personally.

Mr Cook's lobbying has helped Apple avoid direct hits from Mr

Trump's tariffs, already imposed on \$250bn-worth of Chinese imports. But its shares have fallen by almost 12% in the past month. On June 1st, after *The Economist* went to press, China was expected to retaliate with tariffs on \$60bn of American goods, including components for Apple devices. Mr Trump has threatened a levy of 25% on \$300bn more of imports if trade talks do not produce a breakthrough. This would cover the iPhone, by far Apple's biggest source of revenue. Morgan Stanley, a bank, estimates that it could add \$160 to the cost of a \$999 iPhone xs. Apple could absorb the cost or pass it on to buyers. Either way, profits would suffer.

A more immediate threat may be a Chinese reprisal for the Trump administration's decision in May, on national-security grounds, to stop American companies from supplying Huawei, China's tech champion (and the biggest seller of smartphones in China), with chips, software and other technology. A Chinese consumer boycott of Apple products could accelerate their shift towards other, cheaper brands. Because of the trade tensions, Citi, a bank, has halved its forecast for iPhone sales in China in the second half of this year, from almost 14.5m to 7.2m units.

Others reckon that Apple could offset Chinese losses by luring customers away from Huawei in other countries—but only if it could continue to churn them out in Chinese factories. Although Apple has tentatively started production of some iPhones in India for local customers, it appears if anything to have increased its China exposure, even as Mr Trump's trade bluster has intensified. According to a review of Apple's top 200 suppliers by the *Nikkei Asian Review*, a Japanese publication, last year those from China (41) exceeded those from America (37) for the first time—though Apple stresses the importance of its American supply chain. China has recently released draft cyber-security regulations that cover threats to national security and supply chains. Andrew Gilholm of Control Risks, a consultancy, says these could be weaponised against big American firms in China if the situation deteriorates.

That would be the nuclear option. It looks unlikely for the time being. The costs for China would be huge; Mr Dediu estimates that Apple contributes about \$24bn a year to China's economy. Some 1.5m Chinese help assemble Apple products. A further 2.5m Chinese software engineers create apps for the ios operating system. Appetite for punishment may be weak. On May 26th Ren Zhengfei, Huawei's boss, told Bloomberg TV that he would be the first to protest if China hits back against Apple. "Apple is my teacher, it's in the lead," he said. "As a student why go against my teacher? Never."

Mr Ren can always change his mind. So can China. Whereas Huawei claims to have a Plan B to survive its blacklisting by America, and Samsung, a rival smartphone-maker from South Korea, is shifting supply chains from China, Apple appears to have no clear alternative to assembly in China. Few other places possess the expertise to produce the high-end components that Apple needs. The existing network would take years to unscramble.

On Apple watch

One fix would be for Apple to develop another indispensable product that no self-respecting affluent Chinese consumer could do without. For all his success, Mr Cook has not yet managed this. Another would be to develop services that do not need production in China. Apple's much-trailed announcement in March of new video-streaming, payments and other services shows it is trying. They may prove a hit, but would be no substitute for the iPhone. Mr Cook must be hoping that he has not miscalculated the risks to the supply chains he has so intricately engineered. ■



Clearing houses

Flight to safety

NEW YORK

Have regulators created a new type of financial monster?

GRIMSTAD, NORWAY, is an unlikely setting for financial-market shenanigans. But the fishing town is home to Einar Aas, a trader who took huge bets on Scandinavian energy markets. His 15 minutes of infamy came in September 2018, when his bets went spectacularly wrong. Unable to cover his losses, he blew a €114m (\$133m) hole in the capital buffers of Nasdaq Clearing, which handled his trades. Other members of the clearing house—mostly banks and energy-trading companies—were called upon to replenish its buffers.

The affair sent shivers down regulators' spines everywhere. In the midst of the global financial crisis in 2009, leaders at the G20 summit in Pittsburgh decided that the chaotic world of derivatives needed to be made safer by ensuring that they were centrally cleared. A decade later the notional value of all derivatives outstanding globally stands at a trifling \$639trn, of which 68% are centrally cleared through a handful of clearing houses. Collectively these institutions contain one of the biggest concentrations of financial risk on the planet.

Regulators fret most about a murky subset of derivatives: those that are traded over the counter by dealers and investors, rather than on exchanges. The notional value of these OTC derivatives is \$544trn, of which 62% are centrally cleared (see chart on next page). That is up from just 26% before the crisis. The share will rise further: traders who avoid clearing houses will soon be financially penalised by new rules.

All this raises a queasy question: does central clearing, which was meant to make the system safer, come with new risks of its own? To answer that you have to understand Mr Aas's fiasco better and peer into

the complex cascades of liability that clearing houses manage.

A call like Mr Aas's is rare. Before trading through a clearing house, the parties must post an "initial margin". When Lehman Brothers defaulted in 2008 a British clearing house, LCH, was able to cover all Lehman's trades with its initial margin. If bets are souring, clearing houses can demand extra "variation margin". Mr Aas posted a further \$42m as markets moved against him. But when he failed to meet another margin call on September 10th, his positions were liquidated. Nasdaq had to dip into its default fund—a pool of money collected from its members.

Nasdaq's Scandinavian clearing house is tiny compared with the biggest, like LCH, which clears more than half the global market for interest-rate swaps, or ICE, which dominates clearing for credit-default swaps. The optimistic view is that had Mr Aas been a smaller fish, or the pond bigger and more liquid, Nasdaq might have been able to find buyers for his positions.

Some regulators are unwilling to brush off the episode quite so easily. In a letter in March to Randal Quarles, the American Federal Reserve's chief bank regulator, Paul Tucker, a former deputy governor of the Bank of England, expressed alarm that a single trader could wipe out two-thirds of the default fund of a clearing house—albeit a relative tiddler. It augured badly for giant institutions, he argued.

Clearing houses can work as intended ►►

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only if no one believes they can fail. Their purpose is to sit between market participants. If a hedge fund buys \$100m-worth of Apple shares from an investment bank, say, and the transaction is centrally cleared, it is the clearing house that guarantees the bank gets its \$100m and the fund get its shares. For simple transactions this is a small role. Cash-equity trades are settled within two days. The risk that a party goes bust before settlement is minimal.

Now suppose the fund wants to buy an option—say, the right to buy \$100m-worth of Apple shares at today's price in a year's time. The price it pays—the premium—will settle quickly, but the parties' ongoing exposure will vary during the year. If Apple's share price rises sharply before its end, the right to buy those shares at the old price becomes more valuable. If the bank holding the shares goes bust before the year is out, the clearing house will be on the hook. The longer the time between execution and settlement, the bigger this credit risk. It is magnified when products are highly leveraged, as options generally are.

That is still better than the alternative—a bilateral trade, in the industry argot—in which the bank and fund face each other for the life of the option. This requires each to keep tabs on the other's creditworthiness, which is hard when they do not know each other's positions. If the fund wanted to close its position early, for example, it might sell an offsetting position to another bank. It would then appear to each bank that the fund was exposed to movements in Apple's share price, though in reality its risks would cancel out. If its trades had been centrally cleared, that would be obvious to everyone. This lack of transparency played a big part in the financial crisis—hence regulators' desire to shift from bilateral to central clearing.

The trouble is that central clearing creates new risks. Incentives are skewed when the risk of default is spread across a group, making a weak counterparty everybody's problem. Market participants may become less choosy about their counterparties. And most clearing houses are for-profit entities. Their profits rise with transaction volume, but losses for bad trades are largely borne by their members. That is a standing temptation to lower standards.

Skippy margin requirements or shallow default funds increase the chance that the default of a big member would leave a clearing house with large unmatched positions. It would then have just four possible sources of capital: its owner, usually an exchange; its members, usually investment banks; its customers, mostly investment funds—or, in extremis, the taxpayer.

Each has problems. It is unclear that owners could be obliged (or could afford) to cover much. If a big burden were to fall on members, they too might be forced to de-

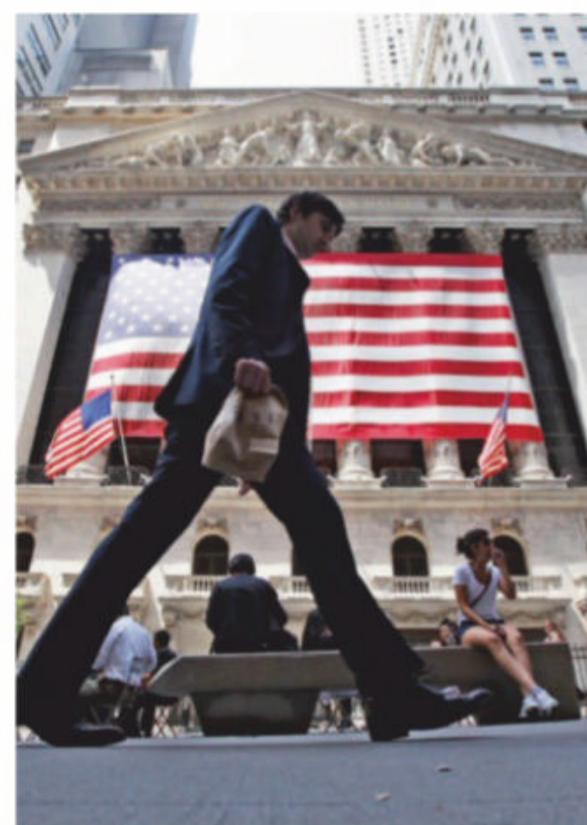
fault, or decide to cut their losses and walk away. If a clearing house looked likely to call on its customers' margin, they might pre-emptively step back, closing positions to reduce their margin requirements and perhaps starting a market panic. And financial regulators are rightly determined that taxpayers should not be landed with the bill for another financial crisis.

Clearing houses have collapsed before. In 1974 a Parisian house was felled by members defaulting on margin calls when sugar prices plummeted. In 1983 one in Kuala Lumpur came to grief when palm-oil futures crashed. But only one has been deemed too big to fail. After global stockmarkets crashed in 1987, the Hong Kong Futures Exchange clearing house collapsed and regulators shuttered the stock exchange while the government and city-state's largest banks arranged a bail-out.

A clearing-house collapse now would have far bigger repercussions. In his March letter Mr Tucker said that a clearing house that could not withstand a member's default could be a “devastating mechanism for transmitting distress across the financial system”. Central counterparties, he said, were “super-systemic”.

