The Economist

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The Pearl river delta: a special report

Hospitals of the future

Jacob Zuma must go

Parking, wrong on so many levels

Why computers will never be safe

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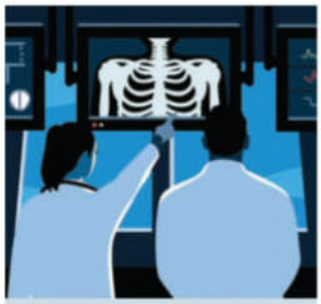

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Politics

A chemical-weapons attack on a rebel-held town near the **Syrian** city of Idlib killed at least 85 civilians, the deadliest such assault in Syria's long and bloody civil war since August 2013. Bashar al-Assad's regime denied responsibility: only the Russians said they believed it. International condemnation came thick and fast, including at the UN Security Council. Donald Trump said Syria had crossed "many, many lines", but did not say what, if anything, he would do.

Israel authorised the construction of the first new settlement in the West Bank for more than 20 years, following the earlier dismantling of a settlement site at Amona that was illegal under Israeli law.

Standard & Poor's cut **South Africa's** debt to junk status for the first time since 2000 after President Jacob Zuma sacked the respected finance minister, Pravin Gordhan, and replaced him with a loyalist. The rand slumped.

An investigation into **Mozambique's** irregular borrowing of millions of dollars has widened, with banks asked to provide information on accounts held by the former president, Armando Guebuza. Last year it emerged that the government had concealed nearly $1.4bn in borrowing.

More mass graves were discovered in the **Democratic Republic of Congo's** central Kasai province. The UN says they contain the bodies of as many as 400 people, including women and children, killed amid clashes between the army and a rebel group.

Just another day in Venezuela

Venezuela's supreme court took over the powers of the legislature, which is controlled by the opposition to the socialist regime, and then reversed its decision. The national assembly remains neutered by the court's earlier rulings; the Organisation of American States called on Venezuela to restore its full powers. Security forces fought protesters in Caracas with tear-gas, water cannons and pepper spray.

Close to 300 people died in landslides in the town of Mocoa in south-western **Colombia**. At least 400 people are still missing.

Lenín Moreno narrowly won **Ecuador's** presidential election, defeating Guillermo Lasso, a conservative former banker. Mr Moreno, a former vice-president, is the political heir of the current left-wing president, Rafael Correa, who greatly expanded social-welfare spending, and restricted press freedoms and the independence of the judiciary. Mr Lasso said the vote count was fraudulent.

Protesters set fire to **Paraguay's** congress after the ruling Colorado Party set up a separate senate to enact laws that would allow the president, Horacio Cartes, to run for re-election. One person was killed by police.

Open to suggestions

The king of **Thailand** promulgated the country's 20th constitution since 1932. In theory, this paves the way for the restoration of civilian government after the military coup of 2014. But the ruling junta has yet to set a date for elections.

Japan said its ambassador to **South Korea** would return to Seoul. He had been recalled three months ago amid a row about statues commemorating Korean women forced into prostitution by Japan during the second world war.

North Korea tested a ballistic missile on the eve of a summit between Donald Trump and his Chinese counterpart, Xi Jinping, at which the two were expected to discuss how to curb North Korea's nuclear programme.

A Chinese academic was allowed to return home to **Australia** after being barred from leaving China for more than a week. His treatment cast a shadow over a visit to Australia by China's prime minister, Li Keqiang.

A court in **China** sentenced two Chinese dissidents to prison for "inciting subversion" through their activism, which included expressing support for pro-democracy protests in Hong Kong.

China announced plans to build a city in Hebei, the province surrounding **Beijing**, to ease pressure on the capital caused by its surging population. Businesses and universities will be encouraged to move to the "Xiongan New Area", the proposed name of the development. Officials say it will be a "special zone", of similar importance to the economic powerhouses of Pudong and Shenzhen.

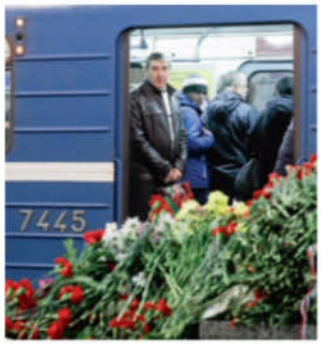
All about Steve

Donald Trump removed Steve Bannon, his chief political adviser, from the **National Security Council**, two months after appointing him. Lieutenant-General H.R. McMaster, the new national security adviser, was said to be unhappy with the appointment. The director of national intelligence and the chairman of the joint chiefs of staff on the NSC, both of whom had their roles reduced by Mr Trump in January, were restored as full participants.

North Carolina's legislature repealed a controversial law that required transgender people to use **public lavatories** according to the sex stated on their birth certificate. The repeal didn't go far enough for some. A new bill forbids towns and cities from enacting similar statutes, but leaves an option open for the state Capitol to do so.

Republicans in the Senate vowed to force a vote over the confirmation of Neil Gorsuch to the **Supreme Court**. Democrats said they had enough votes to block his appointment by a filibuster.

Terror on the train



A bomb in the **St Petersburg** metro killed at least 14 people and injured more than 50 others. Russian authorities said it was a terrorist attack, and that a 22-year-old man from Kyrgyzstan had been the suicide-bomber.

Aleksandar Vucic won **Serbia's** presidential election with 55% of the vote. Mr Vucic, who has been prime minister since 2014, is a former nationalist hardliner who is now an enthusiastic proponent of Serbia's candidacy for the EU.

Hungary's government passed legislation that threatens to shut down the Central European University. It complains that the university, founded by George Soros, a philanthropist, offers degrees that are recognised abroad. This is apparently a bad thing. Thousands marched in Budapest to oppose the law.

Business

In a highly unusual move, one of the presidents of the **Federal Reserve's** 12 regional banks resigned abruptly following an investigation into information that was leaked to a financial analyst five years ago. Jeffrey Lacker had headed the Federal Reserve Bank of Richmond since 2004, a role that gave him a place on the Fed's monetary policymaking committee.

On the never-never again

A warning was issued by the Bank of England about the expansion of **consumer credit** in Britain, notably the growth of unsecured loans and zero-interest offers. The central bank cautioned that although consumer credit makes up only 10% of bank lending, whereas mortgages account for 70%, the losses for banks in a downturn from consumer credit would be significantly greater. Last year's stress tests found that banks were exposed to £18.5bn ($23.1bn) of risky consumer credit compared with £11.8bn for mortgages.

Scotland's economy shrank by 0.2% in the last quarter of 2016, a blow to the nation's independence-minded government given that the United Kingdom as a whole grew by 0.7%. Scottish GDP rose by just 0.4% for the whole year; the UK recorded a 1.8% increase. Scotland's finance minister blamed last June's UK-wide referendum on leaving the European Union.

The **euro zone's** unemployment rate dropped to 9.5% in February, the lowest since May 2009. The Czech Republic and Germany had the lowest rates at 3.4% and 3.9%. Greece and Spain recorded the highest rates, at 23.1% and 18%.

The $43bn takeover of **Syngenta** by **ChemChina** was cleared by the EU's antitrust regulator, which said it was satisfied that the pair's promise to sell some assets allayed concerns that the deal could reduce competition in the agribusiness industry. America's Federal Trade Commission also approved the acquisition, the largest foreign takeover by a Chinese firm to date.

Fox News came under more pressure after it was reported that one of its top stars, Bill O'Reilly, and the network paid $13m to five women to settle allegations of harassment. Some big advertisers, including BMW and Mitsubishi, pulled their business from his show. Last year the station's CEO, Roger Ailes, resigned over similar complaints. Fox also faces lawsuits over claims of racial discrimination.

Britain introduced a mandatory rule requiring private companies with more than 250 employees to report on their **gender pay gap**. Firms are now required to collect and disclose data on differences between the median and mean salaries of men and women. The gaps in each quartile of the pay scale are also to be reported. Some say the measure will do little to tackle the issue. Iceland has taken a tougher approach, unveiling a bill that would force firms to demonstrate that they provide equal pay to men and women, the first such stipulation in the world.

India's Supreme Court banned the sale of alcohol within 500 metres of motorways, a shock to the country's hospitality industry. The court wants to clamp down on drink-driving, but its decision has affected tens of thousands of businesses, including restaurants and five-star resorts.

JAB Holding added to its American food-and-drink brand assets by agreeing to buy **Panera Bread**, a fast-growing bakery and coffee chain, for $7.5bn. JAB already owns Krispy Kreme Doughnuts and Peet's Coffee & Tea in America as well as the Senseo and Douwe Egberts coffee brands in Europe, but Panera is the icing on the cake for its expansion plans.

The share price of **Ulker Biskuvi**, a Turkish producer of biscuits and chocolate, fell sharply after it ran an April Fool's advert that got entangled in Turkey's febrile politics. The ad featured bizarre pranks, ending with the announcement that "now is the day of reckoning", which government supporters, many of whom are suspicious of Ulker's boss, interpreted as an attempt to stir tensions that have been simmering since last July's coup attempt.

Driven by success

Tesla's share price soared after it published bumper first-quarter sales figures for its electric cars. The company's market capitalisation overtook that of 114-year-old Ford for the first time. Last year Tesla delivered 76,000 cars and Ford sold 6.7m vehicles, but it is Tesla that is racing ahead of Detroit in developing the cars of the future.

Other economic data and news can be found on pages 84-85

The myth of cyber-security

Computers will never be secure. To manage the risks, look to economics rather than technology

COMPUTER security is a contradiction in terms. Consider the past year alone: cyber-thieves stole $81m from the central bank of Bangladesh; the $4.8bn takeover of Yahoo, an internet firm, by Verizon, a telecoms firm, was nearly derailed by two enormous data breaches; and Russian hackers interfered in the American presidential election.

Away from the headlines, a black market in computerised extortion, hacking-for-hire and stolen digital goods is booming. The problem is about to get worse. Computers increasingly deal not just with abstract data like credit-card details and databases, but also with the real world of physical objects and vulnerable human bodies. A modern car is a computer on wheels; an aeroplane is a computer with wings. The arrival of the "Internet of Things" will see computers baked into everything from road signs and MRI scanners to prosthetics and insulin pumps. There is little evidence that these gadgets will be any more trustworthy than their desktop counterparts. Hackers have already proved that they can take remote control of connected cars and pacemakers.

It is tempting to believe that the security problem can be solved with yet more technical wizardry and a call for heightened vigilance. And it is certainly true that many firms still fail to take security seriously enough. That requires a kind of cultivated paranoia which does not come naturally to non-tech firms. Companies of all stripes should embrace initiatives like "bug bounty" programmes, whereby firms reward ethical hackers for discovering flaws so that they can be fixed before they are taken advantage of.

But there is no way to make computers completely safe. Software is hugely complex. Across its products, Google must manage around 2bn lines of source code—errors are inevitable. The average program has 14 separate vulnerabilities, each of them a potential point of illicit entry. Such weaknesses are compounded by the history of the internet, in which security was an afterthought (see page 73).

Leaving the windows open

This is not a counsel of despair. The risk from fraud, car accidents and the weather can never be eliminated completely either. But societies have developed ways of managing such risk—from government regulation to the use of legal liability and insurance to create incentives for safer behaviour.

Start with regulation. Governments' first priority is to refrain from making the situation worse. Terrorist attacks, like the recent ones in St Petersburg and London, often spark calls for encryption to be weakened so that the security services can better monitor what individuals are up to. But it is impossible to weaken encryption for terrorists alone. The same protection that guards messaging programs like WhatsApp also guards bank transactions and online identities. Computer security is best served by encryption that is strong for everyone.

The next priority is setting basic product regulations. A lack of expertise will always hamper the ability of users of computers to protect themselves. So governments should promote "public health" for computing. They could insist that internet-connected gizmos be updated with fixes when flaws are found. They could force users to change default usernames and passwords. Reporting laws, already in force in some American states, can oblige companies to disclose when they or their products are hacked. That encourages them to fix a problem instead of burying it.

Go a bit slower and fix things

But setting minimum standards still gets you only so far. Users' failure to protect themselves is just one instance of the general problem with computer security—that the incentives to take it seriously are too weak. Often, the harm from hackers is not to the owner of a compromised device. Think of botnets, networks of computers, from desktops to routers to "smart" light bulbs, that are infected with malware and attack other targets.

Most important, the software industry has for decades disclaimed liability for the harm when its products go wrong. Such an approach has its benefits. Silicon Valley's fruitful "go fast and break things" style of innovation is possible only if firms have relatively free rein to put out new products while they still need perfecting. But this point will soon be moot. As computers spread to products covered by established liability arrangements, such as cars or domestic goods, the industry's disclaimers will increasingly butt up against existing laws.

Firms should recognise that, if the courts do not force the liability issue, public opinion will. Many computer-security experts draw comparisons to the American car industry in the 1960s, which had ignored safety for decades. In 1965 Ralph Nader published "Unsafe at Any Speed", a bestselling book that exposed and excoriated the industry's lax attitude. The following year the government came down hard with rules on seat belts, headrests and the like. Now imagine the clamour for legislation after the first child fatality involving self-driving cars.

Fortunately, the small but growing market in cyber-security insurance offers a way to protect consumers while preserving the computing industry's ability to innovate. A firm whose products do not work properly, or are repeatedly hacked, will find its premiums rising, prodding it to solve the problem. A firm that takes reasonable steps to make things safe, but which is compromised nevertheless, will have recourse to an insurance payout that will stop it from going bankrupt. It is here that some carve-outs from liability could perhaps be negotiated. Once again, there are precedents: when excessive claims against American light-aircraft firms threatened to bankrupt the industry in the 1980s, the government changed the law, limiting their liability for old products.

One reason computer security is so bad today is that few people were taking it seriously yesterday. When the internet was new, that was forgivable. Now that the consequences are known, and the risks posed by bugs and hacking are large and growing, there is no excuse for repeating the mistake. But changing attitudes and behaviour will require economic tools, not just technical ones. ■

Chemical weapons in Syria

Russia's poisonous client

Vladimir Putin saved the Syrian regime. He now shares its guilt

THE horror in Syria is never-ending. Its civil war, now entering a seventh year, has claimed about half a million lives, pushed 5m refugees out of the country and displaced millions more within it. Yet the chemical attack that killed at least 85 people in the rebel-held town of Khan Sheikhoun (see page 36) stands out as an act of infamy. In a murky conflict with few angels, it casts the spotlight on the worst perpetrator: the regime of Bashar al-Assad, backed by Russia and Iran.

The footage of choking children suggests the use of a nerve agent, probably sarin. Its manufacture, storage and use as a weapon usually requires the wherewithal of a state. No militia in Syria—not even the jihadists of Islamic State (IS), who have used chlorine and mustard gas—is credibly reported to have used nerve agents on the battlefield. Israeli newspapers cite intelligence that the chemical air strike was ordered by the "highest levels" in Syria. Russia's claim that the gas was released when a rebel arms dump was bombed is almost certainly a lie. As Mr Assad's protector-in-chief, Russia's president, Vladimir Putin, deserves to be singled out for opprobrium.

A permanent stigma

Often defied, the prohibition against chemical weapons is one of the oldest global agreements to make war less ugly. Even Russia, lately contemptuous of international norms, has every interest in preserving the anathema against such weapons. Imagine the terrorist bombing on the St Petersburg subway on April 3rd if it had involved poison gas. Chemical weapons are, by their nature, indiscriminate. They are of questionable value in warfare; organised armies can protect themselves from poison gases. But they are unparalleled instruments of terror against civilians, who have nowhere to hide.

The taboo on poison gas should not obscure Mr Assad's many other crimes—for which he deserves one day to face justice. And this is not the first time he has been accused of gassing his people. But the attack on Khan Sheikhoun crosses a line that Mr Assad himself has promised to respect. When it killed 1,400 people with sarin in 2013 in al-Ghouta, outside Damascus, his regime breached the "red line" set by Barack Obama. Mr Obama failed to order punitive strikes, and instead accepted a Russian deal whereby Syria would adopt the chemical weapons convention and surrender its stock of poison.

At the time, that seemed a grave misjudgment—just how grave is now clear. The use of sarin in Khan Sheikhoun suggests that Syria hid some nerve agents, or produced them anew, violating its commitments. By using nerve gas again, Mr Assad is flouting a norm that the whole world accepts.

With its deployment of air power to Syria in 2015, Russia saved Mr Assad, helped him to recover lost territory and scored a tactical victory over America. The West cannot now bomb Mr Assad without risking a clash with Russia. Donald Trump is right, but disingenuous, to blame the mess on Mr Obama's weakness. Mr Trump himself opposed military action in 2013. As a candidate, he said that America should join Russia in bombing IS. As president, he says that he has now changed his mind on Syria; he should start by joining his ambassador to the UN in denouncing Russia. Right now, Mr Putin is no ally against jihadism, but a provoker of it.

Perhaps Mr Assad is acting to demonstrate his impunity. Or perhaps he fears an imposed diplomatic deal. Either way Russia is permanently tainted by his war crimes. So is Iran, despite the fact that many Iranians still live with the effects of poison gases used on them by Iraq in the war of 1980-88. The longer Russia and Iran keep Mr Assad in power, the more they will share in his guilt. It is time for them to ditch their toxic ally. ■

America and China

The valley and the delta

To see the merits of openness, the American and Chinese presidents need only look inwards

IT USED to be much easier to spot the difference between the presidents of America and China. One would argue for free markets and economic liberalism, the other for centralised control. One would endorse democracy and the rule of law, the other freedom from outside interference. As Donald Trump geared up to meet Xi Jinping for the first time this week, in a summit in Florida that was due to start after *The Economist* went to press, those differences have narrowed (and in some areas, such as climate change, the positions have flipped).

This is partly a matter of style. Both Mr Trump and Mr Xi adhere to a personalised, "strongman" view of leadership. The American president is literally a brand; the Chinese are being encouraged to pledge personal fealty to Mr Xi (see page 53). But it is also a question of substance. Both men claim to be supporters of free trade but subscribe to a doctrine of economic nationalism. Chinese regulators use tariffs, antitrust laws and state media to target foreign firms; officials shovel subsidies at national champions; uncompetitive state-owned enterprises refuse to die. For his part, Mr Trump vows to get tough on Chinese imports and threatens blanket tariffs. He sees the world as a series of zero-sum games, in which countries with trade deficits lose and those with surpluses win (see page 69).

Both leaders are suspicious of openness. Under Mr Xi, China is one of the most closed big societies on Earth. The Great Firewall censors the internet. Capital controls are designed to stop money flowing out. Investment restrictions impede the path of money coming in. America is built on different precepts entirely. But Mr Trump has isolationist instincts. He wants jobs, supply chains and technologies to be located within America. He sees migration as a threat to be managed, not an opportunity to be encouraged—this week he began to tighten up the processes for work visas. He, too, likes walls.

Principles for reform design

Such attitudes serve neither country well. For evidence of the merits of openness, both leaders need only look to the most dynamic parts of their economies. Silicon Valley is envied around the world for its agglomeration of talent, capital and ideas. It is also a hymn to cosmopolitanism. According to a study in 2016, immigrants founded or co-founded more than half of America's unicorns—privately owned startups valued at more than $1bn. More than a third of the valley's population is foreign-born, compared with a national average of 13%.

But inside China, too, the case for openness has powerful backing. Exhibit A is the Pearl river delta (PRD), a megalopolis in southern China that comprises nine cities in Guangdong, as well as Hong Kong and Macau. As this week's special report lays out, the PRD has been the beating heart of the China miracle. Thanks to the liberal economic reforms introduced into the PRD by Deng Xiaoping from 1980 onwards, a sliver of land with less than 1% of the mainland's territory and 5% of its population produces 10% of its GDP.

The PRD owes much of its success to the fact that it is overwhelmingly private: of more than 100 centrally controlled SOEs in China, only four are in this region. But its transformation also owes much to an embrace of foreign ideas and investment. The sleepy town of Shenzhen was designated a special economic zone in 1980; foreigners were actively encouraged to put money in. Shenzhen is now the Silicon Valley of global hardware startups, attracting investment from around the world; the delta accounts for a fifth of China's foreign direct investment. There is little corruption or red tape involved in exporting goods or importing components; local officials toast foreign businessmen rather than try to shake them down. Hong Kong's democracy in being stifled by the mainland government, but its economy is a conduit for global expertise and capital: mainland companies make up around half of the market capitalisation of the Hong Kong stock exchange.

There is no equivalence between the American and Chinese economies. Capital, people and ideas still flow freely into and out of America; China's relationships with the outside world are semi-permeable at best. But where once it was obvious that the leaders of America and China would embody these differences, now neither truly believes in openness. Mar-a-Lago may be where Mr Xi and Mr Trump meet, but they should not forget the lessons of the valley and the delta. ■

South Africa

Dump Jacob Zuma

The markets and the trade unions agree: it's time for a new president

"AMANDLA" ("power" in Zulu and Xhosa), comes the cry from the podium. "Ngawethu" ("to us"), the crowd roars back. The old chants that once rumbled from South Africa's townships are again ringing out. But this time they are directed not at apartheid but against a reckless attempt by Jacob Zuma, a president who faces 783 charges of fraud and corruption, to tighten his grip on power and install a pliant successor.

The protests were sparked by a cabinet reshuffle last week. Mr Zuma fired Pravin Gordhan and Mcebisi Jonas, the finance minister and his deputy. Both are well-regarded by investors and economists. They are credited with putting a lid on public debt and resisting the biggest of the president's boondoggles, a plan to spend as much as 1trn rand ($73bn) building nuclear power plants that South Africa does not need and cannot afford (see page 35). This is not the first time Mr Zuma has tried to mount a hostile takeover of the Treasury. Last time, in 2015, the markets forced him to backtrack. On this occasion he seems determined to see it through.

The new finance minister is a Zuma protégé. Malusi Gigaba plans "radical economic transformation" and to take back the Treasury from "orthodox economists [and] international investors". In a country where, even by the narrowest definition, 27% of the workforce are jobless that might have struck a chord. Yet it has fooled hardly anyone. In a stunning move, the ruling party's two main allies, the South African Communist Party and the Congress of South African Trade Unions, have called on Mr Zuma to resign. Both suspect him of wanting to loosen the controls that have kept the Treasury honest, even as corruption has flourished elsewhere in the government.

Without Mr Gordhan's vigilance, they fear that it will be easier for bigwigs to hand contracts to chums. An anti-corruption ombudsman found that this is exactly what happened at the state-owned commuter-rail company when its chairman was one Sfiso Buthelezi—who is the new deputy finance minister. Mr Gigaba's record hardly inspires confidence either. As the minister for state enterprises, he told the electricity monopoly to buy coal only from black-owned firms; a process so mismanaged that it contributed to power cuts which knocked 1-2 percentage points off the national growth rate.

Mandela weeps

Another shock is looming. Standard & Poor's has downgraded the government's credit rating to junk for the first time since 2000. If another big credit-rating agency follows suit, its bonds may be removed from the main international indices. Investors such as pension funds that track these or are barred from owning junk would be obliged to sell. Interest rates would soar (they are already higher than those of Russian debt). The rand would plummet still further. South Africa's tentative economic recovery would stall, depressing growth from its fore-

cast level of about 1% this year and 2% in 2018.

Mr Zuma is promoting loyalists to cement his grip on the ruling African National Congress (ANC), ahead of a party conference at the end of the year. Among other things, he wants it to pick a successor who will protect him from prosecution. His favoured candidate is his ex-wife, Nkosazana Dlamini-Zuma. The opposition Democratic Alliance (DA) would love to face her. They think another Zuma at the helm would cost the ANC millions of votes in national elections in 2019, accelerating its decline after the loss of three big cities last year.

So ANC MPs should take heed. They will soon have to vote in parliament on a motion of no confidence in Mr Zuma called by the opposition. They have rejected similar motions before, in the name of party unity, and could do so again. But they should ask themselves: is Mr Zuma really the best torchbearer for the party of liberation? By ignoring court orders, he undermines the constitutional democracy for which ANC members once fought and died. His patronage machine, by deterring investment, impoverishes all South Africans, bar the well-connected. He is not just leading the country into an economic ditch, but also his party to electoral defeat. The ANC should do the rainbow nation a favour and dump Mr Zuma. ■

Parking

Aparkalypse now

The average car moves just 5% of the time. To improve transport and cities, focus on the other 95%

IN IRELAND people ask St Anthony to help them find parking spaces. In Chicago, if you shovel the snow from a space, it belongs to you. In Shanghai people beg their parents to reserve spaces by sitting in them. Everywhere parking is a big reason law-abiding people pay fines to the government and a cause of screaming rows between strangers. More important, it profoundly shapes cities—usually for the worse.

Parking spaces seem innocuous, just a couple of lines painted on asphalt. Multiplied and mismanaged, though, they can create traffic jams, worsen air pollution and force cities to sprawl. The cost and availability of parking affects people's commuting habits more than the rapid buses and light-rail lines that cities are so keen to build (see pages 20-22). Next to other worthy policies like congestion-charging and road-tolling, parking is also easy to change. The fast-growing metropolises of Africa and Asia, especially, need to get it right, before they repeat the West's debilitating mistakes.

In many cities people can park on the street for nothing, or a pittance. In Boston most parking meters charge just $1.25 an hour; in Chennai the rate is 20 rupees (30 cents) a day. Because the number of people who would take advantage of such terrific deals, rather than pay a market rate to park in a garage, exceeds supply, drivers end up circling the block. Researchers have found that much traffic consists of drivers looking for spaces. The record is held by the German city of Freiburg—in one study 74% of cars were on the prowl.

Having concluded that the chaos on their streets is the result of a shortage of parking spaces, many cities have set about creating more. Countries including Australia, China, India and the Philippines require developers to create parking spaces whenever they put up a new building. In America these schedules have become ludicrously exact. St Paul, in Minnesota, demands four spaces for every hole on a golf course and one space for every three nuns in a convent. It is because of these requirements that, in many office developments and shopping centres, more space is given over to cars than to people.

Europeans often take a different approach to scarce parking, by reserving many spaces for residents who pay almost nothing. Around the Economist tower in London, parking costs £4.90 ($6.10) an hour—with the result that most of us cycle or join the public-transport crush. Locals, who are not obviously in need of charity, pay just £145 a year to park in the same streets. A public resource is being allocated highly inefficiently.

That everybody is used to these arrangements does not mean they make sense. Flooding cities with parking works, in that finding a space becomes easier. But the overall cost is enormous. Because parking is so plentiful, it is free, and because it is free, people invariably overuse it. One study of Washington, DC, found that the availability of free parking is associated with a 97% chance somebody will drive to work alone. Generous parking requirements create asphalt deserts, sapping cities of vigour and beauty. The money and land wasted on car parks make life costlier for everyone, even those who do not drive. Parking adds 67% to the cost of building a shopping centre in Los Angeles—and a lot more if the spaces are underground.

Cities should stop trying to increase the supply of parking and rigging the market in favour of homeowners. Instead, they should raise prices until the streets and the car parks are nearly, but not quite, full—and charge everybody. Residents will complain about the loss of their privileges. But if they live in an area of high demand, the revenues from the streets will be enormous. Local governments could spend the money on whatever they like, from beautiful gardens to security guards.

Lovely Rita, meter maid

Another reason to charge fully for parking is that it will speed a welcome transport revolution. If self-driving cars are eventually allowed to trundle around by themselves, picking up and dropping off person after person, they might render many car parks unnecessary. That would be wonderful. But this future will arrive more quickly if governments raise the price of parking. Autonomous vehicles will be nice for everyone, because they will let people get on with something worthwhile as they travel. But another big advantage is that they need not be parked—which is only a boon where parking costs money.

Many Western cities have already been bent out of shape by excessive, poorly priced parking. But it is not too late for the African and Asian cities that could be this century's great metropolises. In most, driving is not yet so widespread that motorists can dictate planning rules, and residents are not used to free parking. So roll out the meters and the wardens. Cities should be for people, not for stationary metal boxes. ■

Is Brexit unavoidable?

Nearly everyone, including *The Economist*, seems to regard Brexit as inevitable (Special report on the future of the European Union, March 25th). The process that leads to Brexit has now been set in motion and the government insists that this is the point of no return. It assures us that it will negotiate a new relationship with the EU that gives us most of the benefits of the single market. If there is no deal, the government promises a bonanza of free-trade deals with the rest of the world. Parliament will be allowed a vote only to accept or reject the deal that is eventually negotiated. That choice is nothing but a sham. The real choices should be to accept the deal or withdraw the Notice to Leave, (but this has been ruled out).

However, the divorce settlement may prove highly contentious and might even lead to a break-up before the main negotiations have begun. The 27 seem likely to refuse us the benefits of the single market. Our exporters will then face tariff and non-tariff barriers and costly delays through border checks. Service industries will not have passports, or rights through equivalence, to operate in the EU. If there is no deal, a free-trade bonanza will be a pipe-dream.

Furthermore, what if stricter immigration curbs deprive the National Health Service of the nurses and doctors it needs and create a devastating shortage of workers in the building and hospitality trades? If a hard Brexit looms or, worse, if there is no deal, a further fall in the pound, increased inflation, a flood of firms emigrating and a serious reduction in our living standards are only too probable.

None of this may happen. But if it does, Leave voters might decide that this was not what they voted for. A major change in the public mood might well spur into action the 80% of MPs who voted for Remain last June because they believed Brexit would be a disaster, but voted for Article 50 in March because they felt they had to obey the people's will. They could well change their minds back again and force the government to give the final say to the people.

In this time of unparalleled uncertainties, Brexit might not be inevitable after all.