The shift to central clearing has been most pronounced in interest-rate derivatives, but is visible in other categories, such as credit derivatives, too. And it will continue. According to research by Citibank, an American investment bank, from September 2020, when margin requirements for uncleared trades come fully into force, investors may have to post three or four times as much margin when trading bilaterally as when using a clearing house.

Regulators have reduced the risk that derivatives will cause as much disruption as they did a decade ago. But they have created a new group of institutions that are too big to fail. Without certainty about where a clearing house in distress can seek capital, its members and customers will be more likely to behave in ways that mean it needs that capital. Rules intended to protect taxpayers may have the paradoxical effect of putting them back on the hook. ■



Chinese stocks in America

Far from home

SHANGHAI

Economic tensions spill into capital markets

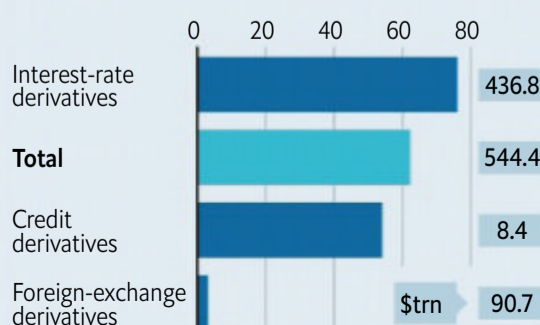
AMERICAN INVESTORS wanting a piece of Chinese firms, whether state-owned oil majors or tech stars, need not stray beyond Wall Street. Over the past two decades some 200 Chinese firms have gone public in America, more than from any other foreign country. (Most have their main listing there; a few have a “secondary” one, with a main listing in China.) These firms' total market value is more than \$1trn. For America's stock exchanges, that is a great triumph. But trade hawks are starting to describe it as a great liability.

In a letter in April a bipartisan group of politicians led by Marco Rubio, a Republican senator, said American investors faced risks because of exposure to Chinese companies “that pose national-security dangers or are complicit in human-rights abuses”. Steve Bannon, President Donald Trump's former chief strategist, expanded the focus to all Chinese stocks in America in an interview published on May 22nd in the *South China Morning Post*. “The next move we make is to cut off all the IPOs [initial public offerings], unwind all the pension funds and insurance companies in the us that provide capital to the Chinese Communist Party,” he said.

Those threats might be dismissed as idle, but for the actions of a couple of their targets. On May 24th Semiconductor Manufacturing International Corp (SMIC), China's largest maker of semiconductors, ▶▶

In the clear?

Global over-the-counter derivatives, notional amount outstanding, % centrally cleared
December 31st 2018



Source: Bank for International Settlements

► said it would delist from the New York Stock Exchange. Then on May 28th Bloomberg reported that Alibaba, a New York-listed Chinese e-commerce giant, was considering a second listing in Hong Kong.

There are unglamorous corporate explanations for both moves. SMIC's securities are rarely traded in America (its main listing is in Hong Kong), and Alibaba has long considered selling shares in either Hong Kong or mainland China, partly to broaden its capital base. But it was also easy to discern political motives. The two companies will gain some insulation from America's capital markets and show support for their home side. That message was not lost in China. Several local reports quoted a line by Charles Li, the head of Hong Kong's stock exchange: "Those who travel far always come home some day."

Yet it is premature to proclaim an end to Chinese voyages to the American stock market. Indeed, these have so far looked like an exception to the trade war. Just about every facet of the two countries' economic relationship has suffered: trade, investment and even tourism have all declined. But last year more than 20 Chinese companies listed in America, an eight-year high. Another dozen have listed this year.

Chinese firms benefit from deeper liquidity than they can get at home, and more flexible regulations. Profitability requirements have all but blocked Chinese tech firms from mainland exchanges. Last year Hong Kong drew nearer to the American norm by allowing founders to own shares with superior voting rights. But several rising tech stars still opted for Nasdaq, including Pinduoduo, an e-commerce firm, and iQiyi, a video-streaming service. "They view the American market as the gold standard," says Drew Bernstein, the co-head of the China practice at Marcum BP, a firm of accountants.

America has benefited, too. The presence of strong Chinese companies has reinforced its stockmarket's position as the world leader. A series of scams, mostly involving smaller companies, have damaged the reputation of Chinese stocks. But bigger stocks have fared well (Alibaba trades at more than double its IPO price), providing investors with growth and variety.

America's exchanges would be loth to part with them. Shortly after Mr Bannon's interview was published, Bob McCooey, a senior vice-president with Nasdaq, sent out a message to his contacts on WeChat, a Chinese messaging service, which spread quickly among Chinese investors. "Like many of you, I have seen the comments by President Trump's FORMER and discredited adviser Steve Bannon. I do not believe these words to have any truth," he wrote. Nasdaq, he added, still welcomes Chinese companies. It is a message he is likely to find himself repeating. ■

Indonesia's economy

After infrastructure

JAKARTA

The president searches for a new growth formula

VICTORIA OPAI, a teacher in a remote part of West Kalimantan, Indonesia's slice of Borneo, is charmed by the new road connecting her school to Putussibau, the nearest town. It is smooth, reasonably straight and cuts through swathes of jungle. It used to take three hours to get into town, she says. Now it takes 40 minutes.

Over the past five years new roads, airports and railways have popped up across Indonesia. Reviving its ailing infrastructure was a pledge of Joko Widodo, the president, known as Jokowi, during his first term. Along with poverty-reduction measures, it helped him win re-election on April 17th. In his first term Indonesia grew by 5.1% annually; last year the IMF said ambitious economic reforms could enable Indonesia to grow at 6.5% by 2022. Jokowi promises to improve "human resources", meaning education and the quality of the labour force. In a speech on April 30th he talked about "upskilling" Indonesia.

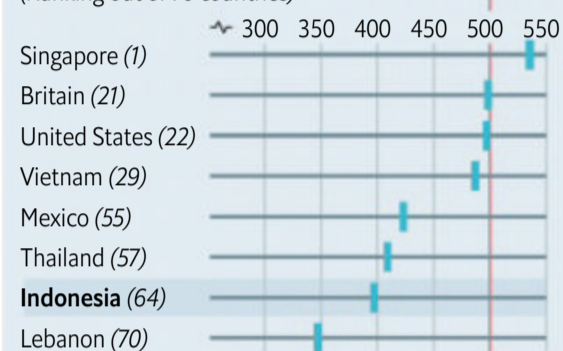
In 2003 the constitution was amended to require the government to spend 20% of its budget on education. Previously it had spent about half that. And the share of 13- to 18-year-olds enrolled in school has risen over the past two decades, to 88%. But outcomes are poor. Over half of those who finish school are functionally illiterate. Between 2003 and 2015 Indonesia's scores in the PISA tests run by the OECD, a think-tank of 36 countries, improved only slightly. In 2015 it came 64th out of 70 countries in the organisation's rankings of 15-year-olds in literacy (see chart 1).

The problem, says Daniel Suryadarma of the SMERU Research Institute in Jakarta, is not how much money goes on education, but how it is spent. Though half of the extra

Not ready for prime time

PISA reading score*, 2015

(Ranking out of 70 countries)



Severance pay for redundancy†

Number of weeks, May 2018



Sources: OECD; World Bank

*15-year-olds †Average for workers with one-, five- and ten-year tenure

funding went on teachers' salaries, pay rises were not tied to performance, so there was no impact on attainment. Meanwhile, facilities are threadbare. Half of primary schools have no electricity.

Shoddy schooling makes it hard for people to find jobs. Red tape makes it harder still. According to the World Bank's "ease of doing business" ranking, Indonesia has the world's third-highest severance pay. An employee dismissed after a year is entitled to four months' pay. Since it is expensive ►►

Bringing down the neighbourhood

Youth-unemployment rate*



Net FDI inflows



Trade†



Sources: World Bank; IMF; Haver Analytics

*15- to 24-year-olds †Exports and imports of goods and services

► for firms to shed workers in lean times, they are reluctant to hire in good ones. Pricy severance also helps explain why 60% of Indonesian employees work in the informal sector, and why many of those who do not are on temporary, rolling contracts.

Unemployment for 15- to 24-year-olds stands at 16%, which is high by regional standards and three times the rate for the working-age population as a whole. That may be partly because young people are holding out for plum jobs in the civil service, where kickbacks are easily extracted, or in the natural-resources sector, where pay is high, says Chris Manning of Australia National University. But youth unemployment is highest among university graduates, suggesting a mismatch between the skills taught and those needed.

Hence an idea popular among policy wonks: to improve vocational schools and government training schemes. School reforms would take a generation to be felt, but better training for the existing labour force could create more jobs within a year, argues Chatib Basri, a former finance minister. That would give Jokowi the political capital and momentum he needs to press for further changes.

The reform economists think would be most effective would be to make it easier for foreigners to invest. A study by the OECD found that Indonesia's rules for foreign direct investment (FDI) were the third-most restrictive out of 68 rich and middle-income countries. FDI as a share of GDP has averaged 1.5% over the past three years, among the lowest in the region (see chart 2 on previous page). Red tape makes it hard for foreign workers to move to Indonesia. They are less than 1% of the workforce.

Loosening these rules would help to revive the ailing manufacturing sector. Indonesia struggles to compete with neighbours with better infrastructure and lower payroll costs. That is particularly the case in export-oriented industries such as smartphone assembly and shoemaking. In Vietnam the value of imports plus exports is around 195% of GDP; in Indonesia it is about 43%. Cutting import restrictions would also help. Mr Basri points out that 90% of Indonesia's imports are raw materials or capital goods, such as machinery, which keep factories humming.