DICK TAVERNE
House of Lords
London

With nauseating pomposity, *The Economist* dedicates an entire special report to offer solemn sensible British advice on how to "save Europe" from tearing itself apart, as if Jean-Claude Juncker and Donald Tusk are supposed to sit attentively and take notes. Speak for yourselves. Most of the British press has salivated over the EU's demise for decades, yet it is still here. It is in fact the UK that has just voted to tear itself apart. Get your own house in order before lecturing others. The EU is doing just fine, thank you very much.

ADAM JAN SADOWSKI
London

I was surprised that your otherwise comprehensive survey made no reference to the European Investment Bank, the world's largest multilateral lending institution. If Britain leaves the EU it will cease to be a member and shareholder of the EIB. Since the EIB is limited to financing projects in the territory of its member states, Britain will cease to be eligible for EIB finance unless there is either a treaty change in its favour to enable it to maintain membership, or the bank's governors agree unanimously to continue financing projects in Britain. A treaty change seems unlikely; a governors' decision to allow continued lending in Britain would depend on the outcome of the Brexit talks.

There is, therefore, a serious risk that Britain will be denied a major source of long-term, low-cost investment financing. Over the past eight years the EIB has committed €40bn ($43bn) to projects in the UK. At a time when Britain will desperately need to retain the confidence of external investors to promote economic growth and employment and to help finance its alarming current-account deficit, the loss of EIB finance could be another unintended but damaging consequence of the government's hard Brexit policy.

BRIAN UNWIN
President of the European Investment Bank, 1993-2000
Dorking, Surrey

You say that "the decision of a majority of voters in a large member country to leave is a huge indictment" of the EU. Had it been Germany or France, that may indeed be the case. But Britain never had its heart in the EU. It joined the European Economic Community in 1973, simply because the original six member countries were growing much faster when the UK was the sick man of Europe. Since then it has tried to disrupt the club on several occasions.

ALI EL-AGRAA
London

In regard to the democratic deficit, one cause for the Brexit vote may have been the invisibility of our representatives in the European Parliament. At no time have our MEPs attempted to discuss issues with our Chamber of Trade. As our representatives they should have tried to keep in touch.

JEREMY MARTINEAU
Secretary
Fishguard and Goodwick Chamber of Trade and Tourism
Goodwick, Pembrokeshire

Your proposed, flexible multi-tier system for the EU is spot-on. It should be extended to the euro. Younger people in southern Europe have suffered from high unemployment and increasing austerity, while super-efficient German industry has benefited enormously from selling its products and services to the rest of Europe at an artificially low exchange rate.

The real solution is for European politicians to swallow their pride and break the euro, not back into its former constituent parts, but via a step whereby a German-led bloc adopts a new currency, the super-euro. Two currency tiers in Europe would re-establish some of the past flexibility of floating exchange rates, interest rates and fiscal policy on which all European countries, with their inherent different cultures, prospered side by side for 50 years prior to the adoption of the euro.

JAMES HENRY
Finance director
Zennor Petroleum
Guildford, Surrey

There is a simple solution to the Brexit conundrum, one that will allow Britain to have its trade cake and eat it too: the UK need only become the 11th province of Canada. Canada and the EU recently concluded a trade agreement and the UK would accede to it as a Canadian province. It would also join NAFTA and enjoy liberal trade terms with the United States.

Adjustments would be few and easy. Canada's provinces have wide powers and by treaty the UK's could be even broader. The queen would remain head of state. As a provincial flag, the Union flag would still be flown, with the Canadian flag a discreet presence on government buildings. As Hong Kong and Macau kept the dollar and pataca, so Britain could keep the pound. English would be an official language (though so would French). Such a move wouldn't be unprecedented. Newfoundland left the UK and joined Canada in 1949. Time to think outside the box.

TED STROLL
San Jose, California ■

Letters are welcome and should be addressed to the Editor at
The Economist, 25 St James's Street, London SW1A 1HG
E-mail: letters@economist.com
More letters are available at:
Economist.com/letters

The African Export-Import Bank (Afreximbank) is a pan-African Multilateral financial institution established in 1993, for the purpose of financing and promoting intra and extra African trade. "The Bank" is currently hiring the below positions. "The Bank" is headquartered in Cairo, Egypt.
To view further information on Afreximbank please visit their website: www.afreximbank.com.

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Contact: Danelle at danelle@caglobalint.com

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Contact: Pandora at pandora@caglobalint.com

Senior Manager, Research (Trade Information)
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Manager, Internal Audit
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The OECD is a global economic forum working with 35 member countries and more than 100 emerging and developing economies to make better policies for better lives. Our mission is to promote policies that will improve the economic and social well-being of people around the world. The Organisation provides a unique forum in which governments work together to share experiences on what drives economic, social and environmental change, seeking solutions to common problems.

Deputy Director Economics Department (ECO)

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We are looking for a dynamic and highly competent Deputy Director of the Economics Department who will support the Chief Economist in delivering the Strategic Orientations of the Secretary-General, particularly in advancing a new narrative of growth, that puts people's well-being at the center of the policy efforts, and the distributional impact of the policies we promote. S/he will report to the Chief Economist and work in close co-operation with Office of the Secretary-General, the OECD Sherpa and Directors. As a key member of the senior management team, s/he will provide leadership and strategic guidance to the Economics Department. The Deputy Director will also be responsible to foster close co-operation and effective interaction with other Directorates.

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Full details of the position are available at **www.oecd.org/careers/vacancies** (ref. 11333). Applications from OECD member country nationals should be submitted online by **midnight on 30 April 2017**.

afme/ Head of Frankfurt Office

Finance for Europe

AFME

The Association for Financial Markets in Europe has recently opened an office in Frankfurt and is now looking for a Managing Director to establish and develop this important European base alongside offices in London and Brussels.

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As Managing Director, Head of Frankfurt Office, you will be responsible for developing AFME's senior level engagement with officials and policy makers based in Frankfurt including the ECB and SSM. You will have broad responsibilities with a strong focus on facilitating advocacy on prudential regulatory matters but you will also be expected to engage on a range of other priorities for AFME. You will also need to build relationships in Berlin and Bonn and actively manage relationships with AFME members based in Germany and trade associations representing investors, corporate and financial institutions.

Candidate Profile

You will be a German speaker, with at least 10 years' experience of financial services with a focus on prudential regulatory and capital markets issues. You may be working or have worked in a public body or financial institution, a bank, regulatory authority or the regulatory side of a consultancy and will have a good grounding in both German and EU prudential and securities markets regulatory issues and processes. A self-starter, you will possess strong oral and written communication skills as well as high quality engagement capabilities and be willing to work independently, flexibly and on your own initiative but with active support from the wider AFME organisation.

A full job description can be found at **www.afme.eu**

Applications should be submitted to Beverley Vince, HR & Operations Director, **beverley.vince@afme.eu**, by 30 April 2017.

/ Association for Financial Markets in Europe
www.afme.eu

DIRECTOR (Grade AD14)

Directorate-General for Informatics (DIGIT), Luxembourg
COM/2017/10372

DIGIT (the Directorate-General for Informatics of the European Commission) is responsible for Information Technology and telecommunications strategy and service provision. You will be leading the newly-created Directorate for Digital Services for Public Administration in the Member States, driving the establishment of the Digital Pole in Luxembourg as a centre for digital innovation and championing big data, data analytics, standardisation, metadata, interoperability frameworks and cross-border and cross-sector services.

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- To align digital services to evolving needs and provide effective professional support to the Commission.

Your skills:
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The European Commission applies an active equal opportunities policy aimed at further increasing the share of women in management functions and it particularly encourages applications from women.

Please consult the Official Journal C 105 A of 4 April 2017 for the detailed vacancy notice as well as the eligibility and selection criteria.

Registration for applicants: **https://ec.europa.eu/dgs/human-resources/seniormanagementvacancies/**

The closing date for registration is **12 May 2017, 12 noon Brussels time.**

UNIVERSITY OF CAMBRIDGE

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Dr John C. Taylor Professorship of Innovation

Department of Engineering • Ref: NM11703

The Board of Electors to the Professorship of Dr John C. Taylor Professorship of Innovation invite applications for this Professorship from persons whose work falls within the general field of the Professorship to take up appointment on 1 October 2017 or as soon as possible thereafter.

Candidates will have an outstanding research record of international stature in technology and innovation management and the vision, leadership, experience and enthusiasm to build on current strengths in maintaining and developing a leading research presence. They will hold a PhD or equivalent postgraduate qualification.

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To apply online for this vacancy and to view further information about the role, please visit: http://www.jobs.cam.ac.uk/job/13188.

Further information is available at: http://www.hr.admin.cam.ac.uk/professorships or contact the Human Resources, University Offices, The Old Schools, Cambridge, CB2 1TT, (email: ibise@admin.cam.ac.uk).

Applications, consisting of a letter of application, a statement of current and future research plans, a curriculum vitae and a publications list, along with details of three referees should be made online no later than 2 May 2017.

Informal enquiries may be directed to Professor Andy Neely, Convenor of Board of Electors, telephone +44 (0)1223 765608 or email adn1000@cam.ac.uk.

Please quote reference NM11703 on your application and in any correspondence about this vacancy.

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Director, Communication and External Relations Department Abidjan, Côte d'Ivoire

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The closing date for applications is **20th April 2017.** We have retained Devex to assist with this appointment, so please apply at **http://www.surveygizmo.com/s3/3464452/Director-Communication-External-Relations-Department-EL5**

www.afdb.org

European Bank
for Reconstruction and Development

First Vice President & Head of Client Services Group

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EBRD has retained Russell Reynolds Associates to assist with this appointment. For further information on the position and additional details on qualifications, requirements, and how to apply, please visit: **www.rrarresponses.com**

The closing date for applications is 12 May 2017.

Russell Reynolds ASSOCIATES

Sacred spaces

AMSTERDAM, BEIJING AND TOKYO

Never mind public transport, bicycle lanes or elegant architecture. What really determines how cities look and move is their parking rules

EVEN if the new headquarters that Apple is creating in California does not prove to be "the best office building in the world", as Steve Jobs boasted shortly before his death in 2011, it will be an astounding sight. The main building resembles a flying saucer with a hole in the middle. Through its large, gently curving windows, workers will eventually look out on a wood containing some 7,000 carefully chosen trees. It is as though a race of high-tech beings has landed on a pristine planet.

And then, unfortunately, there's the car park. For 14,000 workers, Apple is building almost 11,000 parking spaces. Many cars will be tucked under the main building, but most will cram into two enormous garages to the south. Tot up all the parking spaces and the lanes and ramps that will allow cars to reach them, and it is clear that Apple is allocating a vast area to stationary vehicles. In all, the new headquarters will contain 318,000 square metres of offices and laboratories. The car parks will occupy 325,000 square metres.

Apple is building 11,000 parking spaces not because it wants to but because Cupertino, the suburban city where the new headquarters is located, demands it. Cupertino has a requirement for every building. A developer who wants to put up a block of flats, for example, must provide two parking spaces per apartment, one of which must be covered. For a fast-food restaurant, the city demands one space for every three seats; for a bowling alley, seven spaces per lane plus one for every worker. Cupertino's neighbours have similar rules. With such a surfeit of parking, most of it free, it is little wonder that most people get around Silicon Valley by car, or that the area has such appalling traffic jams.

Parking can seem like the most humdrum concern in the world. Even planners, who thrill to things like zoning and floor-area ratios, find it unglamorous. But parking influences the way cities look, and how people travel around them, more powerfully than almost anything else. Many cities try to make themselves more appealing by building cycle paths and tram lines or by erecting swaggering buildings by famous architects. If they do not also change their parking policies, such efforts amount to little more than window-dressing. There is a one-word answer to why the streets of Los Angeles look so different from those of London, and why neither city resembles Tokyo: parking.

For as long as there have been cars, there has been a need to store them when they are not moving—which, these days, is about 95% of the time. Washington, DC, had a parking garage in 1907, before Ford produced its first Model T. But the most important innovation came in 1923, when Columbus, in Ohio, began to insist that builders of flats create parking spaces for the people who would live in them. "Parking minimums", as these are known, gradually spread across America. Now, as the number of cars on the world's roads continues to grow (see chart on next page), they are spreading around the world.

The codes that tell developers how much parking they must provide can be wonderfully revealing of local mores. In Las Vegas, "sex novelty shops" must have at least three spaces per 1,000 square feet (93 square metres) of floor space but "adult entertainment cabarets" at least ten for the same area. Singapore insists on one space for every 500 niches in a columbarium—a place where funerary urns are stored. Chennai's city plan calls for one parking space for every 20 square metres of marriage hall. Perhaps unwisely, the city of Swan, in Australia, has parking minimums for taverns and wineries.

Might as well do the white line

Some developers are happy to supply parking spaces. Ryan Shear of Property Markets Group builds expensive flats in Miami, which are often bought by Latin Americans. He sometimes creates more spaces than the city requires, because his customers desire a safe place for their precious motors. But most developers create the number of parking spaces they are compelled to build and no more. In 2004 London abolished minimum parking requirements. Research by Zhan Guo of New York University shows that the amount of parking in new residential blocks ▸▸

promptly plunged, from an average of 1.1 spaces per flat to 0.6 spaces. The parking minimum had boosted supply far beyond what the market demanded.

Water companies are not obliged to supply all the water that people would use if it were free, nor are power companies expected to provide all the free electricity that customers might want. But many cities try to provide enough spaces to meet the demand for free parking, even at peak times. Some base their parking minimums on the "Parking Generation Handbook", a tome produced by the Institute of Transportation Engineers. This reports how many cars are found in the free car parks of synagogues, waterslide parks and so on when they are busiest.

The harm caused begins with the obvious fact that parking takes up a lot of room. A typical space is 12-15 square metres; add the necessary access lanes and the space per car roughly doubles. For comparison, this summer *The Economist* will move into a building in central London where it is assumed each employee will have ten square metres of space. In cities, such as Kansas City (see map), where land is cheap, and surface parking the norm, central areas resemble asphalt oceans dotted with buildings.

Kerb your enthusiasm

The more spread out and car-oriented a city, as a result of enormous car parks, the less appealing walking and cycling become. Besides, if you know you can park free wherever you go, why not drive? The ever-growing supply of free parking in America is one reason why investments in public transport have coaxed so few people out of cars, says David King of Arizona State University. In 1990, 73% of Americans got to work by driving alone, according to the census. In 2014, after a ballyhooed urban revival and many expensive tram and rapid-bus projects, 76% drove.

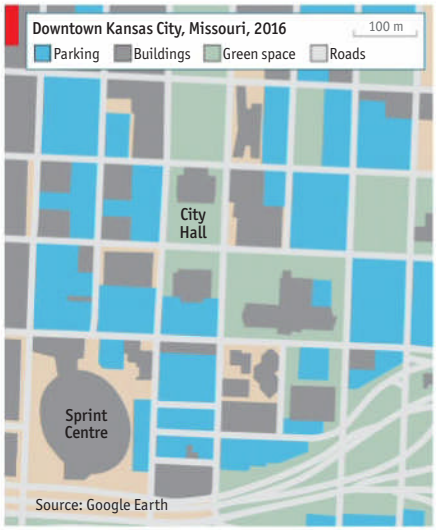
The rule of thumb in America is that multi-storey car parks cost about $25,000 per space and underground parking costs $35,000. Donald Shoup, an authority on parking economics, estimates that creating the minimum number of spaces adds 67% to the cost of a new shopping centre in Los Angeles if the car park is above ground and 93% if it is underground. Parking requirements can also make redevelopment impossible. Converting an old office building into flats generally means providing the parking spaces required for a new block of flats, which is likely to be difficult. The biggest cost of parking minimums may be the economic activity they prevent.

Free parking is not, of course, really free. The costs of building the car parks, as well as cleaning, lighting, repairing and securing them, are passed on to the people who use the buildings to which they are attached. Restaurant meals and cinema tickets are more pricey; flats are more expensive; office workers are presumably paid less. Everybody pays, whether or not they drive. And that has an unfortunate distributional effect, because young people drive a little less than the middle-aged and the poor drive less than the rich. In America, 17% of blacks and 12% of Hispanics who lived in big cities usually took public transport to work in 2013, whereas 7% of whites did. Free parking represents a subsidy for older people that is paid disproportionately by the young and a subsidy for the wealthy that is paid by the poor.

A few crowded American cities, including San Francisco, have abolished their parking minimums. So has one shrinking city—Buffalo, in New York state. But most of the country seems to be stuck with a hugely costly and damaging solution to the parking problem. And the American approach to parking is spreading to some of the world's fastest-growing cities.

In China, cars park everywhere—in marked spaces, in places where parking is specifically banned, in bicycle lanes, on pavements. In some cities, the fight for parking spaces has become so intense that people install metal barriers to which only they have the key, or persuade their parents to reserve spaces by sitting in them. Beijing's streets are patrolled by orange-jacketed workers who, in theory, put slips of paper on car windows to mark when the vehicles arrive, and then collect money from drivers when they leave (they also assist novice drivers in the tricky art of parallel parking). In practice, the parking wardens give discounts to drivers who forgo receipts, then pocket the money. Some also make cash from illegal parking spaces.

Beijing's parking minimums were laid down in 2003, before driving took off, and are modest: just 0.3 spaces per flat in the city centre and 0.5 outside it. They are expected to rise in response to the growing chaos on the streets. Most Indian planners concur that the best way of ameliorating a shortage is to require more off-street parking, says Shreya Gadepalli of the Institute for Transportation and Development Policy, a think-tank. One reason, she suggests, is that so many of them studied at American universities.



Whether in America or Asia, oceans of free parking might delay a transport revolution. When autonomous cars that are allowed to move with nobody inside them become widespread, demand for private cars could fall sharply. Starting in the morning, one car could take a child to school, a city worker to his office, a student to her lecture, party people to a club, and a security guard to his night shift, all more cheaply than taxis. Cars that now sit idle could become much more active, which would drastically change parking needs.

Parking garages would still be needed in a driverless world, predicts Sean Behr, a Silicon Valley entrepreneur. Instead of storing vehicles for hours at a time, though, garages might become service centres where shared battery-powered cars could be cleaned, repaired and recharged before being sent back on the road. "We will need better facilities for a smaller number of vehicles," he suggests. These garages need not be in city centres. In the slow hours of mid-morning and early afternoon, driverless cars could trundle to industrial estates in suburbia. Much of the area now allocated to cars in city centres could be turned into homes, offices or parks.

Mr Shear is already building flats with drop-off and pick-up areas, to accommodate people who travel by Uber cars. In a radically driverless future, he could perhaps do away with many of his parking spaces. But only if consumers decide to forgo car ownership—and whether they do is connected to parking. Where spaces are expensive, shared vehicles that need not be parked are highly attractive. They are less attractive in cities where parking is plentiful and free, such as Miami.

Unlike Africa and Asia, European streets are for the most part well-policed. Although some cities have parking requirements, these are seldom as extrava-

The grand tour

Vehicles in use, 2005=100

Source: OICA

gant as American ones, and have been progressively weakened. Several cities even have parking maximums, which restrict the amount of spaces. Huge buildings rise with hardly any provision for cars: the Shard in London has 95 storeys but just 48 spaces. Yet European cities are much kinder to cars than they usually admit.

To ride in one of Amsterdam's "scan cars" is to witness the epitome of Western parking enforcement. As it moves through the streets, clicking noises confirm that roof-mounted cameras are snapping the number plates of every parked car. If any vehicle has overstayed—which the system knows because Amsterdam's parking meters are connected to a database, and drivers are required to enter their number plates when they pay—a second officer is alerted. He rides to the scene on a moped and issues a digital fine. Amsterdam's parking officers describe their system as fair. They mean it is so ruthlessly efficient that it cannot be beaten.

Just the ticket

Amsterdam charges up to €5 ($5.30) an hour for parking on the street. Visitors can also park underneath office buildings or in large, clean park-and-ride garages run by the city. Drivers thus have many choices and the city raises a lot of money—€190m in 2015. Yet this diverse, market-based system covers only a small slice of parking in Amsterdam. Three-quarters of spaces on the streets of the city centre are occupied not by visitors or commuters but by residents. And the people of Amsterdam, who are so keen on pricing parking for others, would not dream of exposing themselves to market forces.

Anybody who lives in a home without a dedicated space is entitled to buy a permit to park nearby for between €30 and €535 a year. This is a good deal and, not surprisingly, the number of takers in many districts exceeds the number of spaces. So Amsterdam has waiting lists for permits. The longest, in the Westerpark area, is 232 months long. To free more spaces, the city has begun to reimburse permit-holders part of the annual fee if they keep their cars in suburban garages. Take-up is encouraging—which suggests that, despite the long queues, many people do not prize the opportunity to park close to their homes.

A more obvious solution would be to charge more for permits. But that is politically fraught. Amsterdammers believe they have a right to park near their homes, explains Pieter Litjens, the deputy mayor in charge of transport. (They also believe they should be able to leave their bicycles absolutely anywhere for nothing, which is another headache.) So the queues for permits are likely to grow. Amsterdam expects to build 50,000 more homes before 2025, which will mean between 20,000 and 30,000 more cars.

Even more than in America's sprawling cities, car parking in Amsterdam is unsightly. "The canals are beautiful, and cars are parked along them all the time," laments Mr Litjens. The city would love to sweep them away, but that would be unpopular. So in one district, De Pijp, a bold (and expensive) remedy is under way. Engineers have drained a canal and are digging an underground garage with 600 parking spaces into the marshy ground beneath. When the car park is finished and sealed, the canal will be refilled with water. The city will then abolish 273 parking spaces on the streets above.

Other cities lauded for their excellent public transport and enthusiasm for market-based solutions to traffic problems also have a blind spot when it comes to residents' parking. Much of inner London, for example, is covered with residents' parking zones. The permits are often even cheaper than in Amsterdam: Kensington and Chelsea charges between £80 ($100) and £219 a year for the right to park anywhere in the borough and on the fringe of nearby Westminster. Visitors, on the other hand, must pay between £1.20 and £4.60 an hour. Given that the average home in Kensington and Chelsea sold for £1.9m last year, residents' parking represents a gift to some of Britain's richest people.

Despite being the home of Lyft and Uber, two car-sharing services, San Francisco is similarly generous. It charges just $127 a year for residents' permits. Unlike Amsterdam, though, San Francisco does not cap the number, and in some neighbourhoods one and a half are issued for every parking space. The result is a perpetual scrap for empty kerb. A survey in 2015 found that 53% of permit-holders had spent at least five minutes looking for a space at the end of their most recent trip, and 7% more than half an hour.

As San Francisco's infuriated drivers cruise around, they crowd the roads and pollute the air. This is a widespread hidden cost of under-priced street parking. Mr Shoup has estimated that cruising for spaces in Westwood village, in Los Angeles, amounts to 950,000 excess vehicle miles travelled per year. Westwood is tiny, with only 470 metered spaces.

There is, however, one exception to the rule that residential parking must never be subjected to market forces. In the 1950s, when it was still far from rich, Japan began to require city-dwellers who did not have parking spaces in their buildings to purchase them. These days anybody who wishes to buy a car must first show a receipt for a space. He or she had better use it: any vehicle without one left on the roadside will be removed by the police in the middle of the night.

Parking brake

Freed of cars, the narrow residential streets of Tokyo are quieter than in other big cities. Every so often a courtyard or spare patch of land has been turned into a car park—some more expensive than others. Takaomi Kondoh, who works for a firm that manages buildings and car parks, explains that prices are usually higher close to transport hubs, because commuters compete for those spaces. Near the central station in Tama, a suburb, the going rate is ¥17,000 per month ($150). Ten minutes' walk away it drops to ¥10,000.

Once you become accustomed to the idea that city streets are only for driving and walking, and not for parking, it is difficult to imagine how it could possibly be otherwise. Mr Kondoh is so perplexed by an account of a British suburb, with its kerbside commons, that he asks for a diagram. Your correspondent tries to draw his own street, with large rectangles for houses, a line representing the kerb and small rectangles showing all the parked cars. The small rectangles take up a surprising amount of room. ■

It's a sign of the times in Kolkata

Also in this section

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Brexit and the borders

The customs crunch

DOVER

Smooth trading with Europe will be disrupted unless Britain drastically overhauls its customs operation

TO MOST Britons, the white cliffs of Dover are symbols of independence and defiance, especially against any prospect of invasion from the continent. But the clifftops also afford an excellent view of one of the great success stories of Britain's more recent integration with Europe: Dover's eastern docks.

This is the centre of Britain's seamless trade with the European Union. A long line of lorries snakes slowly but uninterruptedly around concrete concourses and onto the roll-on, roll-off ferries that make the short crossing to Calais. So smooth is the process that the port can handle 10,500 lorries a day. About £120bn ($150bn) of traded goods comes through Dover each year, 17% of Britain's total. A few miles away at the Channel Tunnel, up to 6,000 more lorries arrive daily. Yet delays are rare because Britain's membership of the EU's single market and customs union mean there is almost no paperwork to hold things up.

Soon that will change. In two years Britain is due to leave the EU—including its single market and customs union, Theresa May has said. The prime minister's vision of a "hard Brexit" will mean the return of customs barriers in some form, and thus hold-ups at the ports.

There are many benefits to the current, "frictionless" system, as Mrs May has accurately described it. One is that the ease of trade generates more trade: there has been a fourfold increase in the number of lorries coming in and out of Britain via Kent since customs barriers within the EU were abolished in 1992. Another is that British industry has used this reliable, round-the-clock delivery system to exploit "just-in-time manufacturing", which allows carmakers, for instance, to dispense with expensive inventories and warehousing. Take the Mini, manufactured by BMW. Minis are essentially built to order, as each customer selects options for the trim and interior. The company plans production a week in advance, to the very hour that the different parts are scheduled to arrive.

To see how things might work after Brexit, visit Dover's western docks. This is where trucks from non-EU countries arrive to clear customs. About 500 come here daily, from the Dover ferries and the Channel Tunnel, and their clearance is rather less seamless. Drivers have to park and fill in a form at the freight clearance office. A computerised system known as the Customs Handling of Import and Export Freight (CHIEF) logs details automatically, indicating what the goods are and what the import duty might be, but it has to be checked. Even for lorries from countries with close trading relationships, like Switzerland, all this "can take anything from 20 minutes to an hour" from disembarking, says Tim Dixon of Motis, the firm that runs the operation. For countries operating under World Trade Organisation rules only, the process could take much longer. Ominously, the Motis office has a TV lounge, launderette and restaurant in case the drivers have to lie up for a bit.

This glimpse into the future is the stuff of nightmares for British business. Just-in-time manufacturing windows could be just-missed; food importers and exporters could see their perishables wilt with the wait, especially as customs procedures might have to be repeated on the French side. Irish hauliers are particularly anxious, as 80% of Ireland's road freight to Europe goes through the British mainland. Post-Brexit, they might have to clear customs four times.

There is another headache. By coincidence, CHIEF is due to be replaced by a new system in March 2019, the due date for Brexit. Designed to cope with 60m customs declarations a year this will now have to cope with about 300m. The project already seems to be in trouble. In November the government customs service gave it a "green" rating, meaning all was ticketyboo. Yet in January it was rated "amber/red", meaning it was "in doubt", with "major risks". Andrew Tyrie, the chairman of the House of Commons Treasury select committee, is ringing alarm bells. "The consequences of this project failing, or even being delayed, could be serious," he warns. "Much trade could be lost."

Even if the new system does work, it will still require companies to input complex data, and often quickly. Businesses could outsource this sort of work to professionals, but whereas there were 125 such customs agents at Dover before 1992, there are only 24 left. All this will add to costs; even if Britain were to negotiate a good free-trade agreement with the EU, any deal would require customs formalities, says ▸▸

Michael Lux, who used to work on customs for the European Commission. The number of customs officials may have to double, he says. It might be possible to devise a system whereby lorries from "trusted trader" companies are waved through, but this does not take account of the fact that many will be carrying consignments from different sources. Furthermore, no fewer than 34 government agencies have the right to interdict traffic, a splendid recipe for bureaucratic hold-ups.

So finely tuned is the operation at the western docks, and so heavy the weight of traffic, that the slightest glitch can cause lorries to stack up on the approach roads to Dover. And when French ferry operators went on strike during the summer of 2015, the M20 motorway turned into a lorry park, losing businesses £21m worth of stock that was ruined by the wait, according to the Road Haulage Association. If Mrs May continues her pursuit of a hard Brexit and the upgrade of Britain's customs operation maintains its leisurely pace, the summer of 2019 could be more chaotic still. ■

Britain and the European Union

Rocky grievances

The lesson of Gibraltar: this is a time for EU countries to air grievances with Britain

THAT only days after Theresa May kicked off Brexit negotiations a previous Tory leader, Michael Howard, invoked the Falklands war to save Gibraltar from Spain may have been a shock. That the future of Gibraltar would come up during Brexit should not have been. Spain always said it would raise the issue. More pointedly, Britain's need to strike a new trade deal that is subject to unanimous approval gives other EU countries a chance to bring to the table any grievance they wish to air.

The spat began when Donald Tusk, the president of the European Council, clumsily put in his draft Brexit guidelines a provision that any future trade deal would apply to Gibraltar only if Madrid agreed. Brexiteers squealed at what they saw as a Spanish bid to question Britain's sovereignty—and Lord Howard brought up the Falklands. It is true that Spain has objected to British sovereignty over Gibraltar ever since it was conceded in the Treaty of Utrecht in 1713. It also has a gripe over Gibraltar airport, which is partly built on reclaimed land. Yet Madrid's concerns now are not about sovereignty but about competition from Gibraltar's low tax regime—concerns that other EU countries share because of fears that post-Brexit Britain could follow Gibraltar's example.

Rather than rage over the Rock, Brexiteers should prepare for other grievances to emerge. One is the 2003 Le Touquet treaty with France that puts British border controls in Calais. Charles Grant of the Centre for European Reform, a think-tank, notes that all three leading candidates in the French presidential election are promising to withdraw from this treaty, which is blamed in France for the migrant camps that have sprouted around Calais. That threatens to revert to the time when asylum-seekers were sent through the Channel Tunnel to set up camp in Dover instead.

Another border row could come up in Ireland. In this case there is no bilateral dispute. Both London and Dublin say they are determined not to re-create a hard border between the Irish Republic and Northern Ireland, complete with customs controls. Yet the border is not just a bilateral matter: it will exist between a post-Brexit Britain and the EU. If all EU members must agree to bend the rules to avoid customs controls, any one of them may object.

A third grievance may be Britain's grip on the NATO position of deputy supreme allied commander in Europe. Britons have held this job, the most senior military position not occupied by an American, since 1951. But Malcolm Chalmers, deputy director of the RUSI think-tank in London, reports that as the EU's role in security and defence has grown, some EU members are now arguing that, post-Brexit, the deputy post should go to one of their nationals, most likely a Frenchman.

And then there are fish. Those will be a legitimate issue for multilateral Brexit negotiations. But fish can also become a big bilateral grievance, not least because they have a habit of not always staying within designated territorial waters. Mrs May has made clear that Britain will take back control of its fisheries. But several countries, notably Spain and France, have historical rights to fish in British waters, which they want to retain. Disputes over fisheries can become poisonous (remember Britain's "cod wars" with Iceland in the 1970s). British fishermen also need full access to EU markets. The only place that has ever walked out of the European project before is Greenland, which voted to leave in 1982. It took three years to negotiate trading terms for its only export, fish.

The list could be almost endless. Anglo-French rivalries have a long history. Some Cypriots and Maltese might recall colonial injustices. And Tina Fordham, a political analyst at Citi, is not alone in predicting that Greece will bring up the Elgin marbles, which all Greeks believe should be returned from the British Museum in London to the Acropolis Museum in Athens. Brexit gives other EU countries the best bargaining chip they may ever have. Not surprisingly, many will play it. ■

Old friends and new allies

Ahead of Brexit, ministers are out hunting trade deals. Theresa May has just been to Jordan and Saudi Arabia, Philip Hammond to India, and Liam Fox to Indonesia, Malaysia and the Philippines, whose "shared values" with Britain he celebrated. President Rodrigo Duterte has encouraged his citizens to murder drug-dealers, something that is generally frowned upon in Britain. But Dr Fox is eager to improve the terms of trade with the Philippines, which accounts for fully 0.1% of British exports. Meanwhile exit negotiations continue with the EU, which takes 45%.

The current-account deficit

Balancing act

Sterling's slide helps to deal with a persistent weakness—for now, at least

ALONG with rising consumer debt and weak public finances, the current-account deficit is one of the economy's biggest vulnerabilities. Because Britain imports more than it exports, the deficit has averaged around 4% of GDP in the past decade, the highest level of any big, rich country. In late 2015 it widened to 6% of GDP. As a consequence this means that Britain is a large net borrower from abroad. Wonks have worried that with the Brexit process now under way, overseas investors will be less willing to lend to Britain and so send sterling crashing.

So it was with a sigh of relief that economy watchers learnt that in the fourth quarter of 2016 Britain's current-account deficit narrowed to around 2% of GDP, its lowest level since 2011. The reduction was partly thanks to an improvement in what Britons earn on their overseas investments. The pound is roughly one-tenth weaker than it was a year ago. So in sterling terms the returns on Britons' foreign investments have jumped. It also helps that continental Europe, where Britons are heavily invested, has recently seen faster economic growth and hence returns on investments have been juicier.

Trade is the other big factor behind the narrowing of the current-account deficit. Consistent with what economics textbooks would predict, following sterling's tumble last June the trade deficit initially widened. British firms followed through with plans to buy imports even though their cost had risen. By contrast, exporters that price their products in sterling (as many as one-third do so) saw no immediate boost from the weaker pound.

By the fourth quarter, however, the trade deficit had sharply narrowed, thanks partly to a rise in export volumes. Exporters have cut prices in order to lure in more consumers. Brompton, a London-based bicycle maker which exports 75-80% of its bikes, has reduced its prices in foreign markets by about 5%. Overseas sales of food and drink are up by a quarter on last year. In 2016 exports of single-malt whisky were worth £1bn ($1.2bn), the most ever.

Ben Broadbent, a deputy governor of the Bank of England, suggested in a recent speech that British exporters currently find themselves in a "sweet spot" where they are competitive in international markets but have not had to deal with the changes to rules and regulations that are likely to accompany Britain's exit from the European Union. Exporters are also benefiting from a cyclical upswing in the global economy, as are other open economies such as Ireland.

The rise in exports has come at a useful time. Other parts of the British economy are starting to weaken: consumer spending is slowing and surveys from the Bank of England suggest that business investment will remain low. Yet it is still an open question whether the benefits from sterling's depreciation, which accrue mainly to the 10% or so of British firms which export, outweigh the downsides: the higher inflation and reduced purchasing power caused by the weaker pound affect all Britons.

Despite the shrinking of the current-account deficit, foreign investors will continue to exert huge influence over the economy. Britain has an almost entirely free market in corporate control; the stock of overseas investors' assets in the country—including houses, factories and shares—equates to over 500% of GDP (though Britons have similarly sized investments overseas). Sterling could tumble if only a small proportion of holders of these assets sold up, says Samuel Tombs of Pantheon Macroeconomics, a consultancy. As the Brexit negotiations get under way, all the more reason for the government to remain in investors' good books. ■

Three-day weekends

Thank God it's Thursday

A shorter working week sounds appealing, but could be costly

WITH the prospect of Easter and two bank holidays on the horizon, Britons have an embarrassment of long weekends to savour. For Caroline Lucas, the joint leader of the Green Party, that is not enough: she wants three-day weekends every week. On March 31st she announced at her party's conference that the Greens were exploring such a policy, which could go in their manifesto in 2020.

The Greens reckon that lopping a day off the working week would begin to redress the inequalities between men and women, since both paid and unpaid work might then be shared more evenly. People could do more of what they love (assuming that excludes their jobs) and would be less stressed. It would reduce Britain's carbon footprint. And it could even boost the country's productivity.

Some evidence supports this. A paper published in 2014 by John Pencavel of Stanford University, looking at first-world-war munitions workers, shows that reducing working hours can be good for productivity. Between 2007 and 2011 the American

state of Utah adjusted the working week for state employees, with longer days from Monday to Thursday, and Friday off. In ten months the shift saved the state $1.8m in energy costs.

But the Greens would go further than simply redistributing working hours over four days: they suggest that people could work fewer hours overall. Since not everyone can afford to take a 20% pay cut, "wages must go up correspondingly"—courtesy of employers and the state—"to ensure no one loses out". The 26m employed Britons earn on average £90 ($112) a day. Covering the shortfall would cost around £120bn a year, equivalent to the budget of the National Health Service.

The Greens' proposals encounter two problems. First, the theory. They argue that the reduced hours worked by some could be redistributed to others in order to lower underemployment. They thus fall prey to the "lump of labour fallacy", the notion that there is a fixed amount of work to be done which can be shared out in different ways to create fewer or more jobs. In fact, if people worked fewer hours, demand would drop, and so fewer working hours would be on offer.

Second, the cost. Increased productivity could cover some of the costs of paying a five-day wage for a four-day week, suggests Sarah Lyall of the New Economics Foundation, a think-tank. She points to a Glasgow marketing company that did just that, and experienced a 30% leap in productivity. But that is an astonishing increase to expect across the board.

The Greens say they are in the early stages of exploring the idea and have not yet produced firm costings. It might be useful to do so before next month's local elections. That leaves little time—but presumably the party's policymakers will raise their productivity accordingly. ■

Education funding

Learning to count pennies

Schools are overdue a cut, but the pain will be felt unevenly

THE warnings are becoming louder. In January schools in Cheshire suggested that they might have to move to a four-day week. In March a school in East Sussex asked parents to bring in their own loo roll. Teachers' unions are outraged. Jeremy Corbyn, Labour's leader, has raised school funding at every prime minister's questions for a month, accusing the government of "betraying a generation". It is planning the biggest cut to education spending in 30 years.

Yet as Sir Michael Wilshaw, a former chief inspector of schools, has noted, England's schools have enjoyed at least 20 years of "largesse". The new proposals would only partially reverse whopping increases dished out in the early 2000s (see chart). And whereas most other public services have already been subject to swingeing austerity cuts, school spending was protected in real terms in 2010-15.

The government has promised to maintain school spending in cash terms until 2020, which means that in real terms it will fall by 6.5%, according to the Institute for Fiscal Studies, a think-tank. For lots of schools that will be easily manageable, says Jonathan Simons, who was head of education in the prime minister's strategy unit under Gordon Brown and David Cameron. Some will be able to make the necessary savings by doing things like renegotiating energy contracts, say, or economising on teacher training.

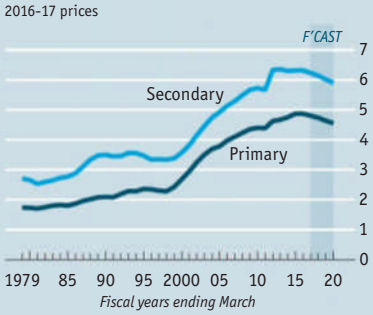
Others will find it harder. Although overall school spending has had a generous run, the money has not been evenly dished out. Some schools have already had to trim their costs. They may now allow class sizes to creep up, cut support staff or ration school trips. British teachers already work long hours by international standards and recruiting new ones is difficult. The National Audit Office, a spending watchdog, has criticised the Department for Education for not providing clear enough advice to schools on how to deal with less money.

To muddle the matter further, opposition to the cuts has merged with opposition to a planned reform of how the money is disbursed. The government hopes to introduce a new "national funding formula" in 2018-19. The current system for handing out funds is partly based on an old model in which local authorities set their own education budgets, which resulted in wide disparities. Thus, at one extreme, schools in Tower Hamlets, a poor London borough with steep rents, this year got £6,906 ($8,600) per pupil in basic funding, whereas at the other end of the spectrum those in comfortable Wokingham received £3,991. The new formula will level out some regional differences, while weighting for things like poverty and low attainment. The Education Policy Institute, another think-tank, says it is a "consistent and transparent" way to hand out the cash.

But it may be bad politics. Mr Cameron is said to have called the formula his education secretary's "plan to lose me the next general election". Before him, a Labour ▸▸

Context to the cuts

England, spending per pupil, £'000
2016-17 prices



Source: IFS

Work v play

The Easter blues

Despite increased chocolate rations, children would rather be at school

ENGLISH schoolchildren enjoy 13 weeks of holiday a year. To jaded office workers (and perhaps the Green Party—see previous page) that may sound ideal. Indeed, few children complain that they spend too much time away from exams, homework and the possibility of detention. Yet a new research paper* suggests that maybe they should: for children are happier when at school than during the holidays. The Easter break, which begins this week at many schools, is the gloomiest time of the year.

The analysis looks at data from the UK Household Longitudinal Study, which has tracked the ups and downs of 40,000 households since 2009. As children are surveyed at different times of the year, Gundi Knies, the author, is able to compare their cheeriness across the calendar. She finds that younger children are happier than teenagers, and that teenage girls are moodier than teenage boys.

The data offer a clue as to what explains the holiday glumness. One possibility is that it is caused by a mild form of separation anxiety. Ms Knies notes that although children's reported satisfaction with their family does not decline during the holidays, their satisfaction with their friends does. Distance may breed discontent.

Another reason may be that, when not distracted by schoolwork, children spend more time in front of a screen, which research suggests makes them less happy. And many extra-curricular activities are suspended, which means less time playing football or hanging out at drama club. "Everyone needs something meaningful to fill their day," says Ms Knies. Unemployed adults are less happy than their peers. Crucially, those children who were on holiday abroad would not have been surveyed, so the ones included in the study were those left hanging around at home.

Give the poor girl some homework

As for why Easter holidays are worst of all, one possible explanation jumps out: exams. The main ones tend to be in the summer term, so the Easter break is spent swotting up (or feeling guilty about not doing so). Steve Jackson, the head teacher of a school in Somerset, frets that the pressure piled on children by exams has "increased exponentially over the years", to the extent that they may now be damaging to young people's health. Foreign jaunts are more common in the summer; Christmas brings families together in the winter. Easter eggs, it seems, are insufficient compensation for the horrors of revision.

* "Income effects on children's life satisfaction: Longitudinal Evidence for England" by Gundi Knies of the University of Essex, Institute for Social and Economic Research Working Paper Series

government had made the funding system a bit fairer but shied away from a complete overhaul because of the strength of opposition from local councils. More than half of schools will benefit from the new formula, but all will probably lose out overall because of the funding cuts. Moreover, the winners will not benefit by quite as much as they had hoped, partly because of a cap the government has put in place to prevent anyone from losing too much.

Plenty of people are cross, many of them in sensitive constituencies. MPs with London seats despair that the capital's high-performing schools will lose money; Tories representing leafy shires moan that the boost to their schools is not big enough. Most expect the government to tweak the formula a bit when it responds to a consultation in the summer. But much extra cash is unlikely to be found for schools, despite the increasingly voluble protestations. ■

Funding for businesses

Into the valley of death

The government eyes pension funds as a source of "patient" capital

LAST year 650,000 new companies were formed in Britain, a new record. London, in particular, now abounds with incubators and accelerators. But the country is much less good at finding the capital for firms to grow over the long term. High-growth companies provide a disproportionate number of new jobs, but too few of those startups transform into "scale-ups".

The Treasury has set up a review into this lack of "patient" capital. Its main aim is "to consider the availability of long-term finance for growing innovative firms looking to scale up". Its panel of finance chiefs is chaired by Sir Damon Buffini, a former head of Permira, a private-equity company. They will soon be sending out a consultation document and are expected to report by the time of the chancellor of the exchequer's budget in the autumn.

The gap in funding concerns firms worth between £5m and £100m ($6m-125m), a range that has become known as the "valley of death". Take tech, a sector in which companies often grow rapidly. Britain invested £2bn of venture capital in tech companies last year, slightly down on the year before. This is good by European standards, but modest by comparison with America, argues Tim Hames of the British Private Equity and Venture Capital Association. Overall, the American venture-capital sector raised $42bn worth of funds for investment last year. In Britain, five big banks set up a "Business Growth Fund" in 2011 to invest in scale-ups. Last year it funnelled £400m to 59 companies. This helps a bit, but cannot meet demand. The industry is "totally sub-scale", says the head of the fund, Stephen Welton.

Consequently, most fast-growing firms, particularly in tech, have to look overseas for cash. According to Octopus, an investment company, 60% of all funding rounds in Britain above £10m involve an American investor. Many sell out to an American behemoth rather than struggle on looking for investment; DeepMind, an artificial-intelligence company, was sold to Google in 2014 for £400m.

Moreover, even when venture-capital funds do stump up big chunks of money, they usually plan to stay invested for just a decade or so, the last years of which are taken up with designing an exit strategy. Many high-growth industries, particularly the life sciences, could do with longer investment periods, of up to 30 years, says Mr Hames.

Pension and life insurance funds will also come under scrutiny in the Treasury review. Pension funds, in particular, dwarf venture-capital funds but have historically invested very little of their money in risky companies, preferring bonds and blue-chip firms. George Osborne, the previous chancellor of the exchequer, had been pushing pension funds into making longer-term investments in infrastructure. They may now be encouraged to invest more in fast-growing companies.

Some look enviously at Canada's pension funds. Whereas Britain has many small funds—at least 300 in the public sector alone—the Canadian government has herded its funds into a few big ones, enabling them to pool their research and administrative resources to scale up their investments. The Ontario Teachers' Pension Plan is one of the more successful. It has bought several British assets, such as Camelot, the company that operates the National Lottery, and City airport in London.

Edmund Truell, a city financier, recommends a similar strategy of creating a handful of "pension superfunds". He transformed the London Pension Fund Authority, which manages the pensions of about 50,000 current and former city employees, hooking it up with the Lancashire County Pension Fund to create a £10bn commonly managed scheme. He sold the portfolio of gilts, arguing that investing in housing and infrastructure were better long-term bets.

One option would be to allow the pension funds to invest in venture-capital trusts. These currently reward private investors with tax relief. They could be extended beyond the present limit of £5m to accommodate larger sums from institutional investors, argues Chris Hulatt of Octopus. That would be one way to make the "valley of death" a tad less forbidding. ■

Labour and anti-Semitism

Beyond their Ken

A problem that Labour can't squash

KEN LIVINGSTONE, a former mayor of London, has been suspended from the Labour Party for a second year over dubious remarks made in 2016, including that Hitler supported Zionism "before he went mad and ended up killing 6m Jews". But to the outrage of many, he has not been expelled. Tom Watson, Labour's deputy leader, says Mr Livingstone's behaviour "discredits the party I love". Ephraim Mirvis, Britain's chief rabbi, says Labour has "failed the Jewish community". One hundred Labour MPs have condemned the decision not to boot him out.

The case has reignited a row over whether Labour is failing to deal with anti-Semitism in its ranks. Last year an inquiry into racism in the party by Shami Chakrabarti, a human-rights campaigner, found no evidence of such prejudice, prompting some criticism—which intensified when she was subsequently made a Labour peer.

Labour was already expecting to do badly in local elections next month. Britain's Jews number only 270,000 and are far less politically homogenous than those in America, say, who tend to vote Democrat. But the dithering of Jeremy Corbyn, Labour's unpopular, far-left leader and a long-standing ally of Mr Livingstone, has done the party little good. Mr Livingstone continues to defend his remarks and has vowed to fight the suspension. Mr Corbyn has now criticised him for failing to apologise for the "deep offence" he has caused and says that there will be yet another investigation. That may not suffice.

Livingstone, still defiant

Bagehot | The third man

The shadow of Enoch Powell looms ever-larger over British politics

IF THE history of the world is but the biography of great men, as Thomas Carlyle put it, the history of Britain since the 1960s is but the biography of two great men and one woman. As Labour home secretary from 1965-67, Roy Jenkins took the government out of the bedroom with a series of liberalising laws on divorce, homosexuality and censorship. As Tory prime minister from 1979-90 Margaret Thatcher unleashed the power of markets. The main job of their successors was to come to terms with these twin revolutions: Tony Blair converted Labour to Thatcherism and David Cameron converted the Tories to Jenkinsism.

Before Brexit it looked as if that was it: the party that could produce the best synthesis of Thatcher and Jenkins would win. But today a third figure hovers over British politics: a man who was born in 1912—eight years before Jenkins and 13 before Thatcher—but whose influence seems to grow by the day. One of Enoch Powell's most famous observations was that "all political lives, unless they are cut off in midstream at some happy juncture, end in failure." His political life is enjoying a posthumous success.

Powell put two issues at the heart of his politics: migration and Europe. He convulsed the country in 1968 when he declared in a speech in his native Birmingham that mass immigration would produce social breakdown—that "like the Roman, I seem to see the River Tiber foaming with much blood." And he campaigned tirelessly against the European Economic Community. These two passions were united by his belief in the nation state. He thought that nations were the building blocks of society and that attempts to subvert them, through supranational engineering or global flows of people, would end in disaster.

Powell didn't have the same direct influence as Thatcher or Jenkins. Thatcher was prime minister for 11 tumultuous years. Jenkins lived his life at the centre of the establishment. Powell spent only 15 months of his 37-year political career in office, as minister for health; nothing of substance bears his name on the statute books. In his new book, "The Road to Somewhere", David Goodhart, a liberal critic of multiculturalism who has been accused of "liberal Powellism", thinks that his "rivers of blood" speech was doubly counter-productive: it toxified the discussion of immigration for a generation and set the bar to successful immigration too low (no rivers foaming with blood, no problem).

Yet Brexit is soaked in the blood of Powellism. Some of the leading Brexiteers acknowledge their debt to Powell: Nigel Farage regards him as a political hero and says that the country would be better today if his words had been heeded. Powell lit the fire of Euroscepticism in 1970 and kept it burning, often alone, for decade upon decade. He provided the Eurosceptics with their favourite arguments: that Europe was a mortal threat to British sovereignty; that Britain's future lay in going it alone, "her face towards the oceans and the continents of the world"; that the establishment had betrayed the British people into joining Europe, by selling a political project as an economic one, and would betray them again. History has also been on his side. David Shiels, of Wolfson College, Cambridge, points out that, in Powell's time, the questions of immigration and Europe were distinct (the immigration that worried him was from the Commonwealth). Europe's commitment to the free movement of people drove the two things together and gave Powellism its renewed power.

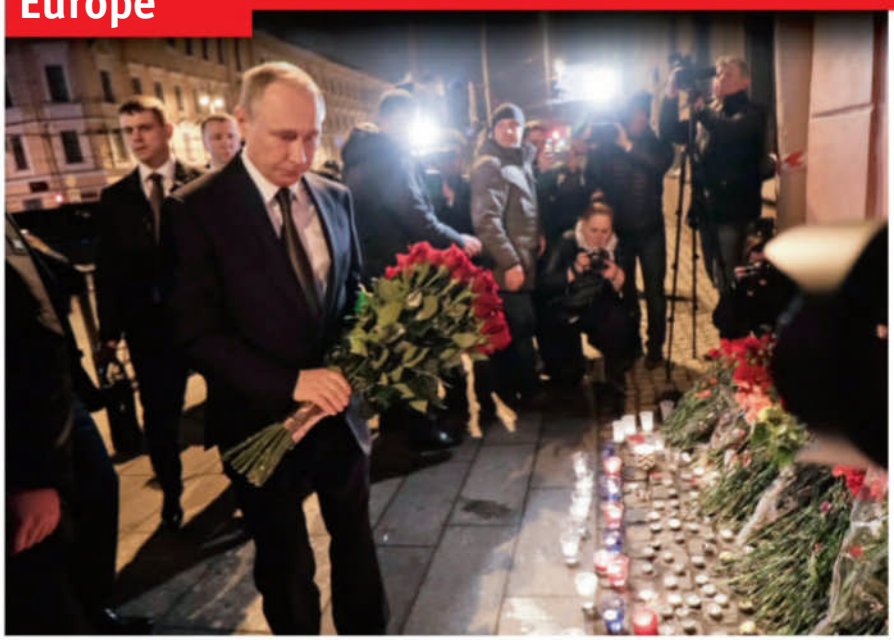
Just as important as his arguments was his style. Powell was the first of the new generation of populists cropping up across the West, a worshipper of Nietzsche in his youth, a professor of classics by the age of 25 who nevertheless considered himself a true voice of the people. He believed that the British establishment had become fatally out of touch on the biggest questions facing the country and used his formidable charisma—insistent voice tinged with Brummie, hypnotic stare—to seduce his audiences.

Powell's errors were legion. He regarded British nationhood as a fixed entity rather than something that was constantly being reinvented. He underestimated the country's ability to absorb foreigners. Some prominent Brexiteers, such as Priti Patel, who is now a cabinet minister, were the children of immigrants, and the most recent Tory to hold Powell's old seat, Wolverhampton South West, was a Sikh, Paul Uppal. He combined a high-flown love of his own nation with a chilly indifference to other people's nations. He didn't pay enough attention to the fact that nationalism can easily turn rancid: on March 31st a 17-year-old asylum-seeker was beaten almost to death in London by a gang of youths. Nor did he recognise that it can easily become ridiculous: on April 2nd a former leader of the Conservative Party, Michael Howard, talked about going to war with Spain over Gibraltar.

Filled with foreboding

But he did recognise one big thing: that the prophets of globalisation and European integration erred badly if they thought that national loyalties would either melt away or become so anodyne that they didn't matter. Britain's political parties now need to come to terms with the Powell question of national identity in much the same way that they once had to come to terms with the Jenkins question (social liberalism) and the Thatcher question (economic liberalism). Those who fail to make the adjustment will be doomed to marginalisation. So far the Tories have taken to this more easily than Labour. Whereas Theresa May's Toryism is rooted in provincial England, Labour's two core constituencies—liberal intellectuals and manual workers—are at war with each other on national identity.

The established parties need to deal with this problem not just because their success depends upon it but also because, if left to fester, untamed nationalism can be a powerfully destructive force. Powell was restrained by the power of the old British establishment and by his reverence for Parliament. Today's pound-shop Powellites don't suffer from any such restraints. ■



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A terrorist hits St Petersburg

Underground man

MOSCOW

A savage bombing could lead to even tighter government control

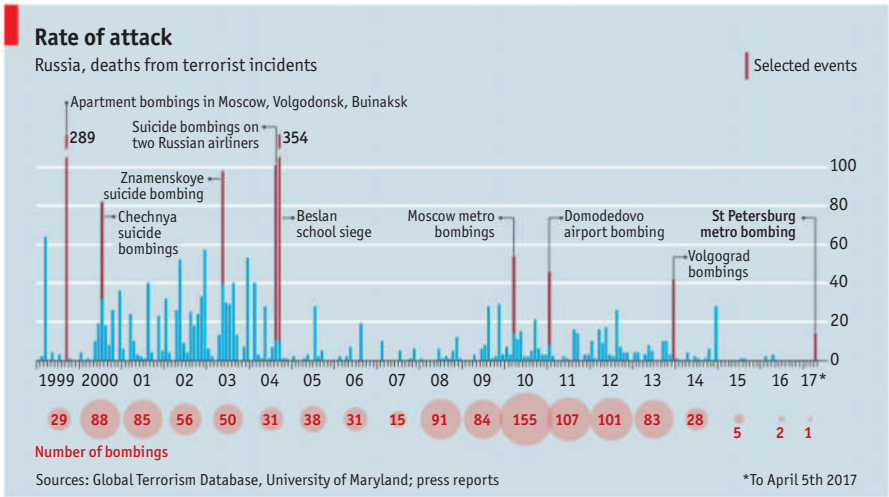
THE oldest victim was 71 years old, the youngest just 18. One was a third-year university student described by a teacher as "pretty, smart, sweet and intelligent". Another was a middle-aged mother known for sewing and selling elaborate dolls. They all entered the St Petersburg underground on the afternoon of April 3rd expecting to return home.

An attacker had other plans. A bomb ripped through the third carriage of a train travelling beneath the city centre at around 2.40pm, leaving 14 dead and some 50 more wounded. "There was a bang, and dust," said the train's driver, Alexander Kaverin. Russian security officials say that the attacker left a second, larger explosive device at another station, though it did not detonate. That the bombing came as President Vladimir Putin (pictured) was visiting St Petersburg enhanced the symbolic significance of the first terrorist attack on a major Russian city in more than three years.

Previous terrorist attacks on Russian transport infrastructure, such as the bombings of Moscow's metro in 2004 and 2010, and its international airport in 2011, have been linked to insurgencies in the restive North Caucasus region. But this week's tragedy appears to fit a different profile. Russian authorities say the chief suspect is Akbarzhon Jalilov, a 22-year-old from the city of Osh in southern Kyrgyzstan who had obtained Russian citizenship and lived in the country for the past six years. Investigators say that Mr Jalilov, an ethnic Uzbek, was spotted on security cameras and that his DNA was found on the second unexploded device. Body fragments found at the scene suggest that it was a suicide attack. Mr Jalilov's parents arrived in St Petersburg on April 5th to speak to investigators and identify the body.

The suspect's origins highlight the terrorist threats percolating in Central Asia. Poverty, autocracy and restrictions on religious freedom have made citizens of the former Soviet republics susceptible to radicalisation. Thousands from Uzbekistan, Kyrgyzstan, Tajikistan and Kazakhstan are believed to have joined the so-called Islamic State (IS). (Thousands more IS volunteers come from Russia itself, mostly from the northern Caucasus.) They include the American-trained former head of Tajikistan's OMON, an elite interior-ministry police unit. Central Asian nationals have been implicated in attacks on Istanbul's airport in 2016 and a nightclub in the same city on New Year's Eve. Many are reportedly radicalised while working at construction sites in Russia. Two days after the St Petersburg attack, Russian investigators said they had arrested six Central Asians in St Petersburg on suspicion of acting as recruiters for IS and Jabhat Fateh al-Sham, a jihadist group linked to al-Qaeda.

As *The Economist* went to press, no group had claimed responsibility. But although the killer's motives are unknown, the attack underlines the risks posed by Russian interventions in the Middle East. Since entering the Syrian war in support of President Bashar al-Assad, Russia has become a prime target for terrorist groups. IS ▸▸



has declared a holy war on Russia and pronounced the northern Caucasus a province of its would-be caliphate. In late 2015, shortly after claiming responsibility for the downing of a Russian airliner over Egypt's Sinai peninsula, IS-affiliated propaganda outlets threatened a "sea of blood" inside Russia itself.

Regardless of who was responsible, the bombing is unlikely to influence foreign policy. The foreign minister, Sergei Lavrov, called the notion that the attack was revenge for Russia's actions in Syria "cynical and despicable". The long list of terror attacks carried out in Russia over the past two decades have not dissuaded Moscow from pursuing ruthless policies in the northern Caucasus or the Middle East. Rather than raising questions about such policies, terror attacks are perceived as a demonstration of their righteousness, noted an editorial in *Vedomosti*, an influential business daily. On April 4th, the day after the St Petersburg bombing, reports of an attack with chemical weapons emerged in Syria, yet Moscow remained steadfast in its support for Mr Assad.