An influx of foreign firms could have direct benefits for the education system, too. In Malaysia and Thailand, unlike Indonesia, foreigners can establish and operate universities. Moreover, foreigners could help train Indonesians. Skills are taught at least as well on the factory floor as in the classroom. Google has launched a scholarship to teach Indonesian students to code; it says it has already trained 110,000 app developers. Jokowi's aim of upskilling Indonesia is admirable. The best way to do it is to attract skill-hungry businesses. ■

Cryptocurrencies

FaceCoin

SAN FRANCISCO

Facebook's new currency may be based on a blockchain, but it is no Bitcoin

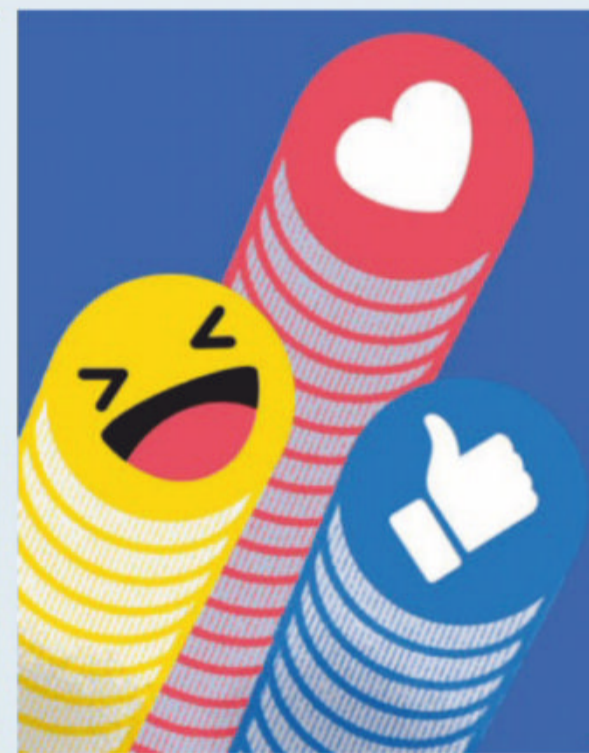
THE EXCITEMENT among crypto-buffs is palpable. Facebook, the world's largest social network, appears to be planning to launch a digital coin early next year. But they should not get their hopes up too high. If the firm does indeed launch what is being dubbed FB Coin, GlobalCoin or Libra, it will be a tame sort of cryptocurrency—more Bitcoin 0.5 than 2.0.

Facebook has declined to comment on the speculation, but is clearly up to something. Last year it put a highly regarded senior executive, David Marcus, in charge of a new team exploring “ways to leverage the power of blockchain technology”, which underlies cryptocurrencies. In April Mark Zuckerberg, Facebook's boss, said at its annual shindig for developers that it “should be as easy to send money to someone as it is to send a photo”. It seems to be talking to potential partners, such as credit-card issuers and merchants, and financial regulators, such as Mark Carney, the governor of the Bank of England.

In America Facebook's Messenger app already allows peer-to-peer transfers, but only in existing currencies and between accounts linked to bank-issued payment cards. But the new blockchain-based money would be a currency on its own.

Reasons abound why Facebook might want to take this step. It has to pull even with other big global apps that already offer easy payment features, such as WeChat in China. A digital coin would work in developing countries, where many people are unbanked and remittances from abroad are large (India is rumoured to be among the first countries where it will be available). If it is used for commerce, not just peer-to-peer payments, Facebook could take part of the fee that now goes to card-issuers, and charge more for ads, since buying the products touted would be quicker and simpler. It could move into services such as tipping, for which other payment systems are too pricey (at the Facebook do Mr Zuckerberg demonstrated how users could send content-creators some digital change). Data on payments would help make up for what the firm will lose in its planned “pivot to privacy”, which includes steps such as allowing users to communicate on encrypted channels.

But despite the crypto-buzz, the new currency is unlikely to be a close relative of Bitcoin, says Lex Sokolin, a fintech



analyst—that is, a decentralised system with no one in charge. Facebook will want to be in control to gather data, simplify administration and avoid the currency being targeted by speculators such as hedge funds. It will be a “stable-coin”, backed by established currencies such as the dollar to avoid the volatility that has bedevilled Bitcoin (which is heading back towards \$9,000 after falling to little more than \$3,000 last year). Regulators, fearing money-laundering or other criminal activity (as happens with Bitcoin), will surely set strict rules, perhaps capping transfers and policing their flow across borders.

Facebook is well-placed to make a go of the venture, according to Ben Thompson of Stratechery, a widely read newsletter on the tech industry. Its services now boast a total of 2.4bn monthly users. It could entice merchants with discounts if they use the new coin to buy ads, and users by paying them in it for viewing those ads—or perhaps, which would be a giant step for Facebook, even for providing data about themselves.

Yet it will not have the field to itself. Similar coins already exist. Signal and Telegram, two messaging apps, are also planning digital cash. Moreover, payment cards are ubiquitous in the rich world, and easy to use online. And then there is the question of whether, for all its reach, a FaceCoin would really be welcome. Should a firm that has shown a cavalier attitude towards users' data be trusted to deal with their money?

Online banks in America

Trouble logging in

NEW YORK AND WASHINGTON, DC

America's regulatory system is unfit for the digital age

HERE COME the Germans. On May 21st Raisin, a “deposit marketplace” from Berlin, declared its intention to set up shop in America. Within a year Raisin hopes to follow its compatriot, N26, a mobile bank that is due to open there soon. Yet neither will, technically, be a bank. Remarkably, no such startup yet has a national banking charter in America, although the country is a hotbed of financial technology, spawning innovators from PayPal to Quicken Loans.

Both Raisin and N26 will rely, at least at first, on the charters and deposit insurance of local “sponsor” banks. That route is “fastest to market”, says Nicolas Kopp of N26. It is also common. Sponsors such as the Bancorp Bank, Cross River Bank and WebBank stand behind fintechs and others wanting to offer banking services. (They often supply technology, too.)

Varo Bank, of Salt Lake City (hitherto a partner of Bancorp), is likely to be the first purely mobile bank with a national charter. Last August the Office of the Comptroller of the Currency (OCC), a supervisor, gave Varo preliminary approval, subject to its raising \$104m in capital and other conditions. Varo will also need a nod from the Federal Deposit Insurance Corporation (FDIC), which it first approached in early 2017. Robinhood, an online wealth-manager, has also applied to the OCC and Square, which handles payments for small businesses (the chairman of The Economist Group, Paul Deighton, is on its board), to the FDIC.

In Australia, Britain, Hong Kong, Singapore and elsewhere, online banks and other fintechs have a fairly clear path to regulatory approval. Regulators have provided “sandboxes” in which startups can develop their products safely. In Britain, online challengers have restricted licences at first; some, such as Monzo and Starling, have gained full bank status.

The Consumer Financial Protection Bureau (CFPB) and the OCC have proposed setting up sandboxes. Arizona, Utah and Wyoming, all eager to attract startups, are building their own. But although things are starting to shift, America is still far behind. It also has no equivalent of the European Union's payment-services directive, which allows third-party companies to make payments and aggregate data from accounts—with consumers' permission—or the British variant, Open Banking. Both may help open up banking to digital competition. Steven Mnuchin, the treasury secretary,

has proposed modernising the Community Reinvestment Act (CRA), an anti-discrimination law whose requirements are tied largely to the location of branches—hard to square with a world of digital banking—but nothing has changed yet.

America's regulatory system is fiendishly complex, comprising “patchworks on patchworks”, says Brian Knight of the Mercatus Centre at George Mason University. As well as several federal regulators, created in response to successive crises—the OCC during the civil war, then the Federal Reserve, the FDIC, the CFPB and more—every state has its own authorities.

Overseeing digital banks is thus no one's business and everyone's. The OCC has tried to take the initiative—last year it invited applications for “special purpose national bank charters” aimed at fintechs—but state regulators took umbrage, though the charter does not permit deposit-taking and none has been awarded. On May 2nd a federal court ruled that New York's Department of Financial Services could proceed with a suit against the OCC. The prospect of a legal battle, progressing at much less than internet speed, may well put off potential applicants for special charters.

Would-be banks have plenty of options, but all have pitfalls. As Varo Bank has found, the route to a conventional federal charter is slow (it went for a full OCC charter, not the limited special version). Hooking up with a sponsor buys time and conve-

nience, but at some expense (eg, a cut of “interchange” fees from card transactions). Digital firms can buy a chartered bank, if they can find a suitable one: Moven, another fintech, has made three unsuccessful attempts, says Brett King, its founder. The biggest obstacle, he adds, was that the CRA would have obliged it to keep branches open. (Moven maintains a partnership with a bank in Kansas.) Or they can be bought themselves. Simple, a digital bank set up after the financial crisis to provide basic bank accounts, at first tied up with Bancorp, but in 2016 was acquired by BBVA, a Spanish bank already active in America.

Admittedly, new banks face similar choices in other countries. At first N26 piggybacked on the licence of Wirecard, a German financial-services firm. Raisin's domestic sponsor was MHB Bank—which it bought this March. Nevertheless, the sheer thickness of America's regulatory undergrowth surely hands an advantage to already-licensed banks of all sizes. Several have their own online brands.

Thus the most prominent digital entrant is arguably Goldman Sachs. Its offshoot, Marcus, has scooped \$35bn in deposits, helped by a famous name and generous interest rates. Ally Financial, the biggest online-only bank, used to be General Motors' financial arm. Meanwhile BankMobile, owned by Customers Bank, a Pennsylvania lender with just \$10bn in assets, has 2m checking-account customers; most are students, thanks to deals with their colleges. In April BankMobile launched T-Mobile MONEY, providing banking services under the telecoms network's brand. Luvleen Sidhu, BankMobile's president, says she is gaining 5,000 accounts a week—against just one through a typical bank branch. “Our path was easier”, says Ms Sidhu, “because we didn't have to apply for a bank charter.” ■



The banking system that time forgot



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Free exchange | The bonds that tie

China cannot easily weaponise its holdings of American government debt



AN OLD SAYING: if you owe the bank \$100 it's your problem; if you owe \$100m it's the bank's. The adage is silent on debts like America's to China, of more than \$1.1trn. The IOU looks like a source of leverage for China's leadership—a reason for President Donald Trump to be cautious in waging trade war, lest his counterpart, Xi Jinping, command the People's Bank of China (PBOC) to dump its Treasury bonds and plunge America into a fiscal crisis. An editorial on May 29th in the *People's Daily*, a Communist Party mouthpiece, suggested that China might restrict exports to America of rare earths, which are used in smartphones, electric vehicles and much more. Seen against fresh threats, the \$20bn-worth of long-term bonds China sold in March might seem a shot across the bow. Yet China's bond pile is more blunderbuss than laser-guided missile. It is as likely to miss or blow up as to strike its target.

China's bond-buying began innocently enough. Its leaders, eager to follow the time-tested path to export-led development, favoured an undervalued currency. In the early 2000s, as rapid growth in output and exports put upward pressure on the exchange rate, the PBOC sold yuan and bought dollars, most of which it parked in American Treasuries. Cheap funding looked like a boon to America, at the time awash in red ink because of tax cuts and foreign wars. But as so often with China, something too small to notice quickly became too large to ignore. China's official holdings of American government debt rose from just under \$100bn in 2002 to a peak of nearly \$1.3trn in 2013. It now manages the yuan against a basket of currencies rather than the dollar alone, and no longer buys very many Treasuries. But the reserve hoard remains.