Government critics fret that the fight against terrorism may be exploited to restrict civil liberties just weeks after the largest anti-government protests in years. Mr Putin, whose popularity is based on providing stability, has said little about the attack beyond offering condolences to the victims and promising a full investigation. But in the past, fighting terrorism has been used as an excuse to strengthen controls over online content and expand the power of the secret services. It also serves as a way to rally people around the flag. Pro-government forces across Russia have made plans for mass anti-terror marches. ■

Anti-gay violence in Chechnya

Republic of fear

MOSCOW

The Chechen government is reportedly rounding up and killing gay people

"THE youngest one was 16 years old, he's from our village," reads a post on VKontakte, a Russian social-networking site. "They recently brought him back, all beat up, just a bag of bones. They dumped him in the courtyard and said to kill him."

The post was by an anonymous user from Chechnya, on a group for closeted gay people from the Caucasus. It was one of the clearer indications of a brutal anti-gay campaign believed to be unfolding across the Chechen Republic. Earlier this week *Novaya Gazeta*, a Russian opposition newspaper, published a series of reports claiming that authorities had been detaining dozens of men in a secret prison "in connection with their nontraditional sexual orientation, or suspicion of such." The paper wrote that two recent waves of crackdowns have seen more than 100 men arrested and at least three killed.

"When the [electric] current is flowing and your body begins to shake, you stop thinking and begin to scream," one survivor said. "You sit there the whole time and hear the cries of people being tortured."

The atrocities described in the articles have not been independently verified, but groups with experience in the region agree that something is happening. Human Rights Watch says the story is consistent with what they have heard from trusted informants. "The number of sources and the consistency of the stories leaves us with no doubt that these devastating developments have indeed occurred," writes Tanya Lokshina, the group's Russian programme director. Ekaterina Sokirianskaia of the International Crisis Group, an expert on the North Caucasus, has heard similar reports from her sources. A hotline set up for Chechens by the Russian LGBT-Network, a rights group, received more than ten calls in the two days following the first publication in *Novaya Gazeta*.

The brazenness of the repression highlights the extent to which Chechnya has become a fiefdom unto itself under its leader, Ramzan Kadyrov. Mr Kadyrov's spokesman, Alvi Karimov, responded to *Novaya Gazeta*'s claims by denying that there are gay people in Chechnya at all: "If there were such people in Chechnya, the law-enforcement organs would not need to do anything with them because their relatives would have sent them to a place from which they could never return."

An intervention by Vladimir Putin, Russia's president, might be the only thing that could sway the Chechen authorities to put a stop to the anti-gay violence. Yet the Kremlin depends on Mr Kadyrov to preserve stability in the volatile republic, and managing the Chechen leader has become a challenge in recent years. He commands his own security forces, numbering about 20,000 men. His republic follows its own hyper-traditional religious and social codes, largely beyond the reach of Russian law; Mr Kadyrov has voiced support for polygamy and honour killings. Discussion of homosexuality is taboo and most gay people remain deeply closeted.

This makes reaching victims and documenting the crackdown especially difficult. "Information gets through with a delay," says Igor Kochetkov of the Russian LGBT-Network, which has also begun organising evacuations from the region. The true extent of the brutality may go deeper than *Novaya Gazeta* describes. As Ms Sokirianskaia says, "We've only seen the tip of the iceberg." ■

France's disintegrating left

The crack-up

PARIS

A dreamer, a revolutionary and a centrist split the Socialists

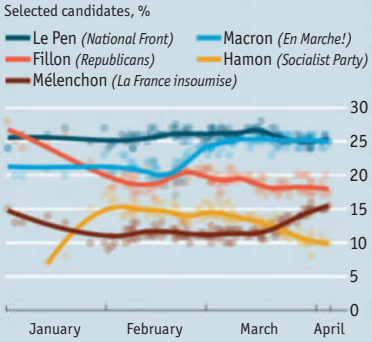
BACK in 2002, the French Socialists suffered such a stinging defeat at a presidential election that it gave birth to a new noun. *Un 21 avril*, referring to the date that their candidate, Lionel Jospin, was evicted in the first round, became a term used for any shock political elimination. Today, ahead of the first round of this year's presidential election on April 23rd, the Socialists are bracing themselves not just for elimination from the run-off, but for a far greater humiliation, one which could call into question the party's very survival.

Current polls put Benoît Hamon, the Socialist candidate, in a dismal fifth place. He trails not only the nationalist Marine Le Pen, the liberal Emmanuel Macron, and the traditional right's François Fillon. In the past fortnight, Mr Hamon has also been overtaken by a far-left firebrand, Jean-Luc ▸▸

Languishing left

France, presidential election polling, first round

Selected candidates, %



Sources: National polls; *The Economist*

Mélenchon (pictured), who promises a "citizens' revolution". A one-time Socialist now backed by the Communist Party, the fist-clenching 65-year-old has surged to 15%, against just 10% for Mr Hamon. This puts him only a couple of points behind Mr Fillon, and in a position—just possibly—to overtake the Gaullist candidate too.

In the campaign's second televised debate on April 4th, it was the wisecracking Mr Mélenchon who delivered the memorable lines. When Mr Fillon argued that industrial relations should be decentralised to firms, Mr Mélenchon snapped: "I am not in favour of one labour code per firm, just as I am not in favour of one highway code per road." It was a difficult debate at which to shine. All 11 official candidates took part: the five front-runners plus six others, including a Ford factory worker, a Trotskyist high-school teacher, and a former shepherd. Each had a total of 17 minutes to speak, spread over three hours. In a poll, voters judged Mr Mélenchon the most convincing, followed by Mr Macron.

In some ways, Mr Hamon's disastrous campaign is surprising. An outsider, he seized the party's primary in January with a handsome 59% of the vote, easing out a moderate former prime minister, Manuel Valls. His recent rally in Paris was packed. Backed by Thomas Piketty, an economist who worries about inequality, he has a programme which—though its finances do not add up—is based on creative thinking about the future of work and society in an era of automation. Mr Hamon promises, for instance, to bring in a universal basic income, which in time would pay out €750 ($800) a month to everyone, partly financed by a tax on robots. He promises a "desirable future", in which consumerism, production and working hours are curbed, greenery flourishes and happiness, long scarce in France, breaks out everywhere.

Yet as Matthieu Croissandeau of *L'Obs*, a left-wing magazine, put it, since Socialist primary voters "were convinced they would lose the presidential election…they chose an ideal rather than a programme of government." The closer voting day gets, the less workable Mr Hamon's ideas seem, even to some of his white-collar constituents. A poll suggested that only 7% of voters think Mr Hamon has "presidential stature". Gilles Finchelstein of the Fondation Jean-Jaurès, a think-tank, argues that Socialist support has not collapsed: it is just not behind the party's candidate. Fully 42% back Mr Macron; 15% support Mr Mélenchon. By positioning himself on the left of his party, Mr Hamon has scared off centrist voters, while failing to sound combative enough for those on the far left.

Mr Hamon has lost the loyalty not just of Socialist voters, but of Socialist politicians. His protracted (and failed) efforts to do a deal with Mr Mélenchon exasperated the moderates. A former backbench rebel, he has refused to say anything nice about the past five years of Socialist government, dismaying ministers. Mr Valls and Jean-Yves Le Drian, the Socialist defence minister, have both thrown their support to Mr Macron. The upshot is a bitterly divided party. The Hamon camp called Mr Valls's defection "pathetic" and "shameful". It is a "very strange campaign", says a Socialist parliamentarian loyal to Mr Hamon; party activists "don't feel connected".

Mr Valls's defection, says Guillaume Balas, a member of the Hamon team, implies "the death of the Socialist Party as conceived by (François) Mitterrand". The party, which has supplied French presidents for half of the past 36 years, has long tried to bridge the differences between its moderates and its left wing. In the 1970s, Mitterrand managed to unify the left; he went on to serve as president for 14 years. Now, under the joint pressure of Mr Macron and Mr Mélenchon, old fractures are pulling it back apart. ■

Academic freedom in Hungary

Orban v intellectuals

BUDAPEST

An illiberal prime minister goes after a liberal university

WITH just 1,440 students, the Central European University (CEU) is one of Hungary's smallest institutions of higher education, but it may be its most prestigious. Housed in a mix of grand historic and ultramodern buildings in central Budapest, it draws visiting professors from across Europe and America, and its graduates include many members of Hungary's business and political elite. It was founded in 1991 by George Soros, a Hungarian-born billionaire, as part of his philanthropic effort to promote liberal democratic values in formerly communist countries. This annoys Viktor Orban, Hungary's prime minister, and his ruling Fidesz party. On April 4th Mr Orban fast-tracked a law through parliament that could force CEU to close.

The legislation requires foreign-accredited universities in Hungary to have a base in their home country. CEU, which is accredited in Hungary and the United States, would have to open an American campus by February 2018, which university officials say would be onerous and prohibitively expensive. They have asked Janos Ader, the president of Hungary, to veto the law, which they argue violates the constitutional guarantee of academic freedom.

Fidesz has long viewed CEU as a stalking horse for the opposition (though its government has repeatedly recertified it). "The antipathy is not new," says Eva Balogh of Hungarian Spectrum, an opposition blog. Mr Orban, who himself received a scholarship from Mr Soros to study in Britain in 1989, has accused CEU of "cheating" by offering degrees that are valid abroad (because heaven forbid that foreign countries should recognise a Hungarian degree). Zoltan Balog, the minister of human resources, said it was not in Hungary's interest to "host experiments" which "aim at undermining the lawfully elected government".

Mr Orban, who vowed in 2014 to make Hungary an "illiberal state", feels empowered both by the impotence of his domes-

tic opposition and by the victory of Donald Trump. Fidesz is also preparing a crackdown on foreign-funded NGOs. "CEU is not an issue for the average Hungarian, but symbolically it's very important," says Tamas Boros of Policy Solutions, a think-tank in Budapest. "It shows that Orban can control everything in the country." Government officials deny that the law targets CEU. It simply levels the playing field for all universities, said Zoltan Kovacs, a government spokesman (and CEU graduate). Another graduate, Ferenc Kumin, Hungary's consul in New York, hosted a reception for the university as recently as March 16th.

Two marches in Budapest this week drew tens of thousands of supporters of the university, who echoed its call for Mr Ader to veto the law. The university's rector, Michael Ignatieff, a former leader of Canada's Liberal party, vows that it will remain open one way or another. Mr Orban's actions have infuriated academics around the world, and drew condemnation from Frank-Walter Steinmeier, the president of Germany. Members of the Hungarian Academy of Sciences have expressed their support for CEU. So has Tibor Navracsics, the EU's education commissioner, who once served as Mr Orban's minister of justice.

Mr Orban may also have misjudged America's mood. Although Donald Trump has sometimes embraced illiberal nationalism, the arbitrary closure of an American-accredited university will not be welcomed in Washington. David Kostelancik, the top-ranking American diplomat in Budapest, said his government was "disappointed" by the legislation. Some compromise may yet be found, says another Western diplomat: "There is not unanimity in the Hungarian government that this is a great idea." ■

Turkey's presidential power grab

The Kurdish card

DIYARBAKIR

To win a referendum, President Erdogan needs the votes of old enemies

WITH just over a week before a referendum on constitutional changes that would give him practically unchecked powers, Turkey's president, Recep Tayyip Erdogan, ought to be coasting to victory. The media have been defanged. Critics, including members of his own party, are afraid to speak up. The secular opposition is tripping over its own shoelaces. Yet Mr Erdogan is not assured of a win on April 16th. Most polls show the "no" and "yes" sides too close to call. The outcome now hinges largely on two groups that have long been at each other's throats: Kurds and nationalists.

In Diyarbakir, the heart of the Kurdish southeast, battered over the past two years by fighting between insurgents from the Kurdistan Workers' Party (PKK) and Turkish security forces, the referendum is not a burning question. "Kurds have no rights in the current constitution, and they have no rights in the new one," says Sah Ismail Bedirhanoglu, a businessman. "People here lost homes, family members and jobs," says Vahap Coskun, a professor at Dicle University. "There is no article in this constitution that will bring them peace."

Across Turkey, the "No" campaign has been hamstrung by restrictions and intimidation. In Diyarbakir, "Yes" billboards and banners depicting Mr Erdogan, who held a rally here on April 1st, crowd the avenues. "No" banners are nowhere to be seen. "When we put them up in front of our headquarters, the police take them down," says Ziya Pir, an MP from the pro-Kurdish Peoples' Democratic Party (HDP). More than campaign materials, the HDP is missing campaigners. Some 5,000 party officials, including 85 mayors and 13 parliamentarians, are jailed on terror charges. The crackdown went into overdrive since last July's coup attempt against Mr Erdogan. Under emergency law, the authorities shut down many Kurdish radio stations and TV channels. More recently, they banned the Kurdish-language version of the HDP's campaign song, "Say No", claiming that it incited "hatred and enmity".

Some Kurds think Mr Erdogan, who presided over negotiations with the PKK before abandoning them in 2015, will restart the peace process if he gets what he wants. "Erdogan is our only hope," says Hamza, a car dealer and "Yes" voter. Most Diyarbakir residents seem to think otherwise. "A vote for this constitution is a vote for yet more repression," says one shopkeeper. But gauging the mood in the southeast is nearly impossible. Abdurrahman Kurt, a former MP from the ruling Justice and Development (AK) party, expects 60% of the region to vote for the new constitution. A recent poll puts the figure at just over 30%.

Mr Erdogan has other reasons to be uneasy. The grand alliance of Islamists and nationalists that he knitted together after the coup seems to be fraying. The leadership of the main nationalist party, the MHP, has backed Mr Erdogan's constitution. But many of its supporters have not. Durmus Yilmaz, a former central bank chairman and one of a pack of MHP parliamentarians who broke with the party last year, estimates that four out of five nationalist voters will vote "no" in the referendum. "The MHP grassroots have always favoured the parliamentary system," he says. "And these amendments put all power in the hands of one man."

One thing that unites Kurds and nationalists, other than opposition to the new constitution, is anxiety about the aftermath of the vote. Some in the southeast hope a "Yes" might get Mr Erdogan to stop hounding opponents. Others fear it would give him licence to do so more ruthlessly. A "No" vote also entails risks. Denied the powers he craves, Mr Erdogan may resort to the tactics he used to win back a parliamentary majority in 2015: an onslaught against PKK strongholds, a war of words with Western countries and an early election. "No matter what happens," says Serkar, a student in Diyarbakir, "the Kurds will probably end up paying the price." ■

Blessings for everyone, provided he gets more power

Charlemagne | Descending Mount Brexit

Reality has started to bite in London

HUGO YOUNG, an author, alighted on Hobbesian metaphors to describe Britain's negotiations, in the early 1970s, to join the then European Economic Community. But if accession was "nasty", "occasionally brutish" and "indisputably long", leaving the club may prove harder still. Last week Theresa May, Britain's prime minister, praised the European Union effusively even as she triggered the process to leave it, beginning two years of withdrawal negotiations. But Donald Tusk, president of the European Council, captured the mood better, predicting "difficult, complex and sometimes even confrontational" talks.

This week's *contretemps* over Gibraltar was a depressing reminder that the strain of British jingoism unearthed by the vote to leave the EU last June remains alive. It will no doubt find fresh modes of expression as the Brexit talks unfold (see page 24). Expect other battles, too: the debate over Britain's outstanding financial obligations to the EU seems almost guaranteed to end in tears. But none of this should obscure the broader trajectory of the past few weeks. Having marched her troops to the top of Mount Brexit since the referendum, Mrs May has begun quietly trotting them back down again.

European negotiators note that a mood of realism has slowly settled on London as the remorseless logic of Brexit has taken hold. Mrs May's insistence on imposing immigration controls after Brexit, for example, led inexorably to her acceptance that Britain would have to quit the EU's single market and lose any say in making its laws. That has broadly neutralised an issue some had thought might be central to the negotiations. "We don't want to write their [migration] rules," says one Eurocrat. The draft negotiating guidelines circulated by Mr Tusk to Europe's capitals last week make only passing mention of the single market's "four freedoms", and then simply to welcome Mrs May's acknowledgment that they are not available *à la carte*.

Reality has left other toothmarks. Gone are the empty threats to turn Britain into an offshore tax haven should the EU fail to offer satisfactory divorce terms. Mrs May now accepts that a trade deal with the EU cannot enter into force before Britain leaves (even if she clings to the fantasy that its full details may be worked out in advance). That means some sort of bridging arrangement will be needed, perhaps lasting two or three years, during which Mrs May has hinted that Britain could accept the rules of the single market, including the free movement of EU workers.

This massacre of sacred cows has reassured Europe. Britain may have spent the nine months since the referendum strutting about and making a fool of itself. But better to get the peacocking out of the way before the actual negotiations open. EU officials are still preparing for a complete breakdown in talks, and for Britain to crash out of the EU in two years without a deal. But as they observe British rhetoric yielding to reality, some now proclaim themselves a little more optimistic.

Indeed, talk to negotiators in Brussels, Berlin or Paris—still notably united—and you find concerns not so much about British perfidy or delusion, but over its readiness to conduct what David Davis, the Brexit minister, calls "the most complicated negotiation of modern times". Take the rights of EU citizens living in Britain and vice versa. Here, there is no reason for a row: both sides want to minimise disruption for their immigrants. But the issue is extremely complex, from pension rules to the rights of third-country spouses to the enforceability of whatever rules are agreed on. One EU negotiator says that in normal times it would take a decade to untangle the threads. Work your way down the Brexit to-do list, and two years looks dauntingly brief.

Hardest of all will be working out how to marry Britain's demands for sovereignty with its trading needs. On this, the Europeans fear, the penny has not yet dropped in London. Mrs May now calls for a "deep and special partnership" with the EU. That implies a trade relationship that extends beyond goods to the services Britain likes to export, particularly the financial sort, and a means of ensuring that its standards and rules do not deviate from Europe's. The deeper the trade deal, therefore, the more Britain must play by the EU's rulebook and, perhaps, accept the de facto supervision of its courts.

You don't know what you've got 'til it's gone

The Europeans also stand to lose from a shallow trade deal. Their hope is that Britain will seek to converge with EU rules once the regulatory trade-offs become apparent. Should the talks proceed relatively smoothly, in time the two sides may find themselves building, law by law, institution by institution, a regime not dissimilar from the one they are preparing to dismantle. There are signs of this already. It is an "absurd" exercise, says an EU official. "We are reinventing many of the instruments we already have."

But Eurocrats also worry that a sensible posture abroad may force Mrs May into a showdown with hardliners at home. For now, she is riding high; her stout conversion to the Brexit cause (and the feebleness of her political foes) leaves her with plenty of political capital. But is she prepared to enter the next election, in 2020, accepting free movement from the EU, paying large sums into its budget and operating under the purview of its courts? Can she negotiate and defend a final deal that preserves so much of what the Leave campaign fought to destroy?

Perhaps she can: ersatz sovereignty can be repackaged as the real thing, and immigration may decline helpfully as the EU economy recovers. The prime minister can argue that although Brexit will lose Britain any say over the rules that govern its commerce with the EU, it wins Britain the right to renegotiate its trade with the rest of the world. It is hard for Europeans to judge whether this will pacify the Brexiteers. Then again, it has always been hard for Europeans to see why Britain's tortured attitude towards the EU should be their problem to solve. ■

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South Africa

The president v the people

JOHANNESBURG

Jacob Zuma faces a revolt after replacing a scrupulous finance minister with a crony

THE death of a struggle hero brought the great and good of South Africa together in mourning. Ahmed Kathrada, who was sentenced to life on Robben Island alongside Nelson Mandela, died on March 28th. His funeral at a Johannesburg cemetery drew former presidents, sitting cabinet ministers, the chief justice of the highest court and the leaders of the African National Congress (ANC). There was one conspicuous absence: Jacob Zuma. Instead, the man who had preceded him as South African president read from a letter in which Mr Kathrada, in a final act of resistance, called on Mr Zuma to resign. The crowd of mourners erupted in cheers.

Such is the tenor of opposition to Mr Zuma, who has an approval rating of just 20% among urban South Africans (though higher among rural ones). Even those who backed him through countless scandals are now calling for him to quit. Their pleas have fallen on deaf ears, with the president growing ever more defiant. A day after the funeral, Mr Zuma reshuffled his cabinet, firing the respected finance minister, Pravin Gordhan, and his deputy, and replacing them with cronies. In doing so, Mr Zuma defied warnings from his own party and the markets. Mr Gordhan had kept a tight rein on spending and stood firm against corruption, while working doggedly to keep South Africa's debt from being downgraded. As if to mock these concerns, Mr Zuma had ordered Mr Gordhan to return from Britain, where he was drumming up investment, to face the axe. The rand duly fell, and within days of the reshuffle S&P, a credit-rating agency, had cut South African debt to junk. Ministers with disastrous records, meanwhile, kept their jobs.

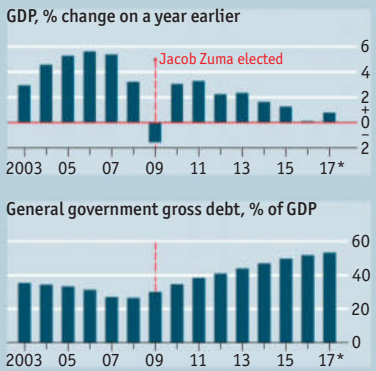
Mr Zuma has crossed a line. For the first time, he is facing an open rebellion from within the ranks of the ANC as well as its official partners, the South African Communist Party (SACP) and the Congress of South African Trade Unions (COSATU). The SACP and COSATU have joined calls for him to step down. Some of the ANC's most senior leaders are now speaking out against Mr Zuma, albeit cautiously. Among them is Cyril Ramaphosa, the deputy president, who wants to succeed Mr Zuma as president. Mr Ramaphosa, who had remained silent until now, condemned Mr Zuma's flimflam excuse for the firing: an "intelligence report" alleging that Mr Gordhan's unremarkable investor road trip was part of a "plot" to overthrow the president.

Mr Zuma has also angered other ANC leaders over his failure to consult with them on the reshuffle, as party pratice dictates. Gwede Mantashe, the party's secretary-general, worried that the list of new ministers had been compiled "somewhere else". His concerns are reasonable: South Africa's anti-corruption ombudsman last year called for a judicial inquiry into allegations that the Gupta brothers, tycoons and close friends of Mr Zuma, had exerted undue influence on cabinet appointments and government contracts.

If the ANC fails to remove Mr Zuma, he may continue to control the party's future. In December the ANC will choose its new leaders at a five-yearly elective conference. The winner is likely to become South Africa's next president in 2019 (after a parliamentary election; MPs then choose the president). With a pliant new cabinet in place, Mr Zuma hopes to be in a stronger position than ever to ensure that his preferred successor, his ex-wife Nkosazana Dlamini-Zuma, takes over from him.

Getting rid of Mr Zuma any earlier than that does not look easy. A shrewd operator, he has installed loyalists in key positions within South Africa's police, prosecuting authority and state security apparatus. Mr Zuma was in charge of intelligence-gathering for the ANC while it was in exile, and has a long memory. His most vocal suppor- ▸▸

The president's record
South Africa



Source: IMF *Forecast

ters have been the ANC women's league, and its youth league, which he neutered by ousting its rabble-rousing former head, Julius Malema. In a show of support, the youth league held a stadium rally to celebrate the reshuffle. Susan Booysen, a politics professor at the University of the Witwatersrand and the author of several books about the ANC, expects Mr Zuma to dig his heels in hard. "He will be pulled down kicking and screaming," she said. "This is a battle now for the soul of the party."

Civil-society groups have planned marches in protest through the streets of Johannesburg and Pretoria. Opposition parties are vowing to work together to remove Mr Zuma from office. Their best shot is through a no-confidence motion in parliament. For this to succeed, at least 50 ANC MPs would need to cross the floor. Many doubt that ANC members would support an opposition motion, even though the ruling party's chief whip, Jackson Mthembu, is a critic of Mr Zuma. The president has easily survived several such votes, including one a year ago after South Africa's highest court found that he had violated the constitution.

Other observers, though, think the tipping point may be near. Parliament is on a break until the second week of May, and the delay may allow outrage over Mr Zuma's shenanigans to subside. But opposition parties have written to the speaker, a Zuma loyalist, asking that she hold an urgent sitting; this is now set for April 18th.

The other road to a Zuma exit seems even rockier. Under the ANC's constitution, he could be made to step down by his party's 104-member national executive committee. Such an internal "recall" felled a previous president, Thabo Mbeki, in 2008. But the ANC's current national executive is said to be evenly divided between those allied to Mr Zuma and those opposed. The party is trying to keep the fight behind closed doors. With decisions taken by consensus, a move against Mr Zuma seems unlikely for now.

Whether he stays or is forced out, Mr Zuma could split the party. This divide would be less factional than opportunistic, pitting those who are beholden to the president against those seeking to preserve the ANC's old reputation for idealism. During the struggle days, people joined the party because of principles (such as non-racial democracy), regardless of personal cost, laments Sipho Pityana, an ANC stalwart who is now the chairman of AngloGold Ashanti, a mining firm. Mr Pityana has launched an anti-Zuma campaign called "Save South Africa". He despairs that the ANC has become "open to opportunists" and that too many people use its power to gain "access to riches in society". That is indeed why the ANC is losing popularity. It is unlikely to recover under Mr Zuma. ■

Syria

Assad unleashes horror again

BEIRUT

A chemical-weapons attack kills scores

ON APRIL 4th a chemical attack struck the town of Khan Sheikhoun in Idlib, a province in northern Syria controlled by an alliance of rebel groups, including a powerful faction linked to al-Qaeda. At least 85 people, including 20 children, died, according to doctors and a Syrian monitoring group. The World Health Organisation said victims appeared to display symptoms that tally with the use of a deadly nerve agent such as sarin (as opposed to, say, a less powerful one such as chlorine).

One boy was filmed suffocating on the ground, his chest heaving and his mouth opening and closing like a fish out of water. Photographs show dead children lined up in rows on the floor or piled in heaps in the back of a vehicle, their clothes ripped from them by rescuers who used hoses to try to wash the chemicals from their bodies. Other images show victims foaming from their mouths or writhing on the ground as they struggle for air. Hours after the attack began, witnesses say, regime warplanes circled back over the area and dropped bombs on a clinic treating survivors.

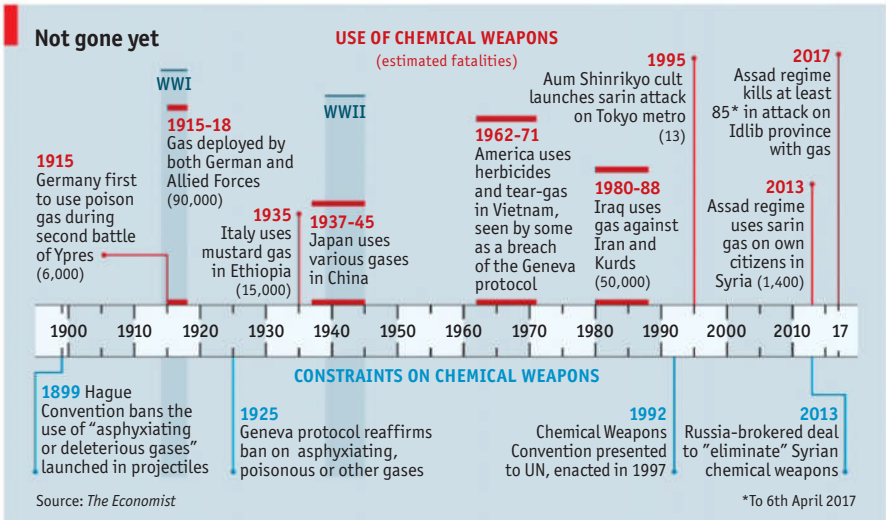
After six years of war, international reaction to the attack followed a predictable pattern. The Syrian government swiftly denied dropping chemical weapons. Russia, its ally, said a Syrian air strike had hit a rebel-held weapons stockpile, releasing deadly chemicals into the air. Leaders in the West condemned the regime, but little more. Donald Trump declared that his view of Syria and its dictator had changed, but declined to say what he would do about it.

If the West ends up doing little, it ought not to come as a surprise. When the Syrian government gassed to death more than 1,400 people on the outskirts of Damascus in August 2013 it seemed inevitable that America would respond by launching air strikes against the regime. One week after the attack—the deadliest use of chemical weapons since Saddam Hussein gassed Iraqi Kurds in 1988—John Kerry delivered one of his most bellicose speeches as secretary of state, arguing the case for American military action in Syria. "It matters if the world speaks out…and then nothing happens," Mr Kerry said.

Yet nothing, at least militarily, is just what happened. Instead, working with the Americans, the Russians brokered a deal that saw the Syrian regime supposedly dismantle its chemical-weapons programme. The Organisation for the Prohibition of Chemical Weapons (OPCW) destroyed about 1,200 tonnes of Syria's chemical stockpile. Barack Obama hailed the deal as a triumph for diplomacy over force.

Yet chemical attacks by regime forces continued, experts believe. Last year American and European officials began to voice growing fears that Damascus might have held onto nerve agents and other lethal toxins, in defiance of the deal cooked up by Mr Obama and Mr Putin. "Syria has engaged in a calculated campaign of intransigence and obfuscation, of deception, and of defiance," Kenneth Ward, America's representative to the OPCW, said in ▸▸

Not me, says Assad



July. "We…remain very concerned that [chemical warfare agents]…have been illicitly retained by Syria."

All these fears seem to have been borne out. As part of the deal in 2013 to end Syria's chemical-weapons programme, both America and Russia promised to punish the Syrian regime should it use chemical weapons again. Despite evidence of the regime's repeated use of chlorine gas since then, neither side has honoured this promise, at least until now. In February Russia once again blocked efforts at the UN Security Council to sanction military and intelligence chiefs connected to the country's chemical-weapons programme. A similar fate doubtless awaits the latest attempt by Britain, France and America at the Security Council. Hours after the attack, the three countries demanded a resolution ordering the Syrian government to hand over all flight logs, flight plans and the names of air-force commanders to international inspectors. Russia, however, called the resolution "unacceptable".

Barring a significant shift in American policy towards military action, the latest use of chemical weapons is unlikely to alter the war's trajectory much. The rebels are weakening. They lost their enclave in the city of Aleppo, the opposition's last big urban stronghold, in December. Pockets of resistance remain around Damascus, north of Homs city, and along the southern border with Jordan; but these areas grow ever more isolated. In Idlib an alliance led by a group linked to al-Qaeda has gained strength, allowing America to argue that there are few appropriate rebel partners left to work with on the ground.

Indeed, now that Donald Trump is in charge, removing Mr Assad from power is no longer a stated aim of American policy in Syria. In recent weeks senior American officials said for the first time in public that they could live with Mr Assad as they concentrate on defeating Islamic State. Ironically, this approach would in fact be more likely to fuel further extremism in Syria, as other jihadist groups sought to take advantage of the vacuum that America's political disengagement presented them with. It would also mean that, with Mr Assad at the helm, the Syrian regime continued to drop gas on its own people. There would be nothing to stop it. ■

The insurgency in Sinai

Terror and counter-terror

CAIRO

The other front in the war against Islamic State

ONLY nine days in, the Egyptian army claimed to have killed 415 militants in Operation "Right of the Martyr", its campaign against jihadists in the Sinai peninsula that began in September 2015. Since then it has often boasted of killing dozens more in attacks; sometimes over 100. But in February the chief of military intelligence said the army had killed only around 500 in total since the operation began.

The body-count is often cited by the armed forces as evidence of their success against the long-running insurgency, which flared up in 2013 after Abdel-Fattah al-Sisi, then a general, now president, toppled a democratically elected Islamist government. But the militants, many of whom pledged allegiance to Islamic State (IS), continue to torment the region. They have killed hundreds of soldiers and policemen, fired rockets into Israel and targeted Christian civilians.

More and more, the army is fighting the militants outside their stronghold in the north. In February and March it conducted raids on hideouts in the desert of central Sinai. This month, after several failed attempts, it says it took the insurgents' base in Jebel Halal, a mountainous area. Israel warns that IS has put up roadblocks in central Sinai to capture soldiers and tourists.

The insurgents still sow fear in the north among Muslims, whom they force to obey Islamic strictures, and Christians, who suffered a series of murders in February and March. IS has vowed to kill more Christians, leading many to flee the area. Critics of the government say it has failed to protect them. In December the Coptic cathedral in Cairo was bombed by IS.

Given the choice to evacuate northern Sinai three years ago, Mr Sisi says he instead chose to "act like a surgeon who uses his scalpel to extract the tumour without harming the rest of the body". But residents describe scorched-earth tactics. "Once militants are in the area, the area must be razed," says an Egyptian NGO worker in Sinai, describing the army's mindset. It demolished thousands of homes in Rafah in 2015 to stop the smuggling of weapons and fighters from Gaza.

The government has banned reporters from the region, but its actions are still scrutinised. Take its release of a video purporting to show a raid in January in which soldiers killed ten militants. Locals say the men, some of whom had been arrested months earlier, were shot in cold blood. The raid, they say, was staged.

The government has long questioned the loyalty of Sinai's residents, many of whom are Bedouin. They cannot join the army or police, or hold senior government posts. The region is poor. The insurgency was originally fuelled by such grievances. Now there is widespread contempt for both the government and the militants.

The situation poses a challenge for Mr Sisi, who hopes to lure foreign investors and tourists back to Egypt. IS scared many of them away when it bombed a Russian airliner departing from the resort of Sharm el-Sheikh in 2015. Officials say the jihadists are linked to the Muslim Brotherhood, the avowedly peaceful Islamist group that Mr Sisi booted from power. They also claim that the situation is under control. ■

The United Arab Emirates

The Gulf's little Sparta

BERBERA

Driven by an energetic prince, the UAE is building bases far beyond its borders

TUCKED away behind rows of tin shacks and unkempt acacia trees, a cluster of tumbledown villas, mosques and a synagogue conjures up the grandeur of a port that once marked the southern tip of the Ottoman Empire. "Berbera is the true key of the Red Sea, the centre of east African traffic, and the only safe place for shipping upon the western Erythraean shore," wrote Richard Burton, a British traveller, in 1855. "Occupation [by the British]…has been advised for many reasons."

After the British came the Russians and in the 1980s NASA, America's space agency, which wanted its runway, one of Africa's longest, as an emergency stop for its space shuttle. Now the United Arab Emirates (UAE) is Berbera's latest arriviste. On March 1st DP World, a port operator based in Dubai, began working from Berbera's beachside hotel. Officials put little Emirati flags on their desks, and refined plans to turn a harbour serving the breakaway republic of Somaliland into a gateway to the 100m people of one of Africa's fastest-growing economies, Ethiopia. Three weeks later the UAE unveiled another deal for a 25-year lease of air and naval bases alongside. The agreement, rejoiced a Somaliland minister in the hotel café, amounted to the first economic recognition of his tiny republic. It would fill the government's coffers, and bolster its fledgling army. Businessmen sat at his table discussing solar power stations, rocketing land prices and plans for a Kempinski hotel.

Berbera is but the latest of a string of ports the UAE is acquiring along some of the world's busiest shipping routes. From Dubai's Jebel Ali, the Middle East's largest port, it is extending its reach along the southern rim of Arabia, up the Horn of Africa to Eritrea (from where the UAE's corvettes and a squadron of Mirage bombers wage war in Yemen), and on to Limassol and Benghazi in the Mediterranean. Fears that Iran or Sunni jihadists might get there first—particularly as the region's Arab heavyweights, Saudi Arabia and Egypt, seem to flounder—propel the advance.

"If we waited to prevent these threats at our borders, we might be overrun," explains Ebtesam al-Ketbi, who heads a think-tank in Abu Dhabi. The UAE also worries that rivals might tempt trade away from Jebel Ali, awkwardly situated deep inside the Gulf. Rapid port expansion at Chabahar in Iran, Duqm in Oman and King Abdullah Economic City in Saudi Arabia all pose a challenge.

But as the expansion accelerates, observers are asking whether the UAE is bent on "the pursuit of regional influence", as Ms al-Ketbi puts it, for its own sake. Most analysts ascribe this push to Abu Dhabi's 56-year-old crown prince, Muhammad bin Zayed. He is the deputy commander of the UAE's armed forces, and the younger brother of the emir of Abu Dhabi, who is also the president of the UAE.

On the prince's watch, the UAE has gone from being a haven mindful of its own business into the Arab world's most interventionist regime. Flush with petrodollars, he has turned the tiny country, whose seven component emirates have a combined population of almost 10m (only about 1m of whom are citizens), into the world's third-largest importer of arms. He has recruited hundreds of mercenaries, and has even talked of colonising Mars.

Hurricane Muhammad

In 2014 he imposed military conscription on his pampered citizens, and sent dozens to their deaths in the Saudi-led campaign against Houthi rebels in Yemen. Before becoming America's defence secretary, General James Mattis dubbed the UAE "little Sparta". Join the dots of the ports it controls, and some even see the old Sultanate of Oman and Zanzibar, from which the emirates sprang, arising afresh.

The UAE has won Berbera and Eritrea's Asaab base by agreement, but elsewhere it applies force. In July 2015 it defied doubters, including the Saudis, by capturing Aden, once the British Empire's busiest port. "They have the only [Arab] expeditionary capability in the region," oozes a Western diplomat, fulsome in his praise of the UAE's special forces, who mounted an amphibious landing to seize Aden from the Houthis.

With the help of American SEALs, Emirati soldiers have since then taken the ports of Mukalla and Shihr, 500km (300 miles) east, and two Yemeni islands in the Bab al-Mandab strait, past which 4m barrels of oil pass every day. The crown prince has seen off Qatari interest in Socotra, a strategic Yemeni island, by sending aid (after a hurricane) and then construction companies, which a Western diplomat fancies may build an Emirati version of Diego Garcia, the Indian Ocean atoll where America has a large military base. While Saudi Arabia struggles to make gains in Yemen, Emirati-led troops earlier this year marched into Mokha port and are setting their sights on Hodeidah, Yemen's largest port and the last major one outside Emirati control.

The prince has also backed separatists in Somalia, helping to stand up both Puntland, by funding its Maritime Police Force, and Somaliland. And in Libya, he has sent military support to Field-Marshal Khalifa Haftar's Libyan National Army, an autonomous force in the east of the country. To Turkey's fury, the UAE opened an embassy in Cyprus last year and is involved in military exercises with Greece and Israel.

But sceptics worry about the dangers of overreach and the potential for clashing with greater powers crowding into the Red Sea. On its western shores Israel, France and the United States already have big bases. China is building a port in Djibouti. Iranian generals look to establish their own naval bases on Yemen's rebel-held coast. And though formally part of the same coalition in Yemen, some Saudi princes are looking askance at their ambitious junior partners. In February Saudi- and Emirati-backed forces fought each other over control of Aden's airport. Saudi Arabia's princes have also hosted Somalia's president, who criticises the Emirates' Berbera base as "unconstitutional". Some wonder what the prince's father and the UAE's founder, Sheikh Zayed Al Nahayan, would have made of it all. "Be obedient to Allah and use your intelligence instead of resorting to arms," he used to counsel when fellow Arabs went to war. ■

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The economy

Eyes bigger than their wallets

WASHINGTON, DC

Consumers and firms think the economy is booming. Most forecasters disagree

IS AMERICA'S economy booming? Consumers seem to think so. Their confidence, as measured by the Conference Board, a research group, is at its highest since December 2000, when the dotcom bubble had not fully burst. Yet in both January and February this year, personal consumption fell. The signals from firms are no less mixed. Small-business confidence is so high that relying on this alone to predict annualised GDP growth in the first quarter leads to a staggering forecast of 7.1%, according to Goldman Sachs, a bank. Order books are swelling and jobs are plentiful, firms say. Yet industrial production has been flat since December, and banks have slowed business lending dramatically. Americans seem wildly enthusiastic about the economy, but it is not clear why.

The surge in the so-called "soft" economic data, drawn from surveys, began when Donald Trump won the presidential election in November (see chart). It coincided with a boom in the stockmarket, up 10% since then, as investors began to salivate over the prospect of tax cuts and deregulation. Yet the "hard" economic data, which measure actual economic activity, have trundled along much as expected. The disparity has caused growth forecasts to fall out of sync. As *The Economist* went to press, a model at the Atlanta Federal Reserve put annualised growth in the year's first quarter at 1.2%. A competing forecast at the New York Fed put the rate at 2.9%.

It is tempting to discount strongly upbeat surveys as driven by politics. Owners of small businesses lean heavily Republican. Consumer confidence is up most among over-55s, who are also likely to have voted for Mr Trump. Most economists' forecasts are closer to the number from Atlanta than the one from New York. Many of them are mindful of the fact that the economy has often seemed to sag in the first quarter of recent years. An attempt by government statisticians in 2015 to purge the growth data of seasonal factors may not have been a complete success.

Cognitive dissonance

United States, economic-surprise index*
based on:

Sources: Bloomberg; Morgan Stanley Research
*Positive values mean data are better than expected

Most important, no tax cut or serious deregulation has happened yet. Instead the Republicans have failed to pass a promised health-care reform, which contained large tax cuts for the rich, on their first attempt. (It may soon reappear, but if it does, its passage, especially through the Senate, is far from certain.) There is reason to wonder whether the party is capable of overcoming the political squabbles that will inevitably accompany tax reform.

Yet even if Mr Trump fails to overhaul the tax code completely, few doubt that Congress will pass a simple cut in rates for him to sign. And confidence in the economy may still prove self-fulfilling. Republicans have long held that replacing Barack Obama's chilliness towards business with a warm embrace of commerce would lead to an investment boom (on this, they might cite the support of John Maynard Keynes, who wrote that businesses are "pathetically responsive to a kind word"). Although there was no sign of a recovery in investment in the fourth quarter of 2016, sales of capital goods, such as machinery, have picked up a bit this year.

Whether that trend continues will reveal whether confidence is crystallising or dissipating. Some conservatives, impatient to trigger what they see as an inevitable surge in investment, want tax cuts, whenever they happen, to be backdated to the beginning of 2017.

Retrospective tax changes are rarely a good idea. For the moment, Republicans should be encouraged that two sectors of the economy—housebuilding and manufacturing—have accelerated tangibly. That should please some of Mr Trump's blue-collar supporters (see next article). In February the trade deficit, which Mr Trump views, strangely, as a barometer for economic strength, was 4.5% lower than it was ▸▸

a year ago. A worldwide economic acceleration has helped this trade and manufacturing revival. The dollar has fallen back almost to where it was on the eve of Mr Trump's election, making American goods cheaper in other countries.

You're up, then you're down

What if the surge in confidence proves fleeting? The stockmarket would surely sink. But it is not as if America was in a funk before Mr Trump won in November. The world economy—and financial markets—have been firming up since mid-2016, partly because of fiscal stimulus in China. America's recent growth of about 2% has been enough to eat up much of the slack in the economy, as rising inflation shows. Much more productivity-boosting business investment would certainly be welcome, not least because Americans produced barely any more per hour worked in 2016 than they did a year earlier. But Mr Trump's promise of 3.5-4% growth has never been a realistic goal, because America's greying workforce imposes a lower speed limit on the economy than in the past.

As that becomes more apparent, the economic elation may subside. If so, those who have been sceptical about soft data as they have heated up should remember to be equally unmoved as they cool down. ■

Donald Trump and the unions

A riveting relationship

WASHINGTON, DC

The president has changed union politics, though maybe not as he thinks

"DID you ever think you'd see a president who knows how much concrete and rebar you can lay down in a single day?" Addressing an annual gathering of North America's Building Trades Unions, in Washington, DC, on April 4th, Donald Trump felt at home. The assembled union bosses, mostly burly white men squeezed into business suits but plumbers and pipe-fitters at heart, were like the men he learned his world view from, working on his father's construction sites in Brooklyn and Queens. "I had the support", he supposed, harking back to last year's election, "of almost everybody in this room."

Manly guffaws and boos rippled around the auditorium. The building trades endorsed the president's rival, Hillary Clinton, and most of its bosses voted for her. ("It's arrogant of him to say we voted for him," muttered a delegate from Ohio. "We didn't.") Yet Mr Trump had been invited in part because many of their members, charmed by his talk of protectionism, new infrastructure and jobs, did vote for him. Exit polls suggest he won 43% of voters from union households, the best result for a Republican since Ronald Reagan in 1984. And in a few midwestern states, he did even better: union voters in Ohio picked him by a 9% margin.

Mr Trump has since tried buttering up some of the main union bosses, by inviting them to meetings at which he has reiterated his campaign pledges. "He intends to do the work on the issues he discussed during the campaigns," Sean McGarvey, head of the building trades, told reporters after being summoned to the White House. "It was by far the best meeting I've had [in Washington]." If Mr Trump can sustain that enthusiasm, he could profoundly reorder American politics, not least because of the traditional importance of union activists and cash to his Democratic opponents. The federation of unions that includes the building trades, the AFL-CIO, donated around $16m to Democratic campaigns last year. The cautious support which some of its most powerful members are nonetheless giving Mr Trump's economic agenda is, in addition, an intriguing way to measure its progress.

Mr Trump's success is built on a long-standing fissure within the labour movement—broadly speaking, between industrial and construction unions, whose members tend to be conservative and white, and the services and public-sector unions, whose members are more diverse. Reagan, and before him Richard Nixon, profited from the same division. Yet Mr Trump, unlike his Republican predecessors, is attempting this at a time when the electorate is feverishly polarised and the unions both depleted and assailed by his own party, all of which might be expected to make them more resistant to his charms. In 1980 20% of American workers belonged to a union; now 11% do. The slide is mostly for structural reasons, including the outsourcing and automation of unionised jobs in manufacturing. Yet it has been exacerbated by Republican efforts to reduce the unions' power of collective bargaining, which in many states has been restricted to modest wage negotiations, and by the "right-to-work" laws introduced by Republican law-makers in 28 states. These allow non-unionised workers to enjoy union-negotiated benefits, creating an obvious free-rider problem.

Such measures are intended to deprive the Democrats of support, and they are working. Forthcoming research by Alexander Hertel-Fernandez of Columbia University suggests that limits on collective bargaining, which are mainly aimed at public-sector unions, made government workers in Indiana and Wisconsin less likely to take part in political campaigns, or to vote. In a study of 111 border counties in Indiana, Michigan and Wisconsin, he also calculates that the right-to-work laws they introduced between 2012 and 2016 could account for two percentage points of Mrs Clinton's underperformance in those states compared with Barack Obama in 2012. Given that Mr Trump's victory in the electoral college was based on a combined total of 70,000 votes across Michigan, Pennsylvania and Wisconsin, that could have cost her the presidency.

By attempting to woo union voters even as his party is attempting to smash

the unions, Mr Trump, by design or otherwise, is placing an extraordinary burden on his populist agenda. If it does not live up to the hopes of union voters, they would have good reason to turn tail fast. Yet it is unclear, three months into his administration, whether Mr Trump's economic policies will amount to much of what he promised. A draft outline of his administration's plans for the North American Free-Trade Agreement, leaked to the *Wall Street Journal*, suggests it may envisage only modest changes to a pact he describes as "the worst trade deal, maybe ever". His ambition to slash corporate taxes has been complicated by Republican opposition to a proposed border-adjustment tax that had been expected to pay for it. The spectre of an unfunded tax cut this conjures up makes it even harder to imagine the administration splurging hundreds of billions of dollars on new bridges and roads—the main hope of the building unions.

Yet even if Mr Trump's prospect of pulling off an enduring realignment are in doubt, his success with union voters has already forced their leaders to reconsider their political methods. A few minutes after the president concluded his speech to the builders, Richard Trumka, the AFL-CIO's trenchant boss, with whom the president shares little more than a syllable, delivered a more revealing address in Washington. It was in part an attack on Mr Trump: "If you say you are with us and then attack us, you will fail." But Mr Trumka also signalled that henceforth the Democrats would have to work much harder to win the unions' support: "We will not be an ATM for any political party." The shrinkage of organised labour may be terminal; but it will go down fighting. ■

The Gorsuch nomination

Going nuclear

NEW YORK

Senate Republicans prepare to kill the filibuster

ON APRIL 3rd, when the Senate Judiciary Committee approved Neil Gorsuch's Supreme Court nomination by 11-9 along party lines, the proceedings took on an oddly funereal flavour. "It breaks my heart to find us in this position," said Richard Durbin, a Democrat. A Republican, Lindsey Graham, said the Senate would be haunted by it, and that future court nominees would be "more ideological, not less". In preparing to block Mr Trump's first Supreme Court nominee, Patrick Leahy, a Democratic senator for 42 years, acknowledged that his party's move might push the Republicans to upend a time-worn Senate tradition. But he suggested his party had no choice but to fight Mr Gorsuch's nomination tooth and nail.

The ill-fated tactic on everyone's lips is the filibuster, a manoeuvre dating back to the 19th century whereby senators hold forth in debate for as long as they like to thwart a vote they expect to lose. In 1917, the body adopted a rule permitting filibusters to continue until two-thirds of senators opted to end debate and hold a vote; in 1975, following delays that almost derailed the Civil Rights Act of 1964, the Senate lowered the threshold to 60 votes. The gradual demise of the tradition continued in 2013, when, in the face of a Republican refusal to act on dozens of Barack Obama's appointments, Democrats resorted to the so-called "nuclear option" to scrap the filibuster for executive branch and lower-court judicial nominations. Four years later the Republican majority leader, Mitch McConnell, is now signalling his willingness to end filibusters for Supreme Court nominations, too. Mr Gorsuch, he promised, "will be confirmed" by April 7th.

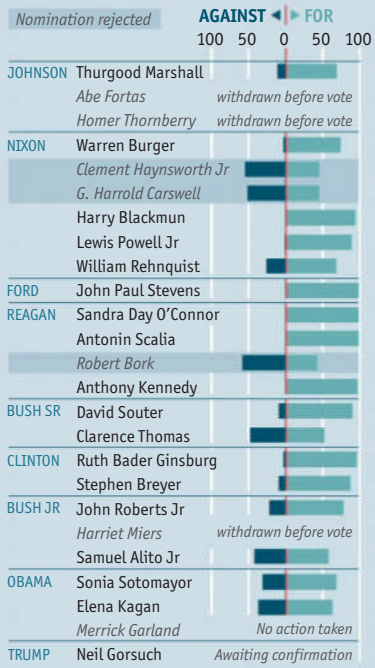
Mr McConnell's implicit threat to go nuclear again would make Supreme Court confirmations subject to a simple majority vote, leaving the filibuster intact (for the time being) only for legislation. At least 50 senators would need to go along with the rule change; in the event of a 50-50 split, Mike Pence, the vice-president, would break the tie. The majority leader is likely to get those votes, since the Republicans have a 52-48 edge and are eager to see Mr Gorsuch, a staunchly conservative, well-qualified appellate judge, in the late Antonin Scalia's seat. But many in his party are uneasy about abandoning the filibuster. As one Republican member put it, "The Senate is getting ready to do a lot of damage to itself." He added that Harry Reid "broke the rules" when, as Senate majority leader, he led the Democrats' bid to curtail the filibuster in 2013. "Now we are moving to the McConnell era, where we break the rules."

The fallout, apart from a precipitous decline in Senate comity, could be greater polarisation of the Supreme Court. Both Mr Gorsuch and Merrick Garland, Barack Obama's pick for Scalia's seat, whom Republicans testily blocked for 293 days, were "boy-scout" nominees, according to that same Republican member: well-qualified picks deserving bipartisan support. With a new 51-vote threshold, he believes, "It won't be a boy scout next time": whichever party controls the White House will have every reason to tap a significantly more ideological nominee.

Jeffrey Rosen, president of the National Constitution Centre in Philadelphia (a museum devoted to the study and celebration of America's founding document), does not see the impending demise of the filibuster for Supreme Court justices as a radical move heralding "a new beginning".

Polarising

United States Supreme Court nominations
1967-2017, number of votes against/for



Source: United States Senate

Rather, it is the result of "the end of an era of bipartisan co-operation over nominations". In the past, justices were often confirmed overwhelmingly (see chart). Abandoning the principle that Supreme Court justices should attract a supermajority of Senate support, though, entails considerable risks for both parties.

Democrats, furious with the Republicans' unprecedented move to deny Mr Garland a hearing and unhappy with Mr Gorsuch's performance over his 20 hours of questioning, feel they are bound to force a nuclear showdown over Mr Trump's bid to fill the "stolen seat". But with three liberal and moderate justices getting on in years (Stephen Breyer is 78; Anthony Kennedy is 80; Ruth Bader Ginsburg is 84), there is a good chance Mr Trump will have at least one more seat to fill in the coming years. Inviting Mr McConnell to go nuclear now means no chance of blocking his next candidate, and perhaps encouraging Mr Trump to go for an ideological firebrand lacking Mr Gorsuch's Ivy League résumé. The worry for Republicans looms a bit farther down the road. If they end up as the minority party after the midterm elections in 2018, Trump nominees could emerge being blocked by Democrats.

For now, both parties are consumed by the politics of the moment. The Senate is poised to complete its transformation from a chamber of heightened reflection and statesmanship to a scaled-down version of the House of Representatives. Time will tell what this myopia brings. ■

Failing jails

Cruel and usual punishment

LOS ANGELES

LA County's jails are still overcrowded, and sometimes brutal

THE Los Angeles Sheriff's Department patrols 4,000 square miles, oversees the largest jail system in America—and is in trouble. In February its eight "jail facilities" held an average of 17,362 men and women: more than the 15,300 inmates held in all 63 county jails in New York state. All but one of Los Angeles County's facilities are overcrowded, and the system as a whole has 38% more prisoners than it is meant to house. In contrast, according to a report by the Bureau of Justice Statistics, in 2014 the average local American jail had room for 17% more prisoners.

The words "jail" and "prison" are often used interchangeably, but they are different. Prisons are long-term facilities run by the state or the federal government. Jails are locally operated, and hold people serving short sentences or deemed too dangerous to release while they await trial. Overcrowding in Los Angeles County's jails has long been a problem. It peaked in 1990, when high crime rates and longer sentences for drug offenders pushed the average daily inmate population to 22,000. Things were so chaotic that the sheriff's department once took more than three weeks to notice that a murderer had escaped.

The state prison population also swelled, partly because of tough laws. The infamous "three strikes" law, approved by Californian voters in 1994, gave sentences of 25 years to life to third-time felons. From 1982 to 2000 the state prison population increased fivefold. Although California scrambled to adapt, building 23 new prisons, in 2011 the Supreme Court upheld a lower-court ruling that state facilities were so crowded they constituted "cruel and unusual" punishment, in violation of the Eighth Amendment. The state was ordered to slash its prisoner population from 200% of its capacity, at the time of the lower-court ruling, to 137.5%.

In response Jerry Brown, the governor, passed a law to divert those convicted of non-serious, non-violent and non-sex-related offences to county jails instead of state prison. The Los Angeles County jail population jumped by 20% between 2011 and 2012. It has since fallen slightly, partly because voters in 2014 approved a proposition which reduced the penalties for certain drug and property crimes. But the county is still under pressure.

One way to reduce overcrowding would be to reform the state's bail system. In March the Board of Supervisors, the governing body for the Los Angeles County, announced that it would review the county's bail and pre-trial release policies. In the fourth quarter of 2016, 40% of inmates in county jails were awaiting trial. Some 21% of those had bail set between $500,000 and $1m—an unthinkable amount for most prisoners. At the state level, two Democratic lawmakers are pushing legislation to eliminate most cash bail, instead relying on empirical analysis of each defendant's case to determine whether they should be released. Similar policies are already in place in Washington, DC. According to a report published in 2015 by the Public Policy Institute of California, a think-tank, California's median monetary bail amount is five times the national figure.

Eradicating the culture of brutality in the jails will be another formidable chal- ▸▸

Steve Bannon and the NSC

Axis of adults

WASHINGTON, DC

Donald Trump's government turns slightly more ordinary

IT HAS been a rough few months for conventional wisdom in Washington, DC, but one old saw never lost its force: "Personnel is policy". That being so, politicians and officials took note when a memorandum revealed that Steve Bannon, chief strategist to Donald Trump and an unblushing nationalist, has lost his guaranteed seat on the principals committee of the National Security Council (NSC), while two pillars of the foreign policy establishment—the chairman of the joint chiefs of staff and the director of national intelligence—were restored as permanent members.

The capital has seethed for weeks with talk of palace intrigues at the White House, pitting Mr Bannon and his populist allies against a more polished, less hardline faction led by Mr Trump's daughter Ivanka and her husband Jared Kushner, both of whom hold senior advisers' posts. Insiders see something simpler and worth applauding.

It was abnormal for Mr Bannon, a political strategist, to enjoy better NSC access than the country's senior uniformed commander and top spook. Now that has been corrected. Mr Bannon himself, in a statement, downplayed his new, invitation-only access to the NSC, a powerful body charged with co-ordinating policies between the Pentagon, State Department, spy agencies and other arms of government, to ensure the president's priorities are followed and delivered. Mr Bannon said that after losing its way during the Obama era, the NSC has been returned to its "proper function" by its boss since February, the national security adviser Lieutenant-General H.R. McMaster.

Down but not out

Unnamed officials offered a further gloss when briefing the press, murmuring that Mr Bannon was put on the NSC "as a check" on Mr Trump's first national security adviser, Michael Flynn, a former three-star general sacked for failing to disclose contacts with the Russian ambassador in Washington. With General McMaster in charge, Mr Bannon's work on the NSC is done, it was suggested.

David Rothkopf, who has written two books on the NSC, argues that General McMaster has in fact "outmanoeuvred" Mr Bannon, in a way that speaks of his growing clout. In a White House made soggy by poisonous leaking, it matters that the NSC shake-up was signed off by Mr Trump and enacted without fuss. Mr Trump has "empowered" his national security adviser, Mr Rothkopf concludes, for instance by allowing General McMaster, a brainy war hero, to bring such "mainstream professionals" onto the NSC staff as Fiona Hill, a tough, highly respected Russia expert.

On Capitol Hill, senior figures already detect a more conventional bent to policy. Not long ago, when bigwigs met Team Trump, they heard alarming talk of grand bargains with Russia, perhaps exchanging concessions over Ukraine for help containing Iran and battling Islamic extremists in Syria. Such ideas have not survived Mr Flynn's ejection, they say. Listen carefully, and people who want America to have a functioning NSC are giving two cautious cheers.

Baca had to go

lenge. On March 15th Lee Baca, who led the sheriff's department from 1998 to 2014, was convicted of obstructing a federal investigation into inmate abuse at Los Angeles County jails. Testifying in court in 2016, Paulino Juarez, a chaplain at the Men's Central Jail in downtown Los Angeles, recalled walking the halls one day in 2009 to find three wardens kicking, kneeing and punching an inmate who appeared to be handcuffed. The battered man begged them to stop, but they continued until they noticed that Mr Juarez was there. In a citizens' commission report produced in 2012 by the Board of Supervisors, the former captain of the Men's Central Jail said that he began to worry about excessive force when he noticed that three guards had broken hands. It turned out that all had been hitting inmates, though one had hit the wall instead.