Its value as an economic weapon is dubious, however. The point of a bond dump would be to saturate the market for Treasuries. America's hefty government debt needs continuous rolling over, and its stonking deficits add to the pile at a pace of about \$1trn per year. Investors, for now, keep buying. But China, by selling Treasuries, might ply the market with more bonds than it can easily digest. To keep overfilled investors coming back, America's government might need to offer higher interest rates. A big enough jump in borrowing costs could force it to choose between growth-crushing fiscal austerity and a fiscal crisis.

But Treasuries are not a typical security. In 2011, for example,

Standard & Poor's, a ratings agency, cut America's sovereign credit rating, citing its soaring debt and dysfunctional politics. Markets promptly gobbled up more Treasuries than ever; the yield on the ten-year bond soon fell by more than a percentage point. This anti-gravity effect derives from America's hegemonic role in finance. It issues the world's primary reserve currency and its most prized safe asset. The always-healthy appetite for American debt grows in times of economic uncertainty—even when America itself is the cause of the trouble. If Chinese bond sales rattle global markets, the flight to safety might well sop up the new Treasury supply.

Even if markets remained calm, Chinese sales might prove a mere annoyance. An analysis published by the Federal Reserve in 2015 suggested that \$1.5trn in bond purchases would be expected to reduce ten-year Treasury yields by between 40 and 50 basis points. A comparable rise in yields induced by Chinese bond sales would be uncomfortable, but hardly a disaster, especially since the Fed could intervene if rising yields threatened America's economy. The Fed is currently shedding \$15bn-worth of Treasury bonds each month as it unwinds the unconventional stimulus measures used after the financial crisis. Were China to start selling, the Fed could simply resume buying.

Bond yields are only part of the picture. China bought its Treasuries to stop the yuan appreciating too quickly. Were it to sell them and convert the proceeds back into yuan, its currency would rise, hurting its already-beleaguered exporters and delighting Mr Trump. China could instead try to swap its Treasuries for other foreign assets. Alas, no other government-bond market matches America's for size and safety. German bunds are rock-solid, but in short supply thanks to German fiscal surpluses. France, Italy and Japan offer large markets but more risk. All would fume if China turned its cash their way, causing their currencies to appreciate, hurting their exporters and perhaps inducing deflation, which they already struggle against. Their governments might respond by raising tariffs on China, a disastrous outcome for Beijing.

Buried Treasuries

China could use a bit of depreciation to offset American tariffs. Investors know this, and may be selling yuan now to avoid future losses. China's recent Treasury sales probably represent an effort to keep the depreciation orderly, using dollars to buy yuan from bearish investors, rather than the start of a belligerent bond dump. If the pace remains slow, then China could offload more of its American bonds without angering other trading partners—but also without causing America much discomfort, if any. Moreover, as market forces push the yuan down, the value to China of dollar assets is obvious. They provide China with a bit more macro-economic autonomy in a global economy dominated by the dollar.

America's place at the centre of global finance is unassailable in the short term. Yet neither America nor China appears to understand just why its position is so commanding. China might like to discomfit America by becoming a credible alternative hegemon: if investors could flee American assets in response to bad behaviour, America might behave better. But challenging America would require open markets, transparent financial institutions and the rule of law—all of which is difficult for an authoritarian regime.

America seems just as clueless. A protectionist bully is an unappealing steward of the world economy. In abusing its privilege, it undermines the shared trust that makes Treasuries an asset without equal. This trade war has been built on mistaking strengths for weaknesses—and weaknesses for strengths. ■

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Medicine

Guts, brains and autism

PHOENIX, ARIZONA

Understanding the connection between gut bacteria and autism-spectrum disorder may be the key to treatment

PARADIGM SHIFT is an overused term. Properly, it refers to a radical change of perspective on a topic, such as the move from the physics of Newton to the physics of Einstein, or the introduction of plate tectonics into geology. Such things are rare. Something which history may come to regard as a true paradigm shift does, however, seem to be going on at the moment in medicine. This is a recognition that the zillions of apparently non-pathogenic bacteria on and in human bodies, hitherto largely ignored, are actually important for people's health. They may even help to explain the development of some mysterious conditions.

One such condition is autism—these days often called autism-spectrum disorder (ASD). ASD is characterised by repetitive, stereotypical and often restricted behaviour such as head-nodding, and by the difficulties those with it have in reading the emotions of, and communicating with, other people. These symptoms are noticeable in children from the age of two onwards. Currently, in America, about one

child in 59 is diagnosed with ASD.

What causes ASD has baffled psychiatrists and neurologists since the syndrome was first described, in the mid-20th century, by Hans Asperger and Leo Kanner. But the evidence is pointing towards the bacteria of the gut. That suggestion has been reinforced by two recently published studies—one on human beings and one on laboratory rodents.

Restoring the balance

The human study, the latest results of which came out a few weeks ago in *Scientific Reports*, is being conducted by Rosa Krajmalnik-Brown of Arizona State University and her associates. It was prompted by earlier work in which Dr Krajmalnik-Brown

and James Adams, a colleague at Arizona State, sequenced the DNA of gut bacteria from 20 autistic children to discover which species were present. They found that the children in their sample were missing hundreds of the thousand-plus bacterial species that colonise a “neurotypical” person's intestine. One notable absence was *Prevotella*. This bug, which makes its living by fermenting otherwise-indigestible carbohydrate polymers in dietary fibre, is abundant in the alimentary canals of farmers and hunter-gatherers in places like Africa, rare in western Europeans and Americans, and nearly nonexistent in children with ASD.

Their discovery led Dr Krajmalnik-Brown and Dr Adams to the idea that restoring the missing bacteria might alleviate autism's symptoms. Two years ago they tested a process called microbiota transfer therapy (MTT) on 18 autistic children aged between seven and 16. Of their participants 15 were regarded, according to the Childhood Autism Rating Scale, as having “severe” autism.

MTT is a prolonged version of a process already used to treat infection by a bug called *Clostridium difficile*, which causes life-threatening diarrhoea. It involves transplanting carefully prepared doses of faecal bacteria from a healthy individual to a patient. The researchers gave the children, first, an oral antibiotic, a bowel cleanse and an oral antacid (to ensure that microbes administered by mouth would

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► survive their passage through the stomach). They followed this up with either an oral or a rectal dose of gut bacteria, and then, for seven to eight weeks, a daily anti-acid-assisted oral dose.

Ten weeks after treatment started the children's *Prevotella* levels had multiplied 712-fold. In addition, those of another species, *Bifidobacterium*, had quadrupled. *Bifidobacterium* is what is known as a "probiotic" organism—something that acts as a keystone species in the alimentary ecosystem, keeping the mixture of gut bacteria healthy. Now, two years later, although levels of *Prevotella* have fallen back somewhat, they are still 84 times higher than they were before the experiment started. Levels of *Bifidobacterium*, meanwhile, have gone up still further—being five times higher than they had been at the beginning of the study. This, says Dr Krajmalnik-Brown, suggests the children's guts have become healthy environments that can recruit beneficial microbes by themselves.

Crucially, these changes in gut bacteria have translated into behavioural changes. Even 18 weeks after treatment started the children had begun showing reduced symptoms of autism. After two years, only three of them still rated as severe, while eight fell below the diagnostic cut-off point for ASD altogether. These eight thus now count as neurotypical.

Exactly how gut bacteria might contribute to autism is a puzzle. But light has been shed on the matter by the second study, published this week in *Cell* by a team led by Sarkis Mazmanian of the California Institute of Technology. Dr Mazmanian and a group of colleagues that also included Dr Krajmalnik-Brown performed a type of MTT on mice. They collected bacteria from the faeces of both neurotypical and autistic people (who ranged in their symptoms from mild to severe) and transplanted these into hundreds of mice. They then interbred the recipient mice and studied the offspring of these crosses—animals that had picked up the transplanted bacteria from their mothers at birth.

Signal results

They were looking for the rodent equivalent of ASD. And they found it. Most of the young mice harbouring gut bacteria from autistic human donors showed features of autism themselves. These included repetitive behaviours, reduced social and vocal communication with other mice, and restricted movement. In contrast, none of the mice colonised with bacteria from neurotypical people ended up autistic. Dr Mazmanian and his team discovered, moreover, that the intensity of a human donor's autism was transferred to the recipient mice. If an individual's symptoms were severe then so, too, were those of mice that hosted his gut bacteria.

Dr Mazmanian's study also dealt with the question of mechanism. One long-held suspicion is that a molecule called gamma-aminobutyric acid (GABA) is involved. GABA is a neurotransmitter, meaning that it carries signals between nerve cells. In particular, it counters the action of another neurotransmitter, glutamate, that excites nervous activity in the brain. Studies have shown that levels of GABA are lower than normal in the brains of autistic children (though, inexplicably, not in autistic adults). Some researchers suspect that this deficiency takes the brakes off glutamate's excitatory activity, thus stimulating things like repetitive behaviour.

Dr Mazmanian and his colleagues produced evidence supporting this idea. They collected faeces, blood and brain tissue from the rodents in the experiment. When they analysed these they found that the "autistic" animals were deficient in taurine and 5-aminovaleric acid, two substances that stimulate GABA's activity.

They, too, drew potentially therapeutic conclusions from their results, and tested those conclusions by giving the missing substances to female mice carrying autism-inducing bacteria in the weeks before those females become pregnant. The resulting offspring, though still showing some symptoms of autism, scored 30% better on the rating scale than did the offspring of untreated females.

Meanwhile, the success of the study in Arizona has prompted America's Food and Drug Administration (FDA) to look into the matter. A firm called Finch Therapeutics Group, based in Massachusetts, hopes to commercialise the use of MTT as a treatment for autism and the FDA has now granted this effort "fast track" status, which should speed up the review process. Dr Krajmalnik-Brown and Dr Adams are now recruiting volunteers for a large-scale trial of MTT for adults with autism, to see if they, too, can benefit. The paradigm, it seems, really is shifting. ■

Astronomy and human evolution

Starchildren

Human beings may owe their existence to nearby supernovas

IF A SUPERNOVA went off near Earth, that would be bad. From a distance of less than, say, 25 light-years, the resulting bombardment of fast-moving atomic nuclei, known as cosmic rays, would destroy the layer of atmospheric ozone that stops most of the sun's harmful ultraviolet light reaching Earth's surface. In combination, these two kinds of radiation, cosmic and ultraviolet, would then kill many forms of life.