Jim McDonnell, Mr Baca's replacement, has worked hard to increase transparency in the jail system. On his watch, the department has installed hundreds of cameras throughout its jails. Perhaps as a result, the use of violence inside the lockups has declined, says Mark Anthony Johnson of Dignity and Power Now, a prisoner advocacy group. Recently Mr McDonnell tried to deliver a list of 300 officers accused of "moral turpitude", such as tampering with evidence, using force unnecessarily or domestic violence, to the district attorney's office, so that criminal defendants would be aware of it. He was blocked when the Association for Los Angeles Deputy Sheriffs, a union, sued over violation of privacy. The same thing happened when Mr McDonnell tried to provide in-depth data about shootings by officers. It is clear that the biggest obstacle to his reforms may be winning over his own department.

"My hope is that Baca's conviction was the last gasp of the old guard," says Sharon Dolovich, a prison-law professor at the University of California, Los Angeles. "There couldn't be a stronger rejection of the old way of doing things." But when it comes to the sheriff's department of Los Angeles County, hope is in short supply. ■

Biology in Alaska

Climate refugees

SOLDOTNA

Move species to protect them from climate change, argues one scientist

JOHN MORTON, head biologist at the enormous Kenai National Wildlife Refuge in Alaska, recently drove a mechanical auger through two feet of lake ice, looking for an aquatic invader called elodea. To his dismay, he found it. Elodea is a popular aquarium plant that probably escaped into the wild when people dumped their fish tanks into lakes. It seems to spread on the floats of sea planes. Mr Morton's agency recently spent more than half a million dollars eradicating the damaging weed in three of the Kenai refuge's roughly 4,000 lakes.

Biologists spend a good deal of time and money trying to knock back or exterminate invasive species. Britons bash rhododendrons; New Zealanders drop rat poison from helicopters; Americans and Canadians are trying (and mostly failing) to stop Asian carp from spreading. But global warming is confusing matters. Mr Morton now thinks that some plants and animals should be encouraged to move to new territory.

In the past 60 years Alaska has warmed by 1.7°C—twice as much as the rest of the United States. In the Kenai National Wildlife Refuge, an 8,000-square-kilometre swathe of mountains, forests and lakes, the landscape is being transformed. Lakes are drying out, bogs are turning into forests and forests seem likely to give way to grassland. Entire habitats are moving northwards and towards higher altitudes.

That is bad news for some animals, such as the mountain goat, whose alpine habitat is being invaded by trees. For others, it may be an opportunity. Kenai and other parts of Alaska are becoming more suitable for some species that do not yet live there. Mr Morton believes in picking and choosing new flora and fauna to colonise the changed landscape. "We're expecting and wanting more species to move in," he says.

The Kenai refuge sits on a peninsula that is almost an island. It is connected to mainland Alaska in the north by a narrow strip of land and surrounded in every other direction by the Gulf of Alaska. That geographical isolation makes it hard for new species to find their way there, at least at the speed required by rapid climate change. Mr Morton suggests that bison, deer and lodgepole pine might be helped along—and might provide new hunting and Christmas tree-cutting opportunities for residents of the small towns bordering the refuge.

America has an unhappy history with deliberately transplanted species. Starlings, which were introduced from Europe by Shakespeare-lovers because they are mentioned in "Henry IV, Part 1", proved much too successful. So did mongooses and Asian carp. Mr Morton, who is gathering data to inform decisions about new introductions, is proposing to move species only within the American continent. Still, his fellow biologists are dubious.

Whether assisted colonisation works will be known only if it is tried, and whether to try is really a philosophical question. Some biologists worry about introducing another destructive invader, and argue that people should avoid meddling with nature. Mr Morton's response is that they already are: "The very climate isn't natural any more."

Development opportunity for bison, deer and lodgepole pine

Lexington | America's forgotten war victory

A century ago, America entered the first world war. Why that still matters

WHEN Calvin Coolidge dedicated a national memorial to the first world war—a 217-foot column flanked by stone sphinxes, towering above Kansas City, Missouri—newspapers called the crowd the largest addressed by an American president. The Liberty Memorial had much to teach the world about America, Coolidge told the throng, eight years after the war's end. Privately built with donations from ordinary midwestern citizens, the sombre monument revealed a country unashamed of its growing wealth and global influence, but at the same time "not infatuated with any vision of empire", the president declared. Soldiers of many races, tongues and homelands had come together as an American army, offering the world a great "lesson in democracy", Coolidge went on. The nation's "main responsibility is for America," the Republican was careful to add. But alongside that ambivalence towards foreign entanglements, he offered a message of altruism and exceptionalism. As the youngest and most vigorous of the great powers, it was, he suggested, America's calling to promote peace and the settling of disputes by reason, shunning the "primal" and "ruinous" hatreds of the Old World. "If the American spirit fails, what hope has the world?" he asked.

A century after America declared war on Germany on April 6th 1917, eventually sending 2m men and women overseas, the Liberty Memorial remains a revealing place. It does not brag of victory. A stone frieze shows advancing riflemen but also depicts a soldier's funeral—53,000 Americans died in combat, half during a few weeks of slaughter in 1918. It ends with men returning to farms and industry, their proper place. Today the memorial, like the war it remembers, is unknown to many Americans (though a fine museum there drew 206,000 visitors last year). Edwin Fountain, vice-chairman of a 12-member Centennial Commission established by Congress to counter that amnesia, suggests that the revolutionary war is America's creation story, while the civil war offers a saga of sin and redemption and the second world war was a heroic quest. But for Americans, Mr Fountain says: "There isn't a myth of world war one." The commission's chairman, Colonel Robert Dalessandro, drily adds that the second world war offers "better villains and bigger explosions".

It does not help that opinion soon soured against the first world war, notably as the Great Depression bit and primal hatreds gripped Europe once more, seeming to mock President Woodrow Wilson's plea, as he braced his country for conflict in 1917, that America had to make the world "safe for democracy". Wilson's dying wish for America to join and lead a League of Nations was rejected by the Senate. Writing in 1935, Ernest Hemingway growled that: "We were fools to be sucked in once on a European war, and we should never be sucked in again." Isolationist politicians and newspaper editors claimed that Britain had colluded with east-coast bankers and barons of industry to trick Americans into crossing the ocean, leaving the providential safety of the New World. The echoes in present-day politics are loud, down to the scorn for elites and the re-emergence of the isolationist battle-cry, "America First".

President Donald Trump is not a true isolationist. As the earlier America First movement gathered strength in 1939, Charles Lindbergh, a pilot-turned-demagogue, used national radio to urge Americans to harden their hearts against tales of Old World suffering and to shun war in Europe, judging national interests as coldly "as a surgeon with his knife". Mr Trump is no tender-heart, but he is proving more willing than expected to project power. His generals have sent more troops to Iraq and Syria. He has made stern, if vague, threats that if China does not rein in North Korea, "We will." What Mr Trump scorns is not war so much as altruism and talk of American exceptionalism. Asked about state-sponsored murders in Russia, he shot back: "You think our country's so innocent?" After Syrian warplanes dropped chemical weapons on children this week, Mr Trump blamed the slaughter on Barack Obama's past "weakness and irresolution"—before saying that the attack "crosses…many many lines". Pressed on whether America still thinks President Bashar al-Assad of Syria should leave office, the White House has dodged, calling it "silly" to ignore "political realities".

No selfish ends to serve

After 16 years of war without clear victories, Mr Trump sensed, correctly, that the next Republican president would do well to distance himself from Bush-era campaigns in Iraq and Afghanistan—though without seeming to tell voters from the conservative heartlands that their sons and daughters fought and died in vain. Mr Trump's bleak genius was to tell America that it lost because it was too good: that troops were sent by foolish elites to create democracies in the Muslim world, when they should merely have killed terrorists, "taken the oil" and sought victory at all costs.

That was clever politics, but a bad reading of history. Mr Trump is not the first president to lead a divided America. Once they had arrived in Europe in 1917, Irish-Americans from the "Fighting Sixty-Ninth", a legendary National Guard regiment from New York, were so incensed to be issued with tunics sporting British brass buttons that they tore them "to ribbons", according to their chaplain, Francis Duffy. But Duffy later wrote that he and his fellow "Fighting Irish" went to war alongside the British as volunteers against "the tyranny of the strong", fighting for "the oppressed peoples of the Earth". That was the voice of their adopted country.

What Mr Trump misses is that, in past crises, altruism has helped to unite America and to make it strong, not weak. Today, it is true that public opinion has swung against nation-building abroad. It is also the case that an exceptional power was born in 1917, capable of great acts when convinced of the cause. Mr Trump can try to forget that history. He cannot erase it. ■

The Economist

SPECIAL REPORT

THE PEARL RIVER DELTA

April 8th 2017

Jewel in the crown

Jewel in the crown

The Pearl river delta is China's most dynamic, open and innovative region, says Vijay Vaitheeswaran. Can it show the way for the rest of the country?

LIBERAL ECONOMICS MAY have gone out of fashion, but not before working miracles in some parts of the world. To witness one of them, visit the Luohu immigration-control point on Shenzhen's border with Hong Kong, where some 80m crossings are made every year. Since Deng Xiaoping designated the mainland Chinese city as a special economic zone in 1980, putting out the welcome mat for foreign investment and encouraging private enterprise, trillions of dollars of trade and investment have flowed across this border.

Forty years ago Shenzhen was a rural backwater. Today it is the most dynamic city of the Pearl river delta (PRD), China's most innovative region. Rem Koolhaas, a Dutch architect who teaches at Harvard, called it the ultimate "generic city"—a place without legacy that can swiftly adapt and grow with the times. It is still doing that, but is now old enough to have a memory.

Not far from the border crossing is Hubei, one of the city's original communities. Old buildings in the neighbourhood are being demolished to make way for modern structures. "If we all get involved in this transformation, every family will benefit!" declares a giant banner. The authorities are offering compensation to villagers and local homeowners.

"Many people consider this place a slum," explains Mary Ann O'Donnell, an American expert on Shenzhen's urban villages. It is indeed shabby compared with Nanshan, a wealthy high-tech neighbourhood nearby with an average income per person of over $50,000 a year. Yet even this humble place has benefited from globalisation. The homes here have proper walls and roofs, as well as electricity, running water and sewerage. Hubei is not heaven, but any slum-dweller in Caracas or Mumbai would love to live like this.

The PRD is home to nine mainland cities in the province of Guangdong, notably Shenzhen and Guangzhou (formerly Canton), as well as to China's special administrative regions of Hong Kong and Macau (see map, next page). The World Bank recently declared the PRD the world's

A list of sources is at **Economist.com/specialreports**

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biggest megacity, surpassing Tokyo. With over 66m residents, it is more populous than Italy or, just, Britain.

This modest-sized triangle of land and water near China's southern fringe has one of the world's most successful economies. Its GDP, at more than $1.2trn, is bigger than that of Indonesia, which has four times as many people. It has been growing at an average of 12% a year for the past decade. As a global trading power the region is outranked only by America and Germany.

For China itself, the PRD is crucial. Though it accounts for less than 1% of the country's territory and 5% of its population, it generates more than a tenth of its GDP and a quarter of its exports. It soaks up a fifth of China's total foreign direct investment and has attracted over a trillion dollars-worth of FDI since 1980. Above all, it is a shining example of the China that works.

None of this would have happened without free enterprise. For centuries this trading post was the country's most globalised corner. The economic liberalisation of the 1980s and 1990s transformed the delta into China's leading manufacturing and export hub. Now it is rapidly becoming one of the world's most innovative clusters.

Though the delta accounts for less than 1% of China's territory and 5% of its population, it generates more than a tenth of its GDP and a quarter of its exports

Even so, this great workshop to the world is now facing a number of challenges. Rival economies in South-East Asia and elsewhere are becoming more competitive. FDI inflows are slowing. And as the whole of China is getting older and its labour force is shrinking, the flow of migrants into the region is drying up. The net inflow of migrants into Guangdong has fallen by nearly half since 2008, from 1.1m to just 600,000 last year. Over the same period the net outflow of workers from Hunan, a poor neighbouring province, dropped from 286,000 to barely 30,000. Rising competition and a shrinking workforce are national problems—but as the most open and market-oriented part of China, the delta is feeling the pain more than the rest of the country.

This special report will ask whether the PRD can adapt to these harsh new realities and once again lead the rest of China by example. It will point to four powerful trends that should help make the delta fit for the future: diversification, integration, automation and innovation.

Diversification is necessary for two reasons. As already noted, the cheap labour that once kept the delta's manufacturing plants going is running out and wages are rocketing, so bosses are shifting some factories to places with lower labour costs. At the same time exporting to the West has become harder. Rich-world economies have grown little since the financial crisis nearly a decade ago, and both America and Europe are becoming more resistant to trade, so the delta's manufacturers are redirecting some of their exports to the Chinese market instead.

Governments and firms are also trying harder to integrate markets, investing in infrastructure that will make it easier to do business in the region. Unlike the Yangzi river delta cluster around Shanghai, which focuses on the domestic market, the PRD serves the world, so its infrastructure was designed mainly for exports. Its supply-chain firms are now developing new logistics systems to serve domestic demand. Automation plays a big part in this adjustment process.

Alpha delta

Most remarkably, a region once known for copycat products is emerging as a world-class cluster for innovation. Shenzhen, a city of migrants, has rapidly moved from sweatshops to advanced manufacturing, robotics and genomics. It is home to Huawei and Tencent, two of China's most valuable and inventive multinationals. Even Apple, an American technology giant, is building a research and development centre there.

Hong Kong, which this summer marks the 20th anniversary of its handover from Britain to China, is the perfect complement to innovative Shenzhen. Its commitment to free speech, the rule of law and international standards has made it a vibrant global financial centre. Cross-border financial flows between Guangdong and Hong Kong are an explicit part of the Closer Economic Partnership Arrangement, an accord between the mainland and Hong Kong that liberalises trade and investment in many goods and services. Hong Kong's banking system and capital markets are in private hands, whereas their counterparts on the mainland are tightly controlled by the state. Hong Kong is also the leading offshore centre for trading the yuan and the conduit for much of the foreign investment by mainland firms.

When the mainland's economy emerged from the devastation wrought by Mao Zedong's policies, it was the PRD that pointed the way to the future. Shenzhen's entrepreneurs defied central planners and demonstrated the power of market forces.

The mainland is now in difficulty again, with double-digit growth a distant memory. It is struggling with excessive public debt. Too much investment has gone into white-elephant projects and ghost cities. Failure to reform or kill bloated state-owned enterprises (SOEs) has created zombie companies.

In contrast, the PRD's economy is made up mostly of private companies. Of the more than 100 giant SOEs controlled directly by the central government, only four are based in this market-minded region. The delta's nimble firms have long been exposed to brutal competition in global markets. Some have succumbed or moved to cheaper places, but many of those that remain are world class. The question is, can the delta continue to lead? ■

Diversification

Asia makes, China takes

The delta's factories are doing a U-turn

"THE GREAT CONVERGENCE", a recent book by Richard Baldwin, argues that throughout most of the industrial era the know-how and culture essential for high-end manufacturing remained cloistered in the factories of the rich world. That led to a divergence between the fortunes of the West and the rest. But once the cost of communications started plunging, after 1990, such knowledge flowed more freely. Western multinationals built world-class factories in remote places, unpacking and outsourcing their manufacturing operations and supply chains.

China was one great beneficiary of this process. The developed world's industrial knowledge and the PRD's low wages created an unbeatable combination. Vast quantities of well-made but affordable goods were shipped from the delta's factories to meet the seemingly insatiable appetites of the rich world. So the other great beneficiary of this axis of efficiency was the consumer in the West.

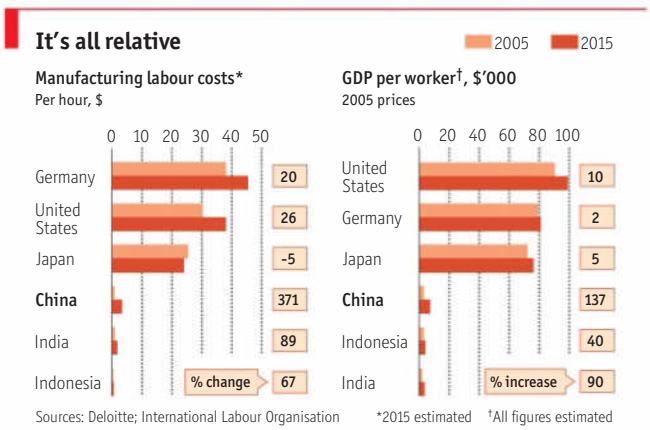
Now the axis is looking wonky at both ends. Labour shortages and increases in minimum wages have pushed up manufacturing salaries by a factor of four in the past ten years (see chart). They are now considerably higher in China than in South-East Asia or India. At the same time the rich world's appetite for imports from China has been kept in check by years of stagnation, and there are now fears that its enthusiasm for free trade may be waning.

This problem faces industrial exporters across the mainland, but it is most acute in the delta. Hourly wages in Guangzhou are about a third higher than the national average. In response, the PRD's resilient manufacturers are performing a neat pivot. They are shifting some of their manufacturing to cheaper regions nearby, and they are redirecting exports to the huge and growing mainland market. "China 2.0 has emerged," declares Marshall Fisher of the Wharton Business School. Until about 2010, the region's labour-intensive factories (which he dubs China 1.0) operated on labour-cost arbitrage. When wages shot up, many pundits predicted a bleak future for the delta, with factories decamping en masse to cheaper places in Asia. Instead, says Mr Fisher, the PRD's companies diversified and adapted.

It is worth noting that despite the recent difficulties, China Inc remains king of global manufacturing. Deloitte, a consultancy, quizzes over 500 chief executives round the globe every three years to rank countries on their manufacturing prowess. In the latest report, published last year, China came top, beating America, Germany and Japan, just as it had done in 2013 and 2010.

Moreover, the delta has not been hollowed out, as some had predicted. Many firms have considered leaving, and those in highly labour-intensive industries (such as low-end textiles or shoes) have indeed left. But most firms have stayed, keeping the bulk of their operations in the delta but hedging their bets by investing in cheaper regions. Some have set up factories in cities in China's interior, others in South-East Asia.

Such investments typically form the spokes of a wheel still radiating from the PRD. George Yeo has his finger on the region's pulse. He runs Hong Kong's Kerry Logistics, a warehousing and transport firm with a big presence in the region. There is no evidence of a wholesale exodus, he says. His clients are adding factories in places like northern Vietnam from which goods can reach the delta within about a day.



The PRD's pragmatic diversification has created a resilient regional network of production, known as Factory Asia, which reinforces rather than undermines the region's importance. The delta contains many industrial clusters, ranging from cars to lighting to electronics. The complex webs of suppliers, middlemen and skilled workers on which these ecosystems rely are unlikely to disappear from it in the foreseeable future.

Tommi Laine-Ylijoki, who manages the supply chain for the consumer business at Huawei, a Chinese multinational based in Shenzhen, emphatically rejects the idea that rising costs might force him to shift manufacturing out of the PRD. He says he did look into moving inland, but found that the cost differential was only 20-30%—and his entire supplier base is in the delta. He also wants his factories and suppliers to be close to his R&D team because he believes that "collaborative manufacturing" promotes innovation. Huawei outsources the production of most smartphones, but keeps about a tenth in-house to maintain the "touch and feel" of mass manufacturing. Given the PRD's outstanding logistics, manufacturing and supply chain, he says, "I can't think of a better place to be in the world to do this."

A treasure at home

The grand pedestrian promenade at the heart of Guangzhou feels like a modern homage to Barcelona's Rambla. On one side rises a beautiful opera house designed by Zaha Hadid, on the other is a fine museum set in a building resembling a Chinese treasure box. A rainbow of lights on the elegant Canton Tower casts a shimmering reflection on the Pearl river nearby.

It does not look like a grubby industrial city. Decades of growth have made this region wealthy. The delta owes its dynamism to legions of private companies, so this wealth has been widely spread. Guangdong has a huge middle class of avid consumers. Annual total retail sales in Guangzhou and Shenzhen are far bigger than in Hong Kong. The world's highest-grossing outlet of Sam's Club, an American retailer, is in Shenzhen.

Alibaba, China's biggest e-commerce firm, holds a giant online-shopping extravaganza, known as Singles' Day, on November 11th every year. Last year customers spent a whopping 120bn yuan ($17bn) on its shopping sites during those 24 hours, more than Americans spend on their Black Friday and Cyber Monday shopping sprees combined. Usually Alibaba hosts the event in its home town of Hangzhou, but last year it moved the Singles' Day gala (featuring Kobe Bryant, a basketball star, and lingerie supermodels from Victoria's Secret) to Shenzhen.

Guangdong spends more than any other province on Sin- ▸▸

gles' Day, but there was another reason to hold the event in the province, says Chris Tung, Alibaba's chief marketing officer: his firm embraces globalisation and innovation, and Shenzhen "has always been at the forefront of China's opening up to the world and represents the spirit of forward-looking innovation".

The pivot to domestic consumption may seem an obvious move for the delta's factories, but foreign firms operating in the PRD, long fixated on export markets, were slow to respond to the rise of China's middle classes. Now they are cottoning on. Factories in the delta with owners in Hong Kong are also switching from exports to the mainland market.

Edwin Keh, an academic who previously worked as a senior procurement manager at America's Walmart, offers an explanation: "We've created this global supply chain that is very efficient at making stuff in the East and consuming in the West…but now it's pointed in the wrong direction." The PRD's shipping, transport and logistics are designed for the speedy delivery of manufactured goods from Shenzhen to Los Angeles, not Shenzhen to Xi'an. Fortunately, that is changing fast. ■

Infrastructure

Come closer

Heavy spending on infrastructure is helping to integrate the region

THE VIEW FROM Lovers' Road in Zhuhai, a seaside promenade in a big city on the PRD's less developed western flank, is breathtaking. A gentle mist rolls in, delighting mainland visitors more accustomed to toxic coal haze. The most expensive flats in town are now going up on the boulevard, but the premium price reflects more than just the ocean panorama.

If you take a ferry to Hong Kong from the terminus nearby, a spectacular sight will soon come into view: the soaring pillars of the world's longest sea-crossing bridge (pictured). It is part of a Y-shaped bridge-and-tunnel combination stretching over 40km (25 miles). Despite numerous technical and political snags, the Hong Kong-Zhuhai-Macau (HKZM) bridge is nearing completion. It will turn a four-hour car journey into a 45-minute jaunt. Its most transformative effect may be on tiny Macau, which has lacked the infrastructure needed to attract global mass-market tourism (see box, next page).

On a map of China the PRD looks small, but the delta's land and water occupy over 40,000 square kilometres. It can take a long time to get from one side to the other. Planners now want to knit the region together more tightly.

To be fair, the PRD already has better infrastructure than most developing countries (see map at the start of this report). Its cities are better built, more connected and greener than those elsewhere on the mainland, with an extensive road network and excellent harbours and airports. Taken together, the seaports in neighbouring Shenzhen and Hong Kong handle more containers than does Shanghai, the world's busiest container port. Hong Kong has the world's busiest cargo airport (see chart, next page).

In many parts of China, politicised infrastructure spending has led to a number of white-elephant projects, but not in the PRD. Bureaucrats in the rest of the country should learn from the delta's sensible, market-oriented planners. The PRD is not overbuilt, so there is a good case for continuing such investment.

Keep building

The latest five-year plan for Guangdong, released in 2016, calls for the creation of a "one-hour transport circle" to link the main cities of the delta. The province is adding thousands of kilometres of new expressways. A big expansion of the intercity train network will add 1,350km of track. Guangdong's officials have increased rail density from roughly 1km per 100 square kilometres in 2008 to 2.2km, but are aiming much higher. The subway systems in Guangzhou and Shenzhen, already among the world's longest, are being expanded further.

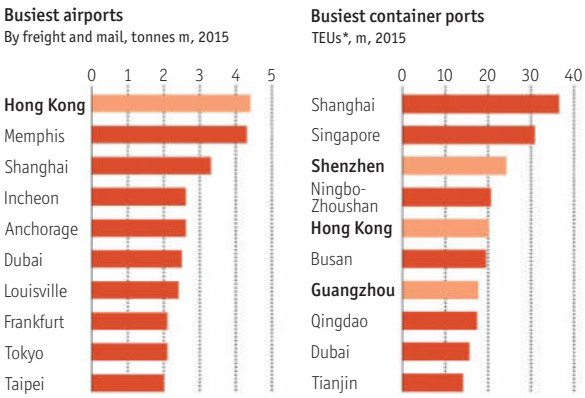
Guangzhou, the provincial capital, is particularly keen on more infrastructure investment. In an effort to make itself more attractive as a transit point for inland goods and grain, it has invested heavily to expand its deepwater port. It is also building a giant "aerotropolis", a supply-chain hub and special economic zone around its airport, which will occupy over 100 square kilometres. A forthcoming high-speed rail link from Hong Kong to Guangzhou will cut the travel time by half, to 48 minutes.

Every three years a group led by the Urban China Initiative (UCI), a think-tank, prepares a detailed report on the country's urbanisation. It measures progress on 23 indicators, ranging from social welfare (employment, health care) and pollution (air, water, waste) to the built environment (public transport, green spaces) and resource utilisation (energy and water efficiency). In its latest assessment of urban sustainability, published in March, the PRD once again stood out. Shenzhen emerged as the clear winner out of 185 mainland Chinese cities, and Guangzhou and Zhuhai also made the top six.

Another sign that the PRD is leading China in making smart infrastructure investments came with the publication in March of the "Chinese Cities of Opportunity" report by the China De-

Bridge to somewhere very useful

World infrastructure champions



Sources: Airports Council International; Marine Department of Hong Kong

*20-foot standard container equivalent

velopment Research Foundation (CDRF), an official research body, and PWC, a consultancy. Using a different methodology from UCI to scrutinise 28 big Chinese cities, the authors conclude that Guangzhou and Shenzhen are the best mainland cities for "technological innovation and balanced development".

The most important investments in infrastructure today are going into transforming supply chains so that the delta's erstwhile exporters can redirect their manufactures to the mainland. The Chinese term for logistics, translated literally, means "the flow of things". Unfortunately, though exports from the PRD move extremely efficiently, the same is not true for the flow of goods inside China. The country spends over 14% of GDP on logistics, nearly twice as much as many advanced economies. Li Keqiang, China's prime minister, has complained that it can cost more to ship goods within the mainland than from China to America.

To Wuhan, not Washington

William Fung, chairman of Li & Fung, a pioneering supply-chain firm based in Hong Kong, notes that factories throughout the delta that had been sending exports to the West for the past two decades are rearranging supply chains, rejigging logistics and tweaking product designs to cater to customers on the mainland. Local supply-chain firms are investing furiously in such things as last-mile distribution and fulfilment capabilities to help manufacturers sell at home. One example is Shenzhen's SF Express, an ambitious delivery firm that pulled off a successful public flotation in February. It has outgrown its command centre at Shenzhen's airport and is now building Asia's largest air-freight hub in Ezhou, a city in the middle of China.

The results are beginning to show. Exports as a share of Guangdong's industrial output fell from 38% in 2000 to 27% in 2015. Mr Fung sums it up: "The next 30-year trend is consumption in China, and we're jumping in." ■

Automation

Robots in the rustbelt

Factories are upgrading, but still lag far behind the rich world

WONG CHAP WING, a native of Hong Kong, runs a factory in Dongguan, an industrial city north of Shenzhen. Hip Fai, his privately held firm, stamps metal parts for things like printers and copiers. The energetic septuagenarian started dye- and mould-making in 1966, and recalls a time when migrants were grateful for a job. "There are not enough technical workers now," he complains. Young people turn up their noses at factory work. He used to pay 600 yuan a month, but now they demand 5,000.

The future is not bright for workshops that cannot upgrade. Mr Wong looked into shifting to a cheaper location inland but decided that the savings were too small. He says that many low-end subcontractors in his area are closing down. Looking at the antiquated equipment and the throngs of workers in his factory, it seems this greasy and noisy place, too, may face extinction.

Turn a corner, though, and you spot the future: a hybrid assembly line where shiny Japanese robots are mingling with human workers. Peter Guarraia of Bain, a consultancy, explains that the big global trend in factory automation is "co-bots": robots designed to collaborate safely with workers. They will look out for people and can be programmed by line workers.

Mr Wong spent 200,000 yuan on each robot but expects to get his money back within three years because his reconfigured assembly line is much more productive. Looking back, "I could not imagine my factory full of robots," he reflects. "I came here

Macau writ large

A plan for the territory to attract many more tourists

CAN MACAU KICK its addiction to gambling? The former Portuguese colony's economy is dominated by casinos. Officials now want to diversify its business model to include entertainment and family attractions, as Las Vegas has done. The snag is that Macau has about 30 square kilometres of land. But a solution is, literally, within reach.

Hengqin, an underdeveloped island about three times the size of Macau, is just 200 metres away. Part of the city of Zhuhai, it has been made into a special economic zone to help Macau diversify, offering more liberal investment rules and tax breaks. Money is also going into infrastructure such as direct access to the HKZM bridge.

Niu Jing, a high-ranking party official in Hengqin, wants to see Macau and Hengqin develop together into a top-flight entertainment, culture and services cluster. He says that investments of 800bn-1trn yuan are planned over the next 20 years, of which 70% will come from the private sector. Chimelong Ocean Kingdom, a big theme park, has opened on Hengqin. A water-sports park is in the works. International schools, hospitals, restaurants and shows are being wooed. To attract more investment, officials have cut red tape. Visas will be offered on demand. Macau residents can drive to Hengqin without mainland licence plates, and Hong Kong residents can work on the island and still pay the territory's low income taxes.