If a supernova went off not quite so close by, though, that might be interesting. It would have effects, but more subtle ones. Indeed, a paper published in the latest edition of the *Journal of Geology*, by Brian Thomas of Washburn University, in Kansas, and Adrian Melott of the University of Kansas, suggests that a series of such stellar explosions may have nudged humanity's forebears down from their trees and up onto their hind legs.

The chain of events Dr Thomas and Dr Melott propose starts with the observation that between 14 and 20 supernovas have gone off in Earth's vicinity over the past 8m years. These explosions, of young, massive stars, are believed to have happened in the Tucana-Horologium stellar group, currently about 130 light-years from Earth.

One reason for believing these supernovas occurred is that the shock waves from them swept away nearby interstellar gas

and the magnetic field which threads through that gas. This has left the sun embedded in what is known as the Local Bubble, a peanut-shaped void 300 light-years long in which the vacuum of space is even emptier than normal, and which is bounded by a wall of somewhat denser gas and stronger magnetic fields. ►►



A lucky strike for humanity?

Once the Local Bubble was established, any cosmic rays created by a supernova within it would have kept bouncing off this magnetic wall and back into the bubble. They would thus have strafed every object within it, including Earth, for tens, or even hundreds of thousands of years after the explosion that created them.

Some of these rays were the nuclei of a radioactive isotope of iron that is created almost exclusively in supernovas. These unstable nuclei, together with their decay products, have been found in the ocean floor on Earth and in rock samples brought from the Moon—another reason to believe the supernovas happened. Those isotopes found on Earth can be dated from the sediment they are in. The strongest signal is from 2.5m years ago, indicating that this explosion was the closest.

A geological feature that coincides with the period when Local Bubble supernovas were going off is an increase in traces of charcoal in oceanic sediment. That is evidence of wildfires on land. This increase starts about 7m years ago and in turn coincides with a period when much of Earth's vegetation shifted from forests to grasslands. The fires recorded by the oceanic charcoal could explain this vegetational shift, because grass is more resilient to fire than trees are. What explains the fires, though, remains mysterious.

Dr Thomas and Dr Melott propose that the culprit is cosmic rays from the local supernovas. The main arsonist of wildfires is lightning. The hammering of atmospheric molecules these rays handed out, they suggest, caused more lightning. The rays would knock such molecules apart, liberating electrons from their atoms. These liberated electrons would in turn knock loose other electrons, creating cascades that would make the air electrically conductive. This would encourage lightning strikes.

Observations made recently on a mountain in Armenia, of electron cascades caused by normal cosmic rays, showed that many of these did indeed end in a lightning flash, so the idea is plausible. Encouraged by this, Dr Thomas and Dr Melott calculated the effect that the cosmic rays of the explosion of 2.5m years ago would have had on the number of cascades. They conclude that the cascade rate would have increased 50-fold.

The replacement of forests by grassland is thought by some anthropologists to have encouraged the evolution of humanity's ancestors away from tree-climbing and towards the bipedalism. It was this change in locomotion that freed human hands to get up to all the mischief which distinguishes people from other species. Human beings, in all their manipulative glory, are thus, if the chain of events Dr Thomas and Dr Melott are suggesting is correct, the children of dying stars. ■



Robotics

Hand in glove

Improving robots' grasp requires a new way to measure it in people

HUMAN BEINGS can pick up and manipulate objects and tools with hardly a thought. This seemingly simple task, however, requires the precise, co-ordinated movement of individual fingers and thumbs, each applying the correct amount of pressure, at exactly the right places, to the object handled.

That people can do this successfully is thanks to special nerve endings, called mechanoreceptors, found in their skin. These provide instant tactile feedback to the brain of the shape, feel and weight of whatever is being grasped. With time and experience, people learn to vary their grip instinctively when lifting a golf ball, for example, as opposed to an egg.

Replicating that dexterity in robots is hard. A machine usually picks things up by, first, identifying the object via a camera and appropriate software, and then using a preprogrammed grasping strategy appropriate to what it thinks it has seen. This approach has improved greatly in recent years, thanks to advances in machine learning and vision. Further improvement will, however, be best served by a more precise understanding of the mechanics of how people themselves manipulate objects. A new "smart" glove, from computer scientists at the Massachusetts Institute of Technology, promises to do just that.

Writing in this week's *Nature*, Subramanian Sundaram and his team describe a way to measure, quickly and easily, the forces a human hand exerts as it grasps and manipulates things. Their invention is a sensory sleeve that fits over a knitted glove. Attached to the sleeve's palm, and running up the fingers and thumb of the glove, are pieces of a film that generates electricity in response to pressure. This film has electrically conducting threads running through it to form a set of grids (see picture). Each of the 548 places on the grids where two threads overlap acts as a localised pressure sensor—the equivalent of a mechanoreceptor in the skin of a hand. The signals from the threads are fed to a computer for storage and interpretation.

In their experiment, Dr Sundaram and his colleagues asked people to put on one of these gloves and use their now-gloved hand to pick up and manipulate 26 everyday objects—a mug, a pair of scissors, a spoon, a pen and so on—one at a time for a few minutes each. The system then recorded the signals from the threads seven times a second as every object was held and moved in its turn.

The trick was to take these recordings and train a machine-learning program, called a neural network, to interpret them. Since many of the best neural networks available are designed to learn and interpret images, Dr Sundaram decided to present the team's data to the network visually, by making each of the seven-a-second samples into an image in which the colour of the grid points represented the pressure applied there in shades of grey from low (white) to high (black). Once the network had been trained on these images it could then identify any of the 26 test objects from new pressure maps recorded by the glove.

Measuring in this way just how a human hand exerts force will, as originally intended, be useful in programming robots to mimic people more closely when they pick objects up. But Dr Sundaram's experiments also provide insights into how the different parts of the hand work together when grasping things—how often, for example, the first finger is used at the same time as the thumb or the second finger. Those data, he reckons, could assist designers of prosthetic limbs in the perfection of their devices.

Dr Sundaram's invention is clever, then. But one of the cleverest things of all about it is that it is also cheap, for the glove costs only around \$10 to make. This, he hopes, will encourage others to create their own versions. Building comprehensive tactile maps of how people employ their hands to manipulate the world will require huge sets of data—ideally derived from many thousands of individuals handling thousands or millions of objects. To gather data on that scale requires cheap tools. ▶

▶ Dr Sundaram cites as an analogy the example of computer vision. This, he says, has improved quickly in recent years because almost everyone has easy access to a standardised, cheap digital recording device, the camera, the outputs of which are easy to share, label and process by computers. The analogy is not perfect. People like taking and sharing photographs, so the supply is endless and free. They will have,

by contrast, to be encouraged, and perhaps paid, to handle things while wearing special gloves, however inexpensive. But the success of so-called citizen science projects, which require the mass participation of interested amateurs, suggests the task would not be impossible. So if, in the future, someone asks you to put on a new pair of gloves and handle a strange object, don't take it the wrong way. ■

frequencies, which remains to be seen.

Elon Musk, SpaceX's boss, initially dismissed astronomers' concerns, tweeting at the weekend that there were "already 4,900 satellites in orbit, which people notice ~0% of the time. Starlink won't be seen by anyone unless looking very carefully & will have ~0% impact on advancements in astronomy." In later exchanges, though, he struck a more understanding tone. Starlink would avoid the frequencies associated with radio astronomy, he said, and if the satellites' orientations needed to be tweaked to minimise solar reflection during critical astronomical experiments, that could easily be done. Moreover, as the initial Starlink satellites moved into their operational configuration after the weekend, their brightness dropped—though they still occasionally flared as they crossed the sky, probably because of reflections from their large solar panels.

Mr Musk also seemed, in his tweets, to suggest that the aims of Starlink outweighed the harms. "Potentially helping billions of economically disadvantaged people is the greater good. That said, we'll make sure Starlink has no material effect on discoveries in astronomy. We care a great deal about science." His assertion has merit. The problem, as Mark McCaughrean, senior adviser for science and exploration at the European Space Agency, observes, is that there has been little public discussion of the matter. From his point of view the night sky is a public commons that risks appropriation in the name of private interest. Whether that appropriation serves the greater good should at least be a matter of debate.

For now, astronomers plan to carry out further simulations of the potential impacts of Starlink and other communication-satellite networks planned by companies such as OneWeb. But even when that work is complete, it is unclear what they can actually do to make SpaceX and its competitors listen to their concerns, for there is no legislation to regulate the impact of satellites on the night sky.

America's Federal Communications Commission does concern itself with how satellites use the available radio spectrum and with what happens to them after they have done their job. But that is it. With the coming mega-constellations of communications satellites, it is perhaps time for this to change, and for governments (not only America's) to involve themselves more deeply in the uses of heaven. ■

Satellites versus astronomers

Blinded by the light

The unexpected brightness of new satellites could ruin the night sky

TWAS QUITE a show: a train of illuminated dots moving across the sky, many of them as bright as Polaris, the north star. These were not new astronomical objects, however. Rather, they were the first tranche of satellites for Starlink, a project intended to provide internet access across the globe. These were launched into orbit on May 24th by SpaceX, an American rocketry firm.

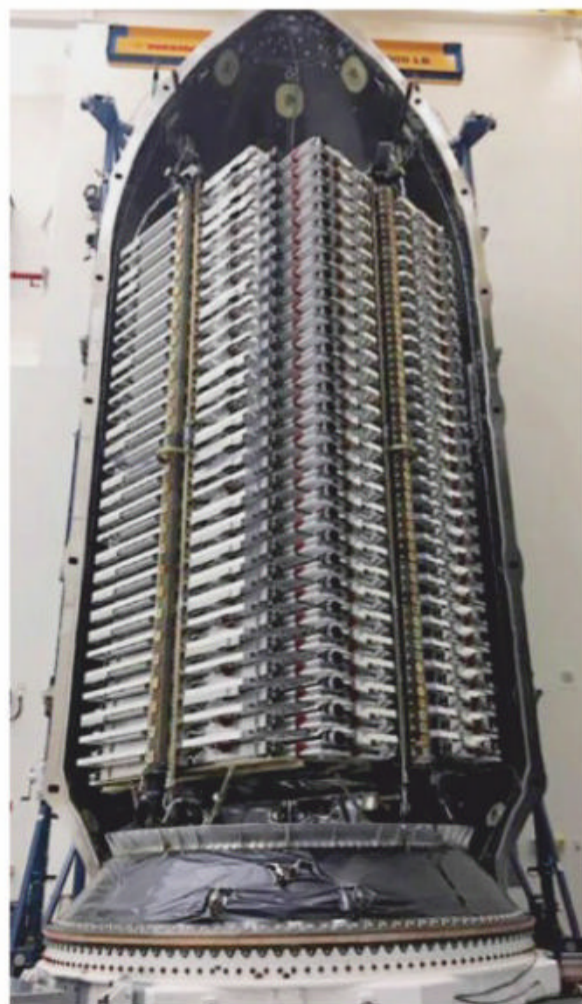
Seeing satellites from the ground with the naked eye is nothing new. But astronomers (professional and amateur) were surprised, and unhappy, at just how many and how bright the Starlink satellites appeared to be. Quite a few of them took to Twitter to raise the alarm and post pictures and videos of the blazing birds. Their worry was that these satellites and their successors could change the night sky for ever. If the initial 60 members of the Starlink network were already causing noticeable light pollution, they reasoned, how bad would it get once the full constellation of 12,000 had been launched?

For those who enjoy watching the night sky for pleasure it would surely be sad, for it would more than triple the number of man-made objects in the firmament and thus further degrade the natural beauty of the heavens—a beauty already diminished in many places by light pollution from the ground. For those involved in investigating the universe scientifically, though, it may be more than merely sad. In some cases it could be job-threatening.

Preliminary analysis shows, for example, that almost every image from the Large Synoptic Survey Telescope in Chile, currently nearing completion and intended to photograph the entire available sky every few nights when it is operational, could contain a satellite trail. These can be edited out, but each correction destroys valuable data. It is possible that some experiments, such as regularly timed observations of the

variation in behaviour of astronomical objects, will no longer be feasible.

Optical astronomers thus have cause to be nervous about Starlink. For radio astronomers its impact may be even more serious. The satellites' mode of operation necessarily requires them to send radio signals back to Earth, all of which will be stronger than any signal arriving from deep space. This can be accommodated to a certain extent by knowing which frequencies the satellites are broadcasting on, and adjusting accordingly. But exactly how badly radio observatories are affected will depend on how well the satellites manage to confine their broadcasts within those



Starlink ready to launch

Awards: Two of *The Economist's* journalists carried off laurels at this year's Association of British Science Writers awards ceremony, held in London on May 28th. Catherine Brahic was pronounced one of two Science Journalists of the Year. Hal Hodson won the prize for Feature of the Year, for "The network within, the network without", about a boy who is missing part of his brain.



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Inequality

The listening cure

A Wall Street trader's photographic journey to neglected parts of America

Dignity: Seeking Respect in Back Row America. By Chris Arnade. *Sentinel*; 304 pages; \$30 and £25

EIGHT YEARS ago Chris Arnade, a physicist turned Wall Street trader, ventured up to Hunts Point, a rough and isolated section of the South Bronx, armed with curiosity and a camera. A habitual walker, Mr Arnade had begun to feel a sort of moral restlessness in the wake of the financial crisis. In his view, his industry was responsible for—yet largely insulated from—the effects of the recession.

He realised that he knew far too little about the many Americans who were much poorer than his social circle. So, in the

Bronx, he began talking to people and photographing them. What he encountered “wasn’t what I was told I would find—it was welcoming, warm and beautiful, not empty, dangerous and ugly.” Thus began a 150,000-mile, multi-year journey through unthriving America—urban and rural, black and white, from Lewiston, Maine, to Bakersfield, California, with many waypoints in between—that Mr Arnade has woven into “Dignity”, his deeply empathet-

ic book. A few of the pictures he took on his travels appear on this and the next page.

“Dignity” is “about” inequality in much the same way that James Agee’s “Let Us Now Praise Famous Men”—a seminal study of tenant farmers in Alabama, illustrated with stark photographs by Walker Evans—was “about” the Great Depression. Both works illuminate the reality of political and economic forces that might seem familiar in outline, by showing their effects on ordinary people.

Mr Arnade offers a handy framework for thinking about inequality. People like him are “akin to the kids who sat in the front row”—strivers eager to learn and achieve. Front-row people believe in science, data and progress. They cluster in big cities, of- ▶▶

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► ten leaving their home towns behind, both for the sake of opportunity or because they felt judged, out of place and hemmed in. They are careerists, often liberal in politics but afflicted by immense blind spots. “We had compassion for those left behind,” Mr Arnade confesses, “but thought that our job was to provide them an opportunity (no matter how small) to get where we were.” That, he discovers, was a patronising mistake: “It didn’t occur to us that what we valued...wasn’t what everyone else wanted.”

Back-row people did less well at school

—because they disliked it, or were obliged to leave to earn money, or were distracted by personal problems. Affinity, family or lack of alternatives kept them more bound to place than the nomadic denizens of the front row. As a woman in Cairo, Illinois, tells Mr Arnade: “When you don’t have anything else all you got is your home.” A generation or two ago, many such people could have stayed put in comfort. Factories provided plentiful jobs at decent wages in small and medium-sized towns across America. The pay might not have made

anybody rich, yet it provided a middle-class life for people who had a sound work ethic but no college education.

More important, jobs conferred dignity. This, argues Mr Arnade, is what (deliberately or not) the front row routinely denies the back row, and what he seeks in some measure to restore. On that score, his book succeeds. Mr Arnade went to a lot of places that his peers have little cause to visit. He talked to a lot of people who are often ignored, and has rendered them visible.

Some of the characters he evokes are haunting: the prostitute who left home after finding her mother unconscious in the company of strangers; the shrewd and diligent drug-dealer in Selma, Alabama; the welcoming wife of a storefront-preacher; the retired factory workers catching up over morning coffee at a McDonald’s on Milwaukee’s north side. Mr Arnade spends a good deal of time in McDonald’s restaurants across America, which often become de facto community centres.

Back to front

His photographs—of addicts and street scenes, invalids and sports events—are uncaptioned, which lends them an everyman air. But they are intimate and unflinching. He quotes people at length, letting them define themselves on their own terms. “Everyone wants to feel like a valued member of something larger than themselves,” he writes. In his telling, back-row Americans find this sense of belonging in places “that [do not] demand credentials”, whether it be church, family or people who share their drug habit.

The portrayal of front-row Americans is much less nuanced. It may be true that America’s elite move more often and value education as a path to advancement. But it does not follow that all of them define “success as all about how much you can learn and then earn”, or put “owning more stuff” above everything else. It is true that racism persists in America, but for a middle-aged man raised in the small-town South, as Mr Arnade was, to say that race relations today are “just the same ol’ thing, dressed up differently” is both facile and inaccurate.

Still, these caricatures may let his front-row readers know how it feels to be stereotyped. To Mr Arnade’s credit, he shies away from prescriptions beyond observing that “we all need to listen to each other more”. Self-deprecatingly, he calls that “wishy-washy”, but it is not; for adults caught in the maelstrom of jobs and relatives and daily life, listening is hard. “Attention is the beginning of devotion,” wrote Mary Oliver, an American poet. Mr Arnade is scarcely the only commentator to worry that Americans have grown less attentive to each other. But in listening himself, and reminding his compatriots to do so more, he sets out a path to greater devotion. ■



New American fiction

Womb for rent

The Farm. By Joanne Ramos. *Random House*; 336 pages; \$27. *Bloomsbury Publishing*; £12.99

FOR JANE, a job at Golden Oaks, an elegant property north of Manhattan, seems almost too good to be true. She spends her days swaddled in cashmere, engaged in light exercise and nourished by organic superfoods. Her bedroom is far more luxurious than the dormitory in Queens where she and her newborn daughter bunked with dozens of fellow Filipinas; the pay is much better than her previous jobs. The hitch is that she had to leave her child, relinquish her freedom and carry a baby to term for one of the most powerful women in the world.

This is the unnervingly plausible set-up for Joanne Ramos's impressive debut novel, "The Farm". The title comes from the employees' name for this high-end surrogacy outfit, where mostly destitute women incubate the infants of the 1%. Befitting an era when parents strive to give their offspring ever-more sophisticated advantages, the place is calibrated to maximise "fetal potential", with customised diets, wristbands to monitor activity levels and wearable machines that broadcast Mozart's symphonies and Churchill's speeches directly into the womb. Hired "hosts" submit to constant scrutiny—there are cameras everywhere. White surrogates are rare and command a premium, par-

ticularly if they have been to university.

Golden Oaks lets Ms Ramos skewer the pretences of the wealthy and the businesses that cater to them. The author previously worked in finance (and for *The Economist*), and knows what money can buy. A chapter in which Jane's older, wiser cousin Ate explains the art of high-end baby-nursing is winningly incisive: "They will tell you to 'make yourself at home'—but they do not want you to make yourself at home!" Yet the book is too subtle to dwell in satire; instead it becomes a suspenseful page-turner. Jane grows increasingly worried about her daughter's welfare, just as readers learn of the sinister lengths to which Golden Oaks will go to serve its clients.

Ms Ramos, whose own family emigrated from the Philippines to Wisconsin when she was six, tells her story through four main characters. As well as Jane and Ate (who came to America decades earlier to support her children back in the Philippines), she introduces Reagan, a young, white, soulfully rudderless graduate who becomes Jane's roommate; and Mae Yu, a 30-something go-getter who runs Golden Oaks while planning her perfect wedding. It would have been easy to reduce these figures to archetypes, but Ms Ramos inhabits each one with affection, sensitivity and a keen ear for voice. Together, these women tell a story of an America in which "you must be strong or young if you are not rich."

Myth and history

A noble enemy

The Life and Legend of the Sultan

Saladin. By Jonathan Phillips. *Yale University Press*; 520 pages; \$32.50. *Bodley Head*; £25

THE WEST has few Muslim heroes but, astonishingly, a 12th-century jihadist is one of them. Saladin broke onto the Middle East's map in a drama not unlike the recent eruption of Islamic State. Born on the banks of the Tigris, he carved out an emirate which by his death in 1193 stretched from the modern-day borders of Tunisia to Yemen, Turkey and Iran. Powerful realms fell like matchsticks before him. He ended the crusaders' 88-year reign in Jerusalem, reducing their kingdom to a few fortress towns dotted along the coast of the Levant.