Best of all, there is the Underground Great Wall—the local moniker for a massive tunnel, over 33km long, which contains all the utility pipes and cables needed for development. Electricity, heat, water, communications and waste from the entire island flow through it and are controlled centrally. Three cables (helpfully labelled "Public Security", "Military Police" and "Island Surveillance") carry the signals needed for the security forces to keep an eye on everything.

Dongguan has an official policy of encouraging automation, part of a national strategy to upgrade manufacturing

for the cheap labour."

Dongguan has an official policy of encouraging automation, and has set aside 200m yuan a year to help its factories eliminate jobs. This is part of a national strategy to upgrade manufacturing through automation. The governments of the PRD are leading the charge. Guangdong has pledged to spend 943bn yuan to boost the manufacture and adoption of robotics in the province. Guangzhou optimistically hopes to automate the jobs of four-fifths of the city's industrial workforce by 2020.

The productivity imperative

The sprawling headquarters of Midea in Foshan, a city near Guangzhou, look as though that day has already come. The firm was started in 1968 with 5,000 yuan, operating from a workshop measuring just 20 square metres. He Xiangjian, the founder, and his team scrounged what they could from Mao's tattered economy to make plastic bottle caps, glass bottles and rubber balls. Today Midea is a *Fortune* 500 company and one of the world's biggest white-goods manufacturers, selling everything from internet-controlled kitchen appliances to smart washing machines. Mr He, who retains a controlling stake in the firm, is a multi-billionaire. Last year Midea gobbled up Kuka, a German robotics firm, in a deal worth nearly $5bn. It also has a joint venture with Yaskawa, a Japanese robotics outfit. It is spending 10bn yuan to develop robots, both to use in its own factories and to sell to others.

There are two main reasons to think the delta's factories need to upgrade. First, the level of automation in China remains low compared with some of its competitors. In 2015 the average for the country as a whole was fewer than 50 robots per 10,000 factory workers, compared with about 300 in Germany and Japan and more than 500 in South Korea (see chart).

Second, China's supply of cheap labour is running out, which is pushing up wages steeply. China's low birth rate, exacerbated by its one-child policy (now revoked), has meant that the working-age population has already peaked and is set to shrink significantly in the next few decades. The mass migration of poor rural dwellers from interior provinces to the PRD is slowing, and without that influx of labour, growth targets will be harder to hit.

As a consequence, China urgently needs to beef up its productivity. Over the two decades to 2016, labour productivity has risen by an average of 8.5% a year, but in the past three years this growth has slowed to less than 7% a year, and the absolute level remains low, at only 15-30% of that in OECD countries.

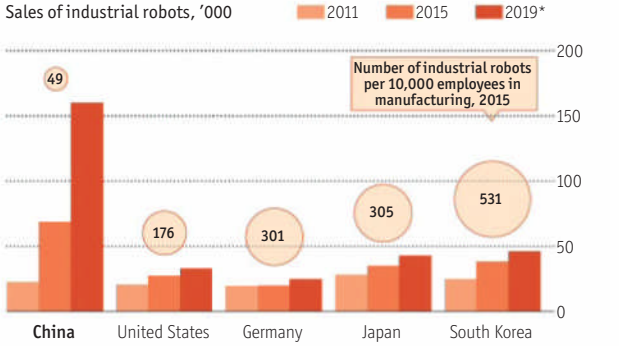
Yet automation should be market-driven, not subsidy-induced, and there are signs of a bubble. Thanks to the official push for "indigenous innovation", Chinese automation firms are often subsidised even if their technology is not up to scratch.

In an era of rapid growth and cheap labour, Chinese bosses set up factories without much concern for efficiency or quality of tooling. If a problem arose, they would throw more men at the job rather than invest even in simple automation. Now many of them are uncritically replacing humans with hardware. AlixPartners, a consultancy, warns that China risks being "left behind as a failed low-cost-country-model economy".

Karel Eloot of McKinsey, a consultancy, reckons that most Chinese firms are not even bothering to adopt such global best practices as Six Sigma, which uses statistical methods to ensure quality, and lean manufacturing, which emphasises efficiency and waste reduction. By one estimate, such tools could boost productivity by 15-30%. Instead, many firms are deploying robots to automate their current inefficient ways of working. Mr Eloot would like to see more data, measurement and analysis on the shop floor, with the lessons integrated into work routines.

Acquisition phase

Sales of industrial robots, '000



Sources: International Federation of Robotics; *The Economist* *Forecast

That may sound too sophisticated, but the PRD's firms are already showing the rest of China how to leapfrog on smart automation. Consider Ash Cloud's factory in Shenzhen. This private company makes cheap plastic cases for mobile phones, each costing a few yuan. It sells about 35m of them a year, earning it about $35m in revenues. Although this is a brutally competitive niche, the firm's profit margin is 10%.

Fred Chen, its general manager, reveals his secret: "Most Chinese firms suffer from production losses, mistakes, scrap, communications and production errors, warehouse mismanagement and so on…our success is due to very good controls." The firm's genius is in its manufacturing management system. Every employee has access to it from scores of iPads found all over the factory. There are cameras and sensors everywhere. The iPads display in large type how much net revenue has been earned from each product during a given shift.

A manager explains the advantages: "We have no information islands…radical transparency means no secrets, no turf battles." Since everybody sees the data in real time, all can change plans on the fly. For Mr Chen the conclusion is obvious: "It is time for Chinese factories to change their management habits." ■

Innovation

Welcome to Silicon Delta

Copycats are out, innovators are in

ON A RECENT weekend several hundred academics and lawyers gathered in a hotel ballroom in Shenzhen for a discussion on "Innovation, inclusion and order", an event jointly organised by the law schools at Peking, Oxford and Stanford universities. Legal conferences can be soporific, especially in China, and a scholar from Beijing duly set the tone by asserting that "order is important in the market." But one of the local speakers livened things up by delivering a surprisingly stout defence of disruptive innovation. Xu Youjun, vice-chairman of the Shenzhen division of the Chinese People's Political Consultative Conference, a government advisory body, said Shenzhen owed its success not to the government or the Communist Party but to its policy of allowing people to go "beyond the planned economy".

The city imposes few limits on freedom of movement (though only a minority of its population has an official *hukou*, or household-registration certificate), is relaxed about employment contracts and does not discriminate against outsiders. "People are the greatest source of our growth," Mr Xu concluded. The contrasting views of the boffin from Beijing and the local apparatchik help explain how disruptive entrepreneurs turned Shenzhen into one of the world's most innovative cities.

Between 1980 and 2016 Shenzhen's GDP in real terms grew at an average annual rate of 22% and today stands at 2trn yuan. The city's Nanshan district, home to about 125 listed firms with a combined market value of nearly $400bn, has a higher income per person than Hong Kong. Unlike Beijing, which has many top-flight universities, Shenzhen has only a handful of lacklustre institutions of higher learning; but so many graduates from all over China flock to the city that they make up a greater share of its population than do graduates in Beijing.

Shenzhen spends over 4% of its GDP on research and development (R&D), double the mainland average; in Nanshan the share is over 6%. Most of the money comes from private firms. Companies in Shenzhen file more international patents (which are mostly high quality, unlike many of the domestic Chinese ones) than those in France or Britain (see chart, next page).

The official story attributes Shenzhen's success to brave party leaders and far-sighted policies. Deng Xiaoping is lauded for liberalising the region's economy. Later political leaders receive praise for investments in infrastructure that enabled rapid growth. That is an incomplete version of history.

An incisive new book, "Learning from Shenzhen", edited by Mary Ann O'Donnell, Winnie Wong and Jonathan Bach, reveals that many of the advances seen since the city was opened up in 1980 came disruptively from below. For example, early reformers pushed ahead with unauthorised investment deals with non-mainland companies and retroactively developed the legal framework needed to protect foreign firms. Time and again, grassroots innovators hit on better ways of doing things, even though strictly speaking they were not permitted. When their risk-taking proved successful, communist leaders typically took the credit. So the best way to study innovation in Shenzhen is to examine it through the eyes of its entrepreneurial firms.

The common perception that China is incapable of innovation needs re-examining. According to a widely quoted study published earlier this decade, the value added on the mainland to Apple's iPods (nearly all of which are assembled there) represents less than 5% of the total, reinforcing the stereotype of Chinese factories as low-end sweatshops. However, a more recent study by Britain's University of Sussex and others for the European Commission concludes that the iPod example "is far from representative". These researchers calculate that the average value China adds to its exports is 76% (the EU's is 87%). The World Bank reaches similar conclusions.

The PRD's companies, which account for a huge chunk of China's innovation, have been moving up the value chain. Local firms that used to rely entirely on imported know-how and parts have started to work on their own inventions and methods. Foreign firms that used to come to the delta to harness its brawn are now tapping into its brains as well. Today, Shenzhen is attracting many entrepreneurs keen to develop new ways of making things. The innovators are transforming the entire delta into an advanced manufacturing cluster. Many multinationals have a listening post in the city to stay close to the latest trends.

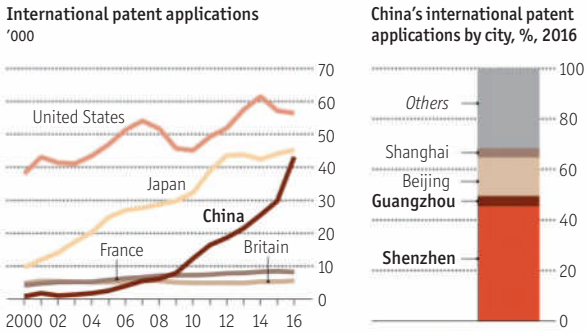
Making it, better

Foxconn, a Taiwanese contract manufacturer which employs over 1m workers on the mainland, is sometimes represented as a low-tech sweatshop; in fact, it holds international patents in areas ranging from electrical machinery to computing to audio-video technology. It is expanding its Shenzhen facility to support rapid prototyping by Apple's new R&D centre in the city. Its joint venture with Japan's Sharp is investing $8.8bn in Guangzhou to make advanced liquid-crystal displays. It is also developing industrial robotics in Shenzhen.

BGI, formerly known as the Beijing Genomics Institute, moved to Shenzhen to get away from northern bureaucrats. Seven years ago it was declared a "DNA superpower" by *Nature*, a science journal, after it bought so many genome-sequencing machines that it ended up owning more than half the world's total. It is due to go public shortly.

Mindray, a devices firm with $1bn in global sales, is developing new technologies for ventilators, digital operating rooms and surgical robots. The firm's experience of managing both American and Chinese researchers is revealing. Its researchers in Silicon Valley are not just tutoring their counterparts in Shenzhen, it turns out, but also learning from them. Cheng Minghe,

Doing their own thing



Sources: WIPO; SIPO

the firm's president, observes that Westerners produce high-quality research but take a long time over it, whereas the locals are better at speedy development of new kit.

Huawei spends more on R&D than Apple does. The privately held Shenzhen firm made its name as a telecoms-equipment vendor, but is now a big force in smartphones and cloud computing too. Its revenues for 2016 are estimated at 520bn yuan, a 32% increase on a year earlier. It devotes an impressive 15% of its revenues and 82,000 of its 180,000 employees to R&D.

Huawei is innovating as it is globalising. Dieter Ernst of the East-West Centre, an American think-tank, praises the company for creating a "global innovation network" of the sort that only Western multinational companies used to have, with more than two dozen R&D centres the world over and a number of collaborative hubs run with leading multinationals and universities.

This has paid dividends. Huawei is one of the world's most prolific generators of high-quality international patents. Along with Sweden's Ericsson it is at the forefront of 5G, which will replace the current 4G networks for mobile telephony. Its narrowband internet-of-things protocol, a cheap and low-energy way to connect machines to the cloud, was recently approved as a global standard.

Another way Shenzhen is rewriting the rules is by embracing open innovation. In the West, corporate innovation has generally been a secretive, top-down affair. Many factories in the city started by making clever imitations of Western goods, which led foreigners to dismiss the locals as mere copycats. That was a mistake. David Li of Shenzhen's Open Innovation Lab argues that the copycats have since morphed into a powerful ecosystem of collaborative, fast-learning suppliers and factories. "Anybody can come to Shenzhen with an idea and get it prototyped, tested, made and put on the market at a decent price," he says. Silicon Valley is obsessed with rich-world problems, he thinks, but China's open innovators work on affordable solutions for the masses on everything from health care to pollution to banking.

Mr Li says the already frenetic pace of Chinese innovation is speeding up further. Dealmaking used to involve long banquets and vast quantities of *baijiu*, a local firewater. Now introductions are made at the flick of a finger on WeChat, a remarkable messaging and payments app with more than 800m users. As soon as a WeChat group is formed, there is little need for phone calls or meetings. Tencent, the internet and online-gaming giant that invented WeChat, is also based in Shenzhen. Worth some $250bn, it is one of Asia's most valuable firms. Its snazzy and green new headquarters in Nanshan towers over a modern neighbourhood of startups, incubators and funky coffee shops.

One of Shenzhen's most daring startups, Royole, is expanding its output of an extraordinary product: the world's thinnest foldable full-colour touchscreen display. Liu Zihong, a mainlander, earned his doctorate in electrical engineering at Stanford University, where he dreamt of radical new ways for machines and humans to interact. When he started Royole, he says, he knew it had to be based in Shenzhen. Getting from early-stage research to manufactured product would require a massive amount of what he calls integrated innovation: "Materials, process, device design, circuit design—all needed to be innovated…if you changed one material, you had to change the process." His team had to develop entirely new materials and factory tools, including custom-built robots, to make his screens, accumulating over 600 patents along the way. He insists this could not have been done even in Silicon Valley, because California cannot match Shenzhen's ecosystem of "makers".

With $280m in venture-capital investment, Royole is valued at $3bn. It is investing $1.8bn to build a heavily automated factory and integrated R&D complex which should propel sales past $3bn. But Mr Liu has even grander ambitions. He thinks his screens could be deployed more widely, in places such as cups, clothes, desks, even walls. "Last year the display industry was worth $150bn," he says, "but flexible displays will double that."

Hacking the future

Shenzhen has become the world capital for hardware entrepreneurs. Navi Cohen is the co-founder of Revols, a Canadian startup developing affordable, custom-fitted headphones. His firm raised a fortune on Kickstarter, a crowdfunding site. When it tried to develop its product in Montreal, it found things slow and expensive, so it moved to Shenzhen, where supplies were cheap and factories made prototypes quickly. It is now in production.

Another promising startup that moved to Shenzhen is Wazer, an American firm. A conventional metal-cutting machine on a factory floor costs $100,000 or more. Shenzhen's know-how helped Wazer perfect a way to cut any material precisely with pressurised water. Its desktop cutter costs about $5,000 and will disrupt the industry when it comes to market later this year.

Revols and Wazer are among dozens of startups that have gone through a manufacturing boot camp run by Hax, a hardware "accelerator" based in Shenzhen's Huaqiangbei, the world's largest electronics-supplies market. Benjamin Joffe, a partner at Hax, reckons that Silicon Valley's experience of hardware is "six to seven years out of date". Big firms ranging from Johnson & Johnson, an American health-care firm, to Michelin, a French tyremaker, have entered into partnerships with Hax to get closer to these bright sparks.

The most successful of Shenzhen's recent startups is DaJiang Innovations (DJI), reportedly worth over $8bn, which makes affordable commercial drones. Frank Wang, the founder, and his 1,500-strong R&D team had to invent vital bits of the technology needed for its flying robotic cameras. The privately held firm commands over half of the global market for small civilian drones, and is purportedly planning to go public soon. It is now diversifying its offerings. Paul Xu, the head of DJI Enterprise Solutions, says it is aiming for business clients in fields ranging from agriculture and energy to public security. It is also considering a services-business model where users can rent airtime.

Shenzhen has done more than any place on the mainland to debunk the outdated myth of "copycat China", becoming the global hub of innovation in hardware and manufacturing. Its entrepreneurs are coming up with entirely new industries. It has been the driving force behind the upgrading that should help the PRD withstand competition. But what does its rise mean for Hong Kong, which has been the catalyst of investment and growth in the delta for decades? ■

Hong Kong and the mainland

The dragon head's dilemma

Hong Kong's best future is to remain China's superconnector

ON THE OBSERVATION deck atop the Diwang building in Shenzhen you can see two large wax figures depicting Deng Xiaoping and Margaret Thatcher enjoying cups of tea. The two leaders negotiated the handover of Hong Kong to China, which eventually took place in 1997. At the time, Mrs Thatcher was criticised by some at home for relinquishing the empire's last great colony to the communists (Prince Charles reportedly described China's leaders as "appalling old waxworks"). The more obvious worry was that Hong Kong's rule of law and its free-market economy would be crushed by the hard men in Beijing.

The critics underestimated the Iron Lady. She got a deal that preserved much of what was good about old Hong Kong, and which has served the entire PRD well. Though China gained sovereignty over the territory, it promised to respect its governance for 50 years, a system that was dubbed "one country, two systems". This has held up far better than had been predicted.

But as the 20th anniversary of the handover on July 1st approaches, Hong Kong is wondering about its future. Many locals are unhappy about being ruled by the mainland, with some activists even calling for independence. Economic growth is sluggish. Twenty years ago Hong Kong's economy accounted for 16% of the Chinese total, dwarfing the rest of the delta. Now it makes up barely 3% of China's GDP and less than half of the PRD's economic output.

Anthony Yeh of the University of Hong Kong once described the city as the PRD's roaring "dragon head". As the delta's main source of capital and provider of manufacturing and commercial services, the city was responsible for much of the region's division of labour and globalisation. Now he worries that Hong Kong may become as irrelevant to the global economy as England's once-mighty Liverpool.

Atop the Diwang building in Shenzhen you can see two large wax figures depicting Deng Xiaoping and Margaret Thatcher enjoying cups of tea

Decline is not inevitable, but Hong Kong is constrained by its political situation. It has no prospect of becoming independent, though its efforts to strengthen democracy and protect local laws and institutions from mainland interference have been well worthwhile. On the economic front, its role is that of a global connector for the delta, adapting and upgrading links to reflect the changing times.

Hong Kong is a "highly complex, semi-permeable membrane" that modulates the impact of globalisation on the mainland, argues George Yeo, the boss of Kerry Logistics and a former trade minister of Singapore. "China doesn't want to harmonise with the world completely, because it makes domestic governance difficult." That is why Hong Kong remains vital to the future of both the PRD and China.

For all the local anguish, it is worth remembering that Hong Kong is the freest economy on Earth. In February the Heritage Foundation, an American think-tank, published its latest ranking of economic freedom, based on factors ranging from property rights and absence of corruption to mobility of labour and capital. Hong Kong once again came top.

The city's commitment to international legal and accounting norms has made it a global financial centre. Its lawyers, accountants and investment bankers are able easily to connect foreigners with mainlanders. Mainland companies make up perhaps half the market capitalisation of the Hong Kong stock exchange. The city is the leading offshore centre for trading the yuan and the conduit for much of the foreign investment undertaken by mainland firms.

Say it with culture

Cultural offerings are not controlled by the Communist Party. That is a good thing in itself, but when combined with the city's knack for making markets, it is also an economic asset. The territory is now a global trading hub for wine and art, even hosting its own version of the influential Art Basel show.

The West Kowloon Cultural District, a massive arts centre now under construction, may be the world's most ambitious cultural undertaking since the Centre Pompidou was built in Paris 40 years ago. It complements a design-focused complex being built in Shenzhen, which will house a collection curated by London's Victoria & Albert Museum. "I see the PRD emerging as an art destination," says the V&A's Luisa Mengoni.

This cultural dynamism makes Hong Kong attractive to global talent. Nicholas Yang, Hong Kong's innovation secretary, notes that of the city's nearly 2,000 startups, perhaps half were founded by foreigners. Visas are easy to get, English is widely spoken, there is little red tape and half the world's population lives within no more than five hours' flying time from the city's airport.

Still, pessimists and pettifoggers abound. For such folk, the dramatic rise of DJI, the drone multinational mentioned earlier in this special report, confirms that Shenzhen has eclipsed their city. Yet a closer look reveals a reassuring symbiosis. Frank Wang, DJI's mainland-born founder, studied at the Hong Kong University of Science and Technology. Li Zexiang, his robotics professor there, was an early investor and now serves as the firm's chairman. And when DJI wanted to let global travellers try its drones, it decided to open an "experience zone" at Hong Kong's airport.

The battle for freedom in Hong Kong could prove a bellweather of political change in China. Economic freedom has not so far brought political freedom on the mainland, but if it did, the PRD would in all probability be in the vanguard. Until the distant day when China unchains its economy, frees its currency and ungags its people, the two-way flow of people, capital and ideas through this semi-permeable membrane will continue to play an essential part in the delta's future. ■

The lessons

A China that works

The delta shows what the country could achieve by setting entrepreneurs free

"THE PRD WAS always the first mover in China," explains William Fung of Li & Fung. Hong Kong's success, he reckons, owes much to its tendency to ignore Beijing's diktats. And Shenzhen's special economic zone did well because it operated as a freewheeling hub. By embracing globalisation and eschewing central planning, the cities of the PRD led the way for the country's economic opening.

As this special report has argued, the next economic revolution is now under way. New infrastructure, including high-speed rail links and the world's longest sea bridge, is helping to stitch the region ever more closely together. Whereas some parts of China are dominated by state-owned enterprises, this region's economy is made up almost entirely of private-sector firms. Slowing growth in world trade threatens all of China Inc, but the PRD's nimble private firms tend to be more resilient than protected state-owned enterprises elsewhere on the mainland.

Since these firms operate in competitive global markets, they are currently undergoing the unnerving process of Schumpeterian creative destruction. Some are moving away or closing down, but those that remain are growing stronger. They are scrambling to upgrade, investing in automation, robotics and advanced manufacturing techniques. A region once infamous for its copycats is producing some world-class innovators.

The PRD is more open to the world and to the private sector than any other place on the mainland. Zhejiang, the province that is home to globally minded Alibaba, has about 33,000 foreign-invested firms, and Shanghai about 75,000, but Guangdong has over 110,000. In Liaoning, an industrial province in the north-east, SOEs account for about 31% of total industrial revenues, and in Shanghai for more than 36%, but in Guangdong the share is less than 14%. And the delta alone generates nearly half of the mainland's high-quality international patent filings, leading China on innovation.

Dragon, unshackled

To catch a glimpse of the future of the PRD, head to the Lok Ma Chau Loop. This valuable parcel of land, at the border between Shenzhen and Hong Kong, was left undeveloped for years because the two cities were fighting over its ownership. In January they agreed to develop it jointly as an innovation and technology park.

The best chance for the PRD's economy of upgrading for the future lies in co-operation between the governments of the region. Xu Qin, Shenzhen's former Communist Party secretary, sees the Loop deal as part of his city's effort to strengthen co-operation with Hong Kong so it can become an international hub. Nicholas Yang, Hong Kong's innovation secretary, reckons that since both cities have advanced economies based on services, they must work together "to get value from knowledge".

The Global Entrepreneurship Monitor, a respected annual report, pointed out in its latest issue in February that both cities have seen explosive growth in entrepreneurship in recent years even as it is declining elsewhere in China. The report argued that the two cities should build on their complementary strengths. Shenzhen has many swashbuckling startups and plenty of risk capital to back them, but they often lack global sophistication and management skills. Hong Kong is more conservative, but its cosmopolitan entrepreneurs are better at scaling, branding and going global.

With more such collaboration between the two cities, they might form the nucleus of a new regional technology cluster, as recently proposed by Ma Huateng, Tencent's influential boss (an idea subsequently endorsed by Li Keqiang, China's prime minister). The creation of such a hub, said Mr Ma, would help China "preside over the global tech revolution of the future".

The delta can weather today's storms if its pragmatic officials work more closely together across the board and continue to respect market forces. Earlier reforms in the region demonstrated the benefits of capitalism to the rest of China and exposed the folly of central planning. The remarkable entrepreneurs who built the delta's economy can propel it forward. All that governments have to do is stay out of the way. ■

Ready for a technological Loop

Also in this section

Venezuela

Undo that coup

CARACAS

South Americans are accusing their leaders of betraying democracy. The first of three stories is about Venezuela, where the grievances are greatest

"THE world knows this is a dictatorship," jeered masked students confronting a rank of national guardsmen on April 4th in Caracas. With tear-gas swirling around Avenida Libertador, one of the capital's main streets, what had begun as a march to parliament became a stand-off between youths with stones and soldiers with machineguns. One placard bore the image of a military boot trampling a map of Venezuela.

Protests against the authoritarian regime, which has ruled since 1999, are no rarity. In 2014, 43 people died on both sides in massive demonstrations. But this week's confrontation felt both angrier and more hopeful than recent ones have been. That is because of a series of extraordinary events, which began on March 29th.

Venezuela's supreme court, which obeys the regime, started things off with a ruling that claimed for itself the powers of the opposition-controlled legislature. That was only the latest in a series of measures to kneecap the assembly after the opposition won elections in 2015. But the formal usurpation of its rightful powers provoked new outrage. Chile, Colombia and Peru withdrew their ambassadors. Luis Almagro, the secretary-general of the Organisation of American States (OAS), denounced what he called a "self-inflicted coup".

The second surprise occurred on March 31st, when Venezuela's attorney-general, Luisa Ortega Díaz, a stalwart of the regime, joined in the condemnation. Delivering her annual address to government lawyers, an event carried live on television, she described the court's decision as a "rupture" of the constitutional order. "We call for reflection so that the democratic path can be retaken," she said. Hours later, Venezuela's president, Nicolás Maduro, summoned the national defence council and ordered the supreme court to reverse the most contentious parts of its earlier announcement (exposing the court's independence for the fiction it is).

Both the public rift at the top, and the government's ratchet away from dictatorship rather than towards it, are unprecedented. Some detect an elaborate ruse. International pressure on the regime had been mounting. The OAS held a debate on Venezuela's deteriorating democracy earlier in March, over the objections of the government. What better way to shut up critics than to have the supreme court do something anti-democratic and then order it to change its mind? If that was the plan, it didn't work. The OAS held a second debate after the U-turn.

Taking on the Taliban

More interesting, and more likely, is the possibility that the rifts within *chavismo*, the left-wing movement founded by the late Hugo Chávez, are real. They could eventually provide an opening for good-faith negotiations between elements of the government and the opposition. Ms Ortega is no softie; she is loathed by the opposition for jailing politicians. But she may have been trying to distance herself from factions in the regime that are even more extreme than she is, says Luis Vicente León, a pollster.

The "Taliban", as some *chavistas* refer to hardliners, include Diosdado Cabello, a former president of the national assembly, and Tareck El Aissami, Mr Maduro's vice-president, who has been named a drug "kingpin" by the United States Treasury Department (an accusation he denies). Mr Cabello reportedly helped to draft the supreme-court ruling, and announced it on his television programme minutes after it was published. Ms Ortega's dissent may be a sign that not all members of the regime are prepared to break irrevocably with democracy. According to the *Wall Street Journal*, the chief of the armed forces, Vladimir Padrino, also urged Mr Maduro to revise the supreme court's ruling.

If the regime cracks, the wretched state of the economy will be one cause (see page 72). Its economic mismanagement has led to severe shortages of food and medicine. Earnings from oil, almost the only source of hard currency, have been falling. The government dare not default on the country's $110bn debt, lest creditors seize oil shipments.

The need to pay debt spurred the supreme court's power grab. This month the government and PDVSA, the state oil company, are due to make bond repayments of $2.8bn, which is more than a quarter of international reserves. The regime has been trying to raise cash through joint ventures, asset sales and other deals with foreign investors and governments, especially Russia's. The national assembly has warned that such deals will be invalid without its approval. That threat held up a $440m loan ▸▸

from CAF, an international development bank based in Caracas, last month. Hence the supreme court's assault on parliament, which gives Mr Maduro broad power to approve joint ventures in the hydrocarbon sector. That part of the ruling stands, though investors may not feel reassured.

Encouraged by fissures in the regime, the opposition and some of Venezuela's neighbours are pressing it to restore parliament's powers in full, hold overdue regional elections and bring forward a presidential election scheduled for December 2018. The *chavistas* are not ready for that. If they lose, the opposition will "destroy them, and their families and their money", says Mr León. Hardliners may need safe passage out of the country if democracy is to return. They would sooner destroy Venezuela than face destruction themselves. ■

Ecuador

Correísmo barely hangs on

QUITO

The new president has made a lot of promises, but will struggle to keep them

IT WAS hardly a ringing endorsement. With nearly all the votes counted, Lenín Moreno, the political heir of Ecuador's left-wing president, Rafael Correa, won the presidential election by barely more than two percentage points. That victory brings to an end a series of defeats for left-wing governments in Latin America. Mr Moreno will try to continue Mr Correa's free-spending populism, but he will have less money and will exercise less power than his predecessor did during more than a decade in office.

Mr Moreno's narrow victory on April 2nd came after an ugly fight with Guillermo Lasso, a conservative former banker. Mr Moreno's party, Alianza PAIS, unjustly attacked his rival as one of the authors of Ecuador's financial crisis in 1999-2000. (Mr Lasso was briefly finance and economy minister at the time, but quit because he opposed Ecuador's decision to default on its bonds.) Mr Lasso's connection to Opus Dei, a conservative Catholic organisation, probably counted against him.

One respected exit poll gave the edge to Mr Lasso, who has so far refused to concede. His supporters have been holding large demonstrations to demand a recount. But Mr Moreno's victory seems likely to stand. Luis Almagro, secretary-general of the Organisation of American States, which had sent election monitors to Ecuador, acknowledged him as president-elect.