Warrior monks scorned Saladin as the whore of Babylon and son of Satan. Medieval England named a tax after him, the ultimate slur. But from the first the opprobrium was tinged with admiration. Crusader accounts celebrated his reputation for mercy, generosity (lavished on Christian as well as Muslim visitors to his court), and above all his *adab*, Arabic for chivalry. Decades after his death Boccaccio and Petrarch extolled him. In "The Divine Comedy", he merits a place in Dante's first circle of hell, alongside virtuous pagans such as Plato—and seven levels above the Prophet Muhammad. He was a hero of Victorian romantic novels; in the 20th century he gave his name to a British battleship and a type of armoured car. It is "impossible to think of another figure from history who dealt such a deep wound to a people and a faith," writes Jonathan Phillips in his gripping biography, "and yet became so admired."

As its title indicates, the book distinguishes the life from the legend. Mr Phillips finds much to praise. Unlike the crusaders who killed the inhabitants when they captured Jerusalem, Saladin spared them when he recovered it. The crusaders defiled Islam's third-holiest mosque, using al-Aqsa for stables. Saladin preserved Christian places of worship, including Jerusalem's Church of the Holy Sepulchre and Hospital of the Order of St John. He ransomed a Christian woman from her kidnappers; he generously redistributed the wealth he took in plunder.

Yet the glowing contemporary accounts owed much to Saladin's tame and prolific propagandists—courtiers, chroniclers and muftis who were rewarded handsomely for their efforts. Contrary to French bodice-rippers, he never seduced crusader prin- ▶▶



Tough day at the office



Holy warriors at the battle of Hattin

cesses. Walter Scott's "The Talisman", in which a disguised Saladin heals an ailing Richard the Lionheart, is also bunk. The two men never met.

And Saladin's conquests owed more to artifice and luck than to military prowess. Potentates in Egypt and Syria made way for him by dying. He negotiated truces to avoid fighting on several fronts and to stall for time while he rearmed. He won Jerusalem at the negotiating table, but lost Acre in battle. His greatest military victory, at the battle of Hattin in 1187 (reimagined above), was a masterpiece of guile. He goaded the crusaders into a summer march through parched land, then choked them with bush-fires and taunted them by spilling water on the ground.

Many Muslim contemporaries had a decidedly lukewarm impression. Saladin was not above the occasional massacre. His road to Jerusalem involved a long detour through other people's territories. Conquests in Egypt, Yemen and Mosul helped amass the forces and revenues needed to take on the crusaders, but it was only in his last years that the interlopers became his primary target. Perhaps most damning of all was Saladin's role in stemming the intellectual curiosity, pluralism and *joie de vivre* that characterised classical Islam, and in precipitating its descent into intolerance and fundamentalism.

In his zeal to impose Sunni orthodoxy on the Middle East, he closed Alexandria's 120 pubs and crucified a philosopher in Aleppo. Shias in Egypt still dub him Kharab al-Din, the destroyer of religion, not Salah al-Din, its righteous reformer. They deride him for toppling the magnificent Shia Caliphate of the Fatimids, selling off its vast library and turning pleasure palaces into madrassas for learning *jihad*.

So why the hero-worship? Gamal Abdel Nasser, Saddam Hussein and Osama bin Laden venerated Saladin as a role model for fighting Western imperialism and recovering Jerusalem. The West's adulation is more perplexing. Mr Phillips suggests that crusaders back from the Holy Land needed an explanation for losing. They elected to emphasise chivalry over Islam. The West needs Muslim heroes, but Saladin may not be the most fitting choice. ■

Saudi television

Princely drama

CAIRO

A series featuring the siege of Mecca captures the mood of Saudi Arabia

THE EPISODE starts on an ordinary night in Mecca in 1979, as worshippers file into the grand mosque for prayers. Viewers are given a few hints of what will follow: characters swap furtive glances; a camera zooms in ominously from above. But any Saudi watching "Al-Asouf" this Ramadan already knew the twist. Rifles were unpacked. The doors of the mosque were chained shut. A siege that would last two weeks and transform the kingdom began.

"Al-Asouf" ("Winds of Change") is not, in fact, principally a series about the siege of Mecca; the clash does not feature until episode 15, which aired on May 20th. Earlier hours were languid, focusing on the transformation of Riyadh, a sleepy town soon to become a modern metropolis.

But the scenes in Mecca are the denouement. The broadcaster, MBC, used them in

advertisements. Saudis discussed them endlessly on social media. With good reason—the siege was a seminal event in Saudi history. Its leader, Juhayman al-Otaibi, was once a member of the praetorian guard. He left the force in 1973 and slowly became an extremist, angry about the supposed decadence of the royals and the intrusion of "Western" culture. After the siege was resolved King Khaled, fearful that these criticisms might find wider support, steered Saudi Arabia in a more conservative direction. Cinemas were closed; gender segregation was strictly enforced.

Ramadan is the biggest month for Arab television, when families spend hours in front of the set after breaking their fasts. In a region with little free media, the shows broadcast at this time are a barometer for politics—a glimpse at the messages Arab governments wish to send their citizens. As Egypt slides further into a repressive dictatorship, for example, producers churn out police procedurals that glorify the security services. "Al-Asouf" was not conceived by the government. But it could not have aired on MBC, which is mostly state-owned, without official blessing.

This is the first dramatic portrayal of the siege, long a taboo subject—but one the crown prince, Muhammad bin Salman, is now eager to broach. Last year women gained the right to drive. Sexes mix freely in Riyadh's cafés; the once-feared religious police are nowhere to be found. To justify all this, the prince has sought to cleave the kingdom's modern history in two. In his telling, the years since 1979 have been an aberration, foisted on the country by political Islamists and Iran (which had its Islamic revolution months before the siege).

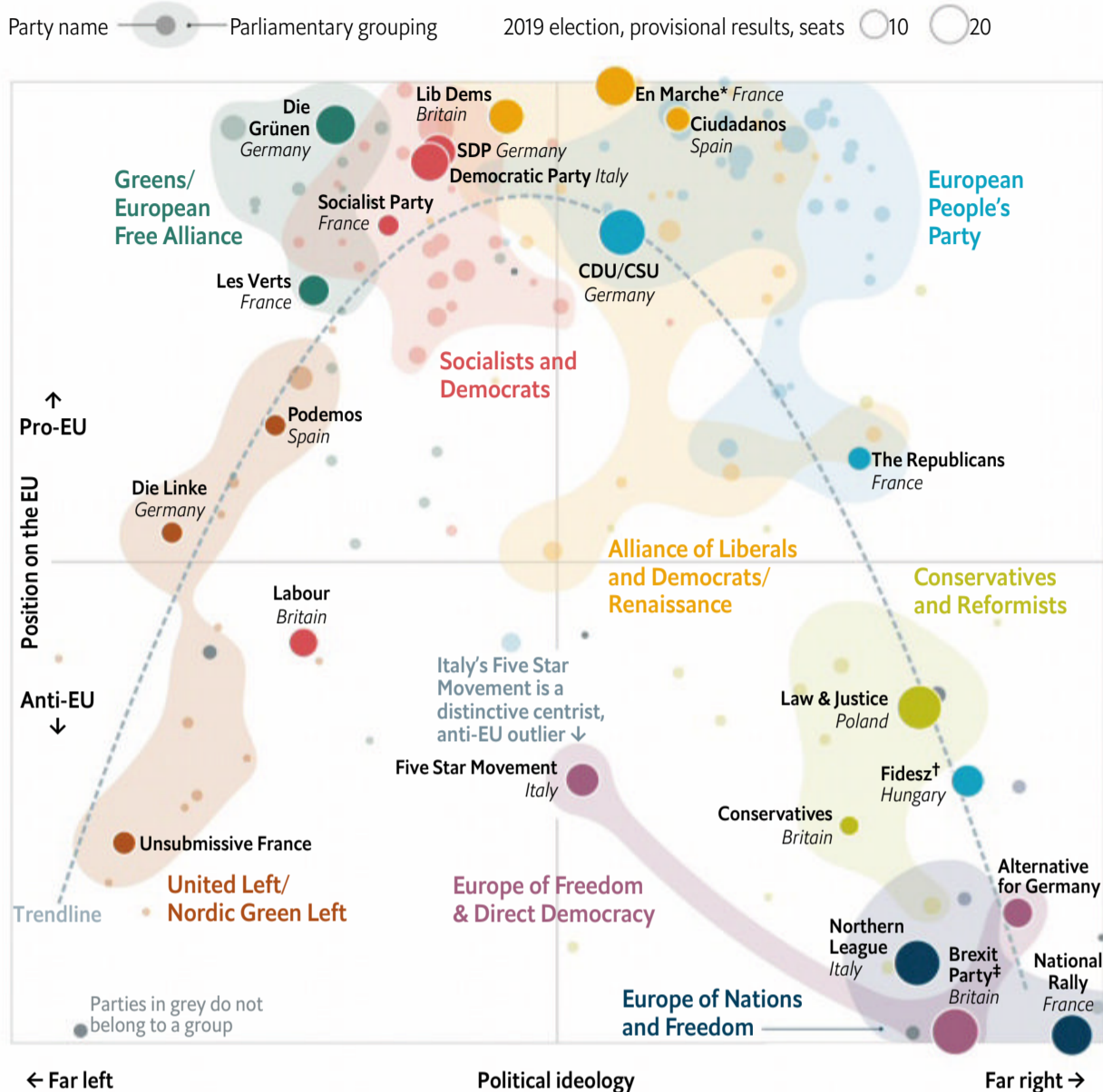
As historical scholarship, this is questionable. The modern state was founded as an alliance between the royal family and puritanical clerics. No one would have confused mid-century Riyadh with free-wheeling intellectual capitals like Cairo or Beirut. But it is astute politics. The first season of "Al-Asouf", which portrayed the early 1970s, depicted adultery, boozy parties and illegitimate children. In this version of history, Saudi society was once more tolerant; religious conservatives were interlopers who went too far in purging its diversity and imposing a doctrinaire vision.

The series is a shift for its star, Nasser al-Gassabi, previously known for his role in the long-running satire "Tash ma Tash" ("No Big Deal"). That show had its own political allusions, lampooning the religious police and other aspects of Saudi society—humour that felt like a despairing rear-guard action. These days, the kingdom is still deeply conservative; social reforms are coupled with harsh political repression. Still, many Saudis see this as a hopeful moment—a time not for dark humour but for thoughtful drama. ■

Anti-EU parties cluster at ideological extremes, whereas pro-EU ones are centrist

European Parliament political parties and groupings

By ideology and position on the EU

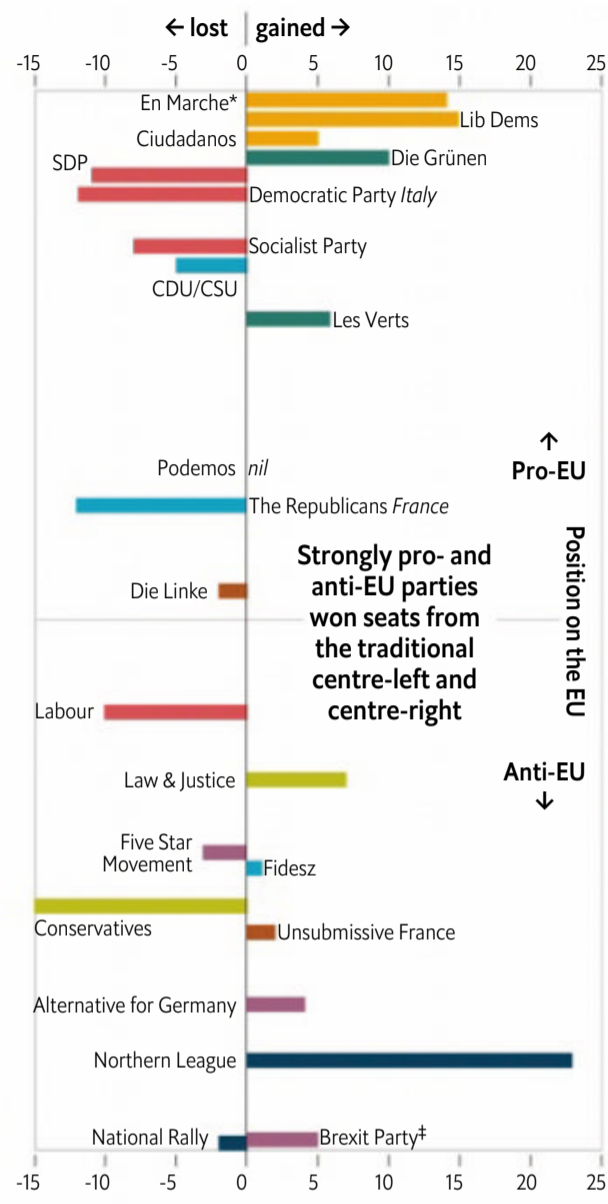


Sources: Chapel Hill Expert Survey (2014/2017); ECFR; European Parliament

*Includes MoDem and UDI †Currently suspended from the EPP group ‡Ideology and difference based on UKIP 2014

Change in seats from 2014 to 2019 elections

Selected parties, by position on the EU



An equal and opposite reaction

Centrist liberals, not populists, gained the most power in the EU Parliament

EUROSCOPTICS HOPED that populist parties would sweep last week's European Parliament elections. But voters delivered a murky verdict. Eurosceptics did make progress: parties in the top 15% of hostility towards the EU, as measured by a survey of political scientists run by the University of North Carolina at Chapel Hill, gained 30 seats. Yet parties in the most pro-EU 15% won 32 extra seats. The losers were the main centre-left and centre-right parties.

For the first time in the parliament's history, its two main blocs, the European People's Party and the Socialists and Democrats, failed to achieve a majority between them. In theory, that could turn the Eurosceptics into kingmakers. In practice, the older parties back the EU and want nothing to do with the populists. That will force

them to depend on the liberals instead. Moreover, the pro-EU parties are likely to form a more cohesive group than their adversaries will.

Almost every possible mix of policy positions is present among the parliament's 177 different parties. However, the Chapel Hill survey shows that some combinations tend to go together. Its authors assess parties' views on dozens of issues, and aggregate them into ideological scores. The study was last run in 2017, so its ratings do not count recent political shifts. Nonetheless, its scores track well with other surveys, and with parties' own manifestos.

One pattern is the boomerang-shaped relationship between views on the EU on one hand, and older divides over economic redistribution and cultural openness on the other. Before the global financial crisis, Euroscepticism won few votes. But the EU's bailouts of bankrupt member states and struggles to absorb refugees linked opposition to European integration with hostility towards bankers and foreigners. Sensing a chance to broaden their scope, far-right and far-left parties sharpened their criticism of the EU, and Eurosceptic parties be-

came more radical on other issues.

As a result, today's anti-EU parties mostly land on either the far left (such as Unsubmissive France) or far right (like the Alternative for Germany). These two wings will struggle to find common cause over economic policy. The biggest exception, Italy's Five Star Movement, sits in the centre only because it combines policies from both left and right extremes.

In contrast, the surging pro-EU parties, including France's En Marche and Britain's Liberal Democrats, have much in common. They combine cultural liberalism with a centrist economic agenda emphasising equitable growth. These parties also tend to back efforts to fight climate change, making them natural allies of the Green parties that gained seats across Europe.

European Parliament elections are sometimes dismissed as a mere opinion poll, since the body has much less power than domestic legislatures do. In terms of votes cast, pro- and anti-EU forces battled to a draw. But the parliament also has real duties, including approving the EU's budget and laws. By this measure, liberals may have won the upper hand. ■



His light materials

Ieoh Ming (I.M.) Pei, architect, died on May 16th, aged 102

WHEN IN 1984 I.M. Pei, then the most sought-after architect in America, presented his plans for a 70-foot glass pyramid in the 18th-century courtyard of the Louvre, the general reaction was outrage. This was an atrocity; it was “an annex to Disneyland”. Because Mr Pei was Chinese-American, a foreigner twice over, he clearly had no understanding of the Louvre, or Paris, or France.

These remarks did not annoy him. As a man of courtesy and cultivation, with quick enthusiasms and wide, wide smiles, he took them in his stride. But he was surprised. He had been asked to design a new entrance for the museum and, instead of adding on some utilitarian concrete block, had created a great welcoming space: put a swirling staircase underground and capped it with a glow of transparency and light that did not touch, let alone hurt, the old ornamented façades. In short, he had taken his usual care.

He had also expressed, once again, his two great passions in architecture. The first, as befitted a true modernist trained at MIT and Harvard, was for simple geometric forms, triangle, circle and square. On these he based all his buildings, which included the East Building of the National Gallery in Washington, the Kennedy Library in Boston, the Museum of Art at Cornell, the Bank of China Tower in Hong Kong and the Museum of Islamic Art in Dubai. Slopes, as in rhomboids and trapezoids, delighted him; pyramids pleased him for their perfect stability. And when he dreamed of one in the Louvre—for he always did the dreaming, while associates did the drawing—it fitted exactly, to his mind, with the love of geometry and rationality that he saw everywhere in Paris.

His other firm conviction was that architecture had to mirror life. So for the Mesa Laboratory at the National Centre for Atmospheric Research (NCAR) in Boulder, Colorado he hiked among the sandstone hills, finding inspiration for his sculptural, reddish, thick-walled towers in Native-American cliff-dwellings. His City Hall in Dallas, a boldly cantilevered wedge of glass and steel facing

the commercial district, reflected the vaunting Texan pride he found there. He built the Kennedy Library to evoke the man, and its towering empty spaceframe, flooded with light and hung with an American flag, summed up both limitless optimism and the country's loss. For the Rock and Roll Hall of Fame in Cleveland, a tower with a pyramid protruding and a wedge driven through it, he prepared his mind by venturing, for the first time, to rock concerts. For his Doha commission he studied Islam and explored the Islamic world, discovering his dome-and-cube ideal in the oldest mosque in Cairo. And when considering the Louvre he impishly took a cue from Napoleon's fascination with the pyramids on the Nile.

Regard for tradition and context did not ward off the doubters, but it helped. So did his punctiliousness about finish and materials. Everything had to be built well: built to last, and to be beautiful. His trademark lattices of glass were devised to admit as much light as possible, sometimes by angling the thousands of crystalline facets, sometimes by connecting them with rods so thin they were more like a spiderweb. Stone, too, was chosen to pick up the changing colours of daylight: creamy limestone, as at Doha, or the pale pink Tennessee marble he used for the East Building. But everyday concrete could also be refined to his purposes by matching its colour consistently to local earth, bush-hammering the NCAR slabs so that they resembled weathered rocks, and avoiding visible joints. One of his designs for William Zeckendorf, the flamboyant New York property developer who employed him in the 1950s, was the Kips Bay Plaza housing project, two square grids in pre-cast concrete which were meant to revitalise a blighted neighbourhood. He softened them with arched and recessed windows until they looked like honeycombs. Architecture could heal, too.

Once Jackie Kennedy had daringly picked him to build her husband's library in 1964, he became such a feature of America's cultural scene, owlishly sipping his favourite red Bordeaux, that it was easy to forget that only the rise of the communists in China had kept him in America at all. He had come to study in 1934, lured mostly by the films of Bing Crosby and Betty Grable, and had fun. But he was keen to go back until it became too risky for a banker's son to do so. He therefore took American citizenship, but did not cut the roots. His wife was Chinese; his children had Chinese names. And his imagination had been shaped less by Le Corbusier or Walter Gropius, though he met and admired both men, than by his family's ancient gardens at Suzhou in Jiangsu. There, as a child, he would wander winding paths through fantastic rocks towards pavilions, unconsciously absorbing sightlines and approaches, light and shadow, as well as the framing of views. He did not forget.

The bamboo growing

In 1974 he managed to return; later he built, for the government, a hotel complex at Fragrant Hill outside Beijing. He seized on this as a chance to wean the Chinese away from their drab eastern European blocks and back to the domestic traditions they had lost. But their break with the past had been too definite; they now wanted to copy the West, and did not care for the old motifs he combined with his geometry and glass. He did better with the Bank of China Tower for the bank his father had run, where his shaft of 70 slim, dark storeys, criss-crossed with white lines, was based on the angular growth of bamboo. Visiting shrines in the mountains once in childhood, he thought he heard the bamboo growing.

Those mountains, like the gardens, led him to seek tranquillity in the buildings he designed. They sometimes seemed too exciting for that: sweeping stairways, soaring glass, razor-sharp angles, scintillating slopes. But at their heart lay those perfect forms, triangle, circle and square. Water often lay nearby, offering both transparency and reflection. A pyramid with water round it, as at the Louvre, was the very essence of serenity: harmony of structure and spirit. It might take time to make its case; architecture was a slow art. But as it moved from newness to permanence, he felt beamingly sure that Parisians would agree with him. ■

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