Mr Moreno probably won in part because voters preferred his promises of expanded welfare to Mr Lasso's offer to cut taxes and red tape. Mr Moreno, who was Mr Correa's vice-president from 2007 to 2013, said he would continue his "21st-century socialism", under which social-welfare spending doubled as a share of GDP between 2006 and 2012. Mr Moreno says he will treble a cash transfer to poor households, raise pensions, provide 100,000 subsidised houses a year and build 40 technical universities. Julian Assange, the founder of WikiLeaks, will remain a guest at Ecuador's embassy in London for the foreseeable future. (Mr Lasso would have made him face rape charges in Sweden.)

Hosting Mr Assange is easy, if perhaps trying; keeping the rest of Mr Moreno's promises will be hard. A drop in oil prices since 2014 has pushed the economy into recession. Mr Correa compensated for lower government revenue by borrowing more. The cost of servicing Ecuador's debt last year was 12.1% of GDP, up from 7.2% in 2007, the year Mr Correa took office. The country uses the dollar as its currency, which has hurt its competitiveness. Although Alianza PAIS, Mr Moreno's party, has kept its majority in congress, its margin is smaller.

Despite his alarming first name and his pledge to continue Mr Correa's policies, Mr Moreno has a reputation as a pragmatist. Born in Nuevo Rocafuerte, a hamlet in the Amazon forest accessible only from the Napo river, he grew up in Quito, the capital, where he began his career in the tourist industry. He has been in a wheelchair since 1998, when muggers shot him. But his personality is sunny. He set up a foundation to promote "humour and happiness" and has published a book called "The World's Best Jokes".

As Mr Correa's vice-president, he portrayed himself as more tolerant and less power-hungry than his boss. He expressed misgivings about Mr Correa's assaults on press freedom. After the United States Justice Department disclosed that Ecuadorean officials had taken at least $33.5m in bribes from Odebrecht, a Brazilian company, between 2007 and 2016, Mr Moreno promised to carry out "major surgery" to stop corruption with the help of the UN. That implicitly challenges Mr Correa in two ways: the president curbed the independence of the judiciary and denied that corruption was a serious problem.

The laughing Latin Lenín

Mr Moreno's promise to be a more liberal, corruption-fighting version of Mr Correa faces obstacles. One is his running mate, Jorge Glas, the current vice-president. He has been the target of numerous allegations of corruption, which he denies. He and his allies in congress are likely to resist a crackdown on graft. Another worry is about Mr Moreno's health; he has refused to release his medical records. To carry on the popular bits of *correísmo* while discarding the bad ones, the new president will need plenty of energy. ■

The burning of congress in Paraguay

Re-election row

ASUNCIÓN

The president wants the right to run again. Citizens violently disagree

IT SHOULD have been a public-relations triumph. The annual meeting of the Inter-American Development Bank (IADB), held in Asunción from March 30th to April 2nd, was a chance to boast of landlocked Paraguay's economic achievements. It is the world's fourth-biggest exporter of soyabeans and number seven in beef. On the opening night the president, Horacio Cartes, unveiled the results of a national branding exercise: a logo of flora, lorries and silos in soothing blues and greens.

A day later, Paraguay's congress was in flames. Protesters were battling police and an opposition activist, Rodrigo Quintana, lay dead. Police had shot him in the back at the headquarters of the Liberal Party.

The violence was triggered by Mr Cartes's desire to run for re-election in 2018. The constitution of 1992 forbids presidents from serving more than one five-year term, a safeguard against dictatorship, under which Paraguay suffered from 1954 to 1989. Allies of Mr Cartes, a rich businessman, argue that Paraguay's democracy no longer needs such swaddling. Besides, he is the only plausible presidential candidate from his right-wing Colorado Party, which has held power for all but five of the past 70 years (including during the dictatorship).

On March 28th 25 senators from his party and others, including the left-wing Frente Guasú coalition of Fernando Lugo, a former president who may run again, proposed a constitutional amendment to allow re-election. When the senate's speaker objected they, in effect, formed their own

senate and passed the measure.

This enraged many Paraguayans. They are offended less by re-election itself than by the attempt to evade the rules for amending that part of the constitution, which require a constituent assembly. The government thinks it is enough to ram the change through congress and hold a referendum. "We're living in a dictatorship with the name of a democracy," said Rocío Vera, an actress, at a vigil outside congress.

On her side are less high-minded foes of Mr Cartes's scheme. They include a crony-capitalist faction of the Colorado Party, which is angry that the president has invited foreigners to invest in agribusiness and bid for public works. Some fear that the beneficiary of re-election will be Mr Lugo, who was impeached in 2012, rather than Mr Cartes. The president has offended a once-friendly media mogul by buying up much of the press himself.

Soon after the senate vote, protesters converged on congress, with rioters joining as night fell. A police cordon gave way, surrendering congress to arsonists. Mounted officers fired tear-gas. Police arrested 211 people, allegedly torturing some.

Mr Cartes's government is now trying to rescue its reputation. He has sacked the interior minister and chief of police, and convened a dialogue with opposition parties (which the Liberals refuse to attend). The government will accept the supreme court's ruling on a legal challenge to the senate vote, promises Gustavo Leite, the trade and industry minister.

Mr Cartes is likely to win in the end. The supreme court is packed with his allies. Barely 12 hours after congress burned, the finance ministry tweeted images of Santiago Peña, the minister, tangoing at the IADB meeting. The country's leaders know how to charm foreign investors. Now they must regain the trust of Paraguayans. ■

Bello | Not so bad, perhaps

The threat from Donald Trump may be diminishing. That does not mean Mexico can relax

IN THE anxious days before Donald Trump was inaugurated in January the outlook for Mexico seemed bleak indeed. Mexicans worried that the president-elect would do what he said: tear up or drastically revise the North American Free-Trade Agreement (NAFTA), build a wall on the United States' southern border and deport millions of their countrymen. Between election day in November and mid-January the peso lost 15% of its value against the dollar.

Now, 11 weeks into Mr Trump's shambolic administration, the mood has lightened somewhat. Mexicans watch with mounting glee as judges block his executive orders. They are encouraged, too, by the impression that he cannot get bills through Congress and is hobbled by probes into connections between some of his advisers and Russia.

Now they have reason to hope that Mr Trump's protectionism will be less calamitous than feared. Wilbur Ross, the United States' commerce secretary, talks of making a "very sensible" agreement with Mexico. A leaked draft letter to Congress by the acting trade representative, Stephen Vaughn, proposes updating NAFTA to make it more like the Trans-Pacific Partnership (TPP), an 11-country trade agreement from which Mr Trump withdrew. Peter Navarro, Mr Trump's trade adviser, wants to create a "mutually beneficial regional powerhouse", though his way of doing that could be disruptive. He would tighten rules of origin, which might make it hard for Mexico to get car parts from China to sell within NAFTA, for example.

All this better-than-expected news from Washington has pushed the peso, which functions as a national mood ring, nearly back to its pre-election levels. That reduces the risk of higher inflation and interest rates. JPMorgan Chase, a bank, recently lifted its forecast for growth in Mexico this year from 1.3% to 2%. Outside the theatre of Mr Trump's threats, real-world trade is doing well. Strong manufacturing growth in the United States is helping Mexican factories: Mexico's non-oil exports grew 5.5% year-on-year in February. The boss of a *maquiladora* factory on the border says: "2017 is looking good."

It is still too early to conclude that some combination of Mr Trump's incompetence and reasonableness among his trade negotiators will shield Mexico's economy from his aggression. Congress has yet to confirm the United States' trade representative, though here, too, the signals are mildly encouraging. Mr Trump's nominee, Robert Lighthizer, is more likely to be a vigorous enforcer of trade rules than a shredder of the rule book.

Stay scared

More worrying, perhaps, is what the United States might do on tax. Paul Ryan, the Speaker of the House of Representatives, wants a 20% "border-adjustment tax" to pay for a cut in corporate-tax rates. Steve Bannon, the leading economic nationalist in the White House, is thought to support the idea. It is little comfort to Mexico that the tax would hurt all exporters to the United States, not just Mexicans.

The fact is that Mexico remains uncomfortably exposed to Mr Trump's whims and Mr Ryan's tax plans. Although they may not carry out their worst threats, they have already done damage. Foreign investment is likely to be lower this year than in 2016. Higher inflation, the result of the peso's slump and a rise in fuel prices ordered by the government, has hurt consumer spending, the main source of growth last year. GDP growth in 2017 is unlikely to match last year's 2.3%.

The government of Enrique Peña Nieto must not let down its guard, in part because the Trump scare is a spur to do things Mexico should be doing anyway. It is improving trade ties with more-distant partners, including China and the European Union. Minus the United States, the TPP could become a hub of future trade agreements. Mexico is making a case for NAFTA among Americans who would be hurt by Mr Trump's protectionism, from maize growers in Iowa to consumers across the country.

Most important, the Mexican government needs to do more to spread prosperity, raise productivity and strengthen the rule of law. Excessive red tape encourages many businesses to remain informal. The economy is still hobbled by poor infrastructure and criminality. This week the editor of *El Norte*, a newspaper in the border town of Juárez, said it would close down because journalism had become too dangerous. A reporter who had contributed to the paper was recently murdered in the nearby city of Chihuahua. If Mexico wants to be strong enough to cope with the Trump era, it must do something about such lawlessness.

Also in this section

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North Korea

The land of lousy options

Donald Trump will find it hard to curb North Korea's nuclear programme

IT WAS with trademark braggadocio that Donald Trump told the *Financial Times*, just days before meeting his Chinese counterpart, Xi Jinping, that if China failed to "solve" the problem of North Korea's nuclear programme, it was "totally" possible that America would do so alone. "China will either help us with North Korea, or they won't," said Mr Trump. "If they do, that will be very good for China, and if they don't, it won't be very good for anyone." Mr Trump's remarks came after the conclusion of a White House review of all the options available for dealing with what Barack Obama had warned would be the most urgent threat to national security under the new administration.

The review, led by Mr Trump's national security adviser, H.R. McMaster, has looked at everything from pre-emptive military action at one end of the scale to a continuation of Mr Obama's policy of "strategic patience". The latter amounted to some discreet disruption of North Korea's missile launches through cyber-attacks and gentle cajoling of the Chinese to be a bit tougher over the implementation of various UN sanctions. Mr Obama does not claim to have had much success in changing North Korea's behaviour. Victor Cha, a former American official now at the Centre for Strategic and International Studies, once dubbed it "the land of lousy options". It remains so.

The most recent addition to the UN's sanctions was agreed on in November, two months after North Korea's fifth nuclear test, its second of 2016. China has enforced them by restricting coal imports from its troublesome neighbour this year. As well as the nuclear tests, North Korea conducted 24 missile tests last year, including one successfully launched from a submarine. The tempo of testing has been maintained this year, with the latest launch on April 4th. Preparations also appear to be under way for a sixth nuclear test. Other demonstrations have suggested rapid progress in mastering important technologies, such as solid-fuel rocket motors (allowing quick launches); miniaturisation of warheads (to fit on top of a missile); and re-entry vehicles (to protect a warhead as it plummets through the earth's atmosphere).

How do you solve a problem like Korea?

North Korea already has missiles that can hit targets anywhere in South Korea or Japan. Soon it will also be able to reach the big American base on Guam. Kim Jong Un, North Korea's dictator, claimed in his new year address to be in the "final stages" of preparation for a test launch of an intercontinental ballistic missile (ICBM). John Schilling, a missile expert who writes for the website 38 North, reckons that with a warhead weighing around 400kg the North's prototype KN-08 missile may be capable of reaching most of America's West Coast. Most analysts think that at its present rate of progress, North Korea will have a working ICBM within four years, as well as up to 50 warheads.

On a trip to East Asia last month, Rex Tillerson, America's new secretary of state, declared that the time for strategic patience was over. In response to Mr Kim's ICBM boast, Mr Trump boasted back in a tweet: "It won't happen!" In the past, Mr Trump, who regards himself as a good negotiator, has suggested that he would be happy to eat hamburgers with Mr Kim in the White House, if that was what was needed to get a deal done to curb North Korea's missile programme. Mr Trump has swung between sabre-rattling and talk of a grand bargain in part because neither is likely to be successful.

The first option is a pre-emptive strike. An attack that targeted nuclear facilities only, assuming that they could all be found, would still leave intact North Korea's 20,000 conventional rocket launchers, artillery pieces and heavy mortars. North Korea claims to be able to obliterate Seoul, the South Korean capital, with conventional weapons, turning it into a "sea of fire". That is an exaggeration. Only a part of its formidable arsenal is in range of Seoul, a metropolis with more than 20m inhabitants. But by conservative estimates, about 130,000 people would die in the first two hours of a bombardment, with the fatality rate declining thereafter as batteries malfunctioned or were destroyed.

However, if the attack and North Korea's response escalated into full-scale war on the peninsula, as would be likely, millions could lose their lives. America would also probably have to provide a large occupation force in the war's aftermath. This assumes that China would be prepared to sit on its hands while all this was going on, by no means a certainty.

If a different military approach was adopted, in which the plan was to assemble a force sufficiently overwhelming to destroy Mr Kim's war machine within a ▸▸

few days, the risks might be even greater. North Korea, seeing what was happening, would lash out, perhaps with its nuclear weapons, before the assault was ready to start. Mr Kim will have learned from the first Gulf war the risks of allowing America to attack at a time of its own choosing.

The military option thus has nothing to recommend it as a means of resolving the problem, although it should stay on the table as a deterrent. The regime must know that to use, or even seriously threaten to use, its nuclear weapons would be an act of suicide. But the flipside is that Mr Kim also knows that military threats as a means of forcing him to give up his nuclear weapons programme are largely hollow. He correctly sees the bombs he is building as the best guarantee of the survival of his regime, along with its slave-labour camps and torture chambers.

The heel's still alive

The same calculation renders the current sanctions ineffective. North Korea has known much greater hardship—hundreds of thousands of people starved to death in the 1990s—and there is no sign of sanctions fomenting enough discontent in elite circles to encourage a palace coup. Indeed, having purged anyone who could threaten his power, Mr Kim looks more secure than ever. (His uncle, for example, was executed with an anti-aircraft gun.)

There are only two other ways of deflecting Mr Kim from his present course. One is to press China to make life so uncomfortable for the regime that it fears for its survival (the likely intention of Mr Trump's talk of dealing with North Korea alone if necessary). The other is to offer Mr Kim some sort of deal.

Mark Fitzpatrick of the International Institute for Strategic Studies, a think-tank, says that the chances of getting anywhere are low, but "we have to keep the door open for engagement," if only because it may be the best way of winning Chinese support for tougher measures. South Korea's probable new president, Moon Jae-in, will also need to show his supporters that the diplomatic track is still alive.

The initial objective, says Mr Fitzpatrick, should be to get Mr Kim to agree to a moratorium on missile testing and a freeze on plutonium and uranium enrichment at known nuclear sites, which could be verified through surveillance by satellites. In return, there might be some relaxation of sanctions. Another possible carrot would be negotiations on a peace treaty to end the Korean war formally. Mr Fitzpatrick argues that a proposal by the Chinese to end joint American-South Korean military exercises should not yet be considered, much less the withdrawal of American forces from the peninsula. But the hope would be that a little bargain, which would put on hold the development of an ICBM or, worse, submarine-launched missiles that would let North Korea retaliate even after an attack on its terrestrial missile launchers, could turn into a grander bargain leading to de-nuclearisation.

Jonathan Pollack, a Korea specialist at the Brookings Institution, is sceptical. "What would talks achieve?" he asks. He thinks that all the evidence indicates that Mr Kim is set on his current path and has no interest in entering into negotiations—at least not until North Korea gains recognition as a de facto nuclear power. That leaves only increased pressure from China as a way to raise the costs of the nuclear programme and, with luck, slow it down.

What Mr Trump appears to have in mind is demanding that China halt all financial transactions with North Korea. Anthony Ruggiero, a former Treasury official who advised American negotiators the last time there were talks with North Korea in 2005, argues that the new administration should target banks and other firms that help North Korea evade sanctions. Mr Ruggiero believes that America could levy swingeing fines on Chinese banks that facilitate trade with North Korea, just as it punished European banks that helped customers get around sanctions on Cuba, Iran and Sudan. The ultimate threat would be "secondary sanctions" that deny access to the American banking system, making it impossible to handle transactions denominated in dollars.

Mr Obama made little use of secondary sanctions, for fear of provoking such ire that he damaged the wider economic and diplomatic relationship between America and China. That may be a prospect that troubles his successor rather less.

But for all Mr Trump's apparent confidence in unilateral American action, a strategy that enlists China rather than repels it is likely to be more effective. China, after all, still accounts for about 85% of North Korea's trade with the outside world. It could cause Mr Kim's regime extraordinary difficulties by shutting off the pipeline that supplies North Korea with oil, albeit with unpredictable and perhaps chaotic consequences. China also hosts many migrant workers from North Korea.

Which is not to say that Mr Xi can bring Mr Kim to heel with a snap of his fingers, as Mr Trump seems to believe. He probably would if he could do so without triggering a collapse of the regime. If some combination of pressure and engagement continues to fail, containment and deterrence are all that is left. Mr Fitzpatrick says there is no reason to suppose that Mr Kim, who appears rational if exceedingly callous and violent, would invite the destruction of his regime by launching a nuclear attack. But accepting North Korea as a nuclear-armed state might drive South Korea to seek its own nuclear weapons, spurring further proliferation across the region. And North Korea is so opaque that the risk of a catastrophic miscalculation is high. ■

Four more reasons to worry

Pacific secession movements

Palm-fringed indecision

WELLINGTON

Votes loom on the future of New Caledonia and Bougainville

IT HAS been six years since the birth of the world's youngest country, South Sudan, in 2011. It may soon have some younger siblings. The Pacific island of New Caledonia is due to hold a referendum on independence from France by November next year; Bougainville, 1,200 miles to the north (see map on next page), is supposed to vote on separation from Papua New Guinea in 2019. The timing of the two referendums was fixed decades ago, to defuse long-festering conflicts. But the approach of the appointed time is raising tricky questions about how to word the question on the ballot, who should have the right to vote and what to do once the results are in.

New Caledonia's secessionist uprising ended in 1988 when leaders of the indigenous Kanaks and French loyalist politicians agreed to hold a vote on independence a decade later. When that deadline arrived, the two sides approved a further delay of 15-20 years. They also agreed to

Bougainville's economy has run aground

share power in the local government and to try to bring about an economic *ré-équilibrage* (rebalancing) to lift predominantly Kanak regions.

New Caledonia has a population of 269,000. Kanaks account for 39%; Europeans for 27%; other Pacific or Asian ethnicities and people of mixed race make up the remainder. Most Kanaks are thought to lean towards independence; most Europeans, towards the status quo. The electoral roll for the referendum will not include those who arrived in the territory after 1998. That excludes many of the European *métros* who come and go from mainland France on short-term contracts.

Even so, French nationalists such as Marine Le Pen, a leading contender in France's presidential election, are keen for a quick vote and a straightforward question, in expectation of an emphatic defeat for the independence movement, which has never won a majority in elections for the local parliament. But some loyalist politicians, such as Pierre Frogier, a former "president" of the local government, would prefer a new accord deferring a vote again, for fear that Kanaks might resort to violence in the event of a "no". Unrest in St Louis, a largely Kanak suburb to the east of the capital, Nouméa, has served to heighten those fears, and led to a bolstering of the police force in November.

Bougainville's population is similar in size to New Caledonia's, but far poorer. The separatist war that ran from 1988 to 1997 claimed about 5,000 lives and led to the closure of a big copper mine run by Rio Tinto, an international mining group. A peace agreement in 2001 established an Autonomous Bougainville Government (ABG) and included a provision for a referendum to "include a choice of separate independence" by 2020. Some rebels spurned the peace talks, however, and held on to their guns.

Papua New Guinea's prime minister, Peter O'Neill, is adamant that he will not allow Bougainville to break away, and insists that the referendum will be non-binding. Yet in January his government collaborated with the ABG to set up a Bougainville Referendum Commission. Both sides have also agreed to hold the vote in June 2019.

The ABG had been counting on reopening the closed copper mine to fund its future state, but Rio Tinto demurred last year. Other investors are wary, too, fearing renewed conflict. Without the mine, the ABG is reliant on the central government for the bulk of its revenue. But Papua New Guinea is facing a fiscal crisis and, despite the impending ballot, has trimmed spending on Bougainville. If, as expected, Bougainvilleans vote for independence, the island's future is unlikely to be prosperous.

Peace agreements that depend on delayed referendums enable both sides to imagine the future of their dreams, but only by putting off the day of reckoning. When that comes, as both Bougainville and New Caledonia are discovering, the advantages of an ambiguous status quo may seem greatly preferable to the dangers of a clear decision. ■

Islami Bank Bangladesh

Cheques and imbalances

DHAKA

The government arranges a change of leadership at the country's biggest bank

IT WAS an odd job for a spy agency. On the morning of January 5th military intelligence operatives phoned the chairman, a vice-chairman and the managing director of Islami Bank Bangladesh, picked them up from their homes and brought them to the agency's headquarters, in Dhaka's military cantonment. Polite officers presented the bankers with letters of resignation and asked them to sign. They did so. A few hours later the bank's board, meeting under the noses of intelligence officers at a hotel owned by the army, selected their replacements.

Islami Bank has been of interest to the government chiefly for its association with the Jamaat-e-Islami, Bangladesh's biggest Islamist party. The bank is the country's biggest (see chart on next page), and operates in accordance with Islamic principles. Although the party only holds a minority stake in the bank, quiescent shareholders from Saudi Arabia and Kuwait had allowed it to appoint the top management.

The Jamaat advocates an austere, Arabian form of Islam, which has never had much of a following in relatively liberal Bangladesh. It has never won more than 12% in a national election. It does not help that the party opposed Bangladesh's separation from Pakistan in 1971. Its student wing was the main source of recruits for a notorious pro-Pakistani paramilitary body. A special court set up by the ruling Awami League party in 2010 convicted most of the Jamaat's senior leadership of war crimes. Those found guilty were jailed or hanged.

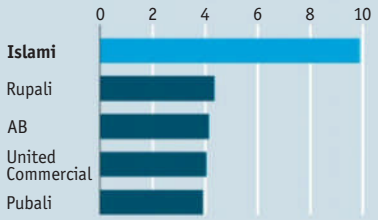
The trials destroyed the Jamaat as a political force, but its economic clout endured. Islami Bank accounts for a third of the assets of the Islamic banking industry. It has 12m depositors, 12,000 staff and a balance-sheet of $10bn. It handled more than a quarter of the $14bn Bangladeshi workers abroad sent home last year. Much lending in Bangladesh goes to those who know bankers or bribe them; Islami Bank appears to use more prudent criteria.

The Awami League seems to have worried that the resources of the bank might be used to help revive the Jamaat. A charity tied to the Jamaat, Ibn Sina Trust, which is also a shareholder in the bank, has a staff of 6,000. It runs 19 hospitals, and many schools and professional colleges. The bank also has a charitable arm of its own; its bosses were also replaced in January.

In recent months companies with ties to S Alam Group, a conglomerate based in

An obvious target

Bangladesh, biggest banks by total assets
September 2016, $bn



Source: Bloomberg

Chittagong, Bangladesh's second city, have built stakes in the bank, although the group denies any role in the shake-up. Senior staff from other banks in which the group holds stakes have been appointed to Islami Bank. The new chairman, Arastoo Khan, is seen as one of the country's most effective bureaucrats, but has only recently turned his hand to banking. He declined to comment on the changes at the bank. But Ahsanul Alam, the new vice-chairman, says there is a risk that the management may open the "sluice gate" to political lending. Another board member says there have been changes in who is getting loans and how these loans are approved, with many of them going to borrowers from Chittagong. The central bank has chided the new management for violating proper procedures for loan disbursement.

The shareholders from Saudi Arabia and Kuwait were kept in the dark about the boardroom coup, and complained bitterly about it. One of them, the Islamic Development Bank, based in Saudi Arabia, pointed out that it was only given three days' notice of the board meeting in January, and therefore was not able to send anyone to attend it. It has questioned the rationale behind the changes, and pointed out that there was no proper recruitment process for the new managing director. It has also upbraided the government for suggesting that the foreign shareholders had endorsed the change of management, when in fact important decisions were being taken without their "knowledge or consent". The government has assured foreign shareholders that it will not let politicians loot the bank.

The nominally secular Awami League has built a formidable one-party state since it came to power in 2009. Western diplomats are jittery after recent suicide attacks. They fear that the repression of competitive politics is undermining the country's long history of secularism and tolerance. No one expects the government to permit a meaningful electoral contest in 2019. The sense in the capital is that Sheikh Hasina, the prime minister, will do whatever it takes to remain in office. Like the former bosses of Islami Bank, Bangladeshis are being presented with a *fait accompli*. ■

Government caprice in India

Bar wars

DELHI

New rules on alcohol drive thousands of businesses into a ditch

WHAT is a bigger threat than war, civil unrest or natural disaster? For Indian businesses there is an obvious answer: government. Consider the past few months. In November the central government scrapped 86% of paper currency, pitching citizens into a mad scramble to find alternative ways to buy, sell and get paid. In March it slipped a new rule into the annual budget bill that frees taxmen to raid or seize any property at any time with no need to explain why.

Sometimes it is particular industries that get bashed. Politicians keen to impress voters with their devotion to cows, for instance, are making life hard for producers of meat (meaning mostly buffalo), including exporters who earn India around $4bn a year. Some state governments turn a blind eye to vigilantes such as those who beat a (licensed) Muslim dairy farmer to death in Rajasthan last week; others have encouraged hyper-zealous "inspections", followed by closures, of slaughterhouses.

This week two bigger industries have found themselves hit by another bit of the government, India's Supreme Court. Its judges not only upheld an earlier decision to deny licences to sell alcohol within 500 metres of a state or national highway; they also extended it from retail outlets to embrace any place serving alcohol, be it a bar, restaurant, hotel or club. In a country that suffers 400 traffic deaths a day, the need to curb drunk driving is clear. But this step by the court into the realm of rule-making, which in most countries is the job of legislators, has had jarring effects.

To India's liquor and hospitality industries, the shock has been cataclysmic. "Nationwide we are talking about closing 100,000 outlets and losing a million jobs," says Dilip Datwani, a Mumbai hotel-owner and top executive in both regional and national hotel and restaurant associations. In the state of Maharashtra alone some 16,000 out of 26,000 licensed premises lie within 500 metres of a highway. This includes not just roadside booze shacks but some of India's poshest hotels. Not only can they no longer sell alcohol; they must forfeit all the liquor they had in stock.

"Being on the main road was a big plus, and now suddenly it's a liability," protests the owner of a resort south of Mumbai who reckons that alcohol sales make up around 10% of her revenues. "It's not that drinking is the epicentre of the experience we offer, but if you can't offer it clients will just go elsewhere." Gallingly she, like many others in Maharashtra, had renewed her very costly annual alcohol licence hours before the court ruling rendered it void. Mr Datwani, for his part, notes that the highway by which one of his hotels stands was not designated "national" until a decade after he built it.

This time, however, business owners have an unexpected ally: state governments. Many rely on liquor taxes for a big chunk of revenue. Estimates of their potential loss this year alone range from $15bn to $30bn. And so, while some liquor outlets are applying the ancient Indian science of *jugaad* (work-around), such as by diverting motorists to a rear entrance that happens to be more than 500 metres from the highway, governments are proving ingenious too. The favoured trick so far has been to change the signposts, so that state highways magically become district or municipal roads. Rajasthan, for instance, has already "denotified" 125km of state highway. As one tweet quipped, perhaps the rules should now read, "No road shall be classified as a highway within 500m of a bar." ■

Supreme injustice

Banyan | An Australia that can say no

China is Australia's biggest trading partner. That does not mean it has to kowtow

IF THERE'S anything worse than running a huge trade deficit with China, it is, to judge by Australia's incessant fretting, running a huge surplus. Australia's was A$22bn ($17bn) last year—1.3% of GDP. China's industrial revolution has long been fuelled by coal from Queensland and iron ore from Western Australia. But China wants ever more from Oz. Education, for instance: nearly 160,000 Chinese are studying in Australia. Food and drink is the next boom. Annual exports of beef will soon exceed A$1bn. Restaurants in Beijing and Shanghai can't get enough Australian lobster. And sales of Australian wine to China were nearly A$500m in 2016, and growing by 50% a year.

So what are Australians worried about? Their country has escaped recession for an astonishing 25 years, thanks chiefly to Chinese demand. And Australia never had a big manufacturing sector to be hollowed out by Chinese competition. Yet nervousness is growing that Australia is somehow beholden to China, a feeling exacerbated by China's testy reaction whenever Australia does anything that displeases it.

The testiness is especially acute when Australia appears to side with America, its closest ally since the second world war. Last July an international tribunal ruled against China's sweeping territorial claims in the South China Sea. In response, Australia issued a bland statement emphasising the importance of a rules-based maritime order and expressing opposition to any action that might increase tensions. China reacted furiously. *Global Times*, a state newspaper, described Australia as an American toady "with an inglorious history", not even a paper tiger but "a paper cat at best". "Australia's power," it thundered, "means nothing compared to the security of China." If Australia meddled, it would be "an ideal target for China to warn and strike".

Some Australian commentators seem to think that the best response to such bluster would be to take even greater care to avoid riling China. When Australian officials make anodyne statements of support for America or mild criticisms of China, they sometimes still earn worried rebukes at home. When the foreign minister, Julie Bishop, called last month for America to remain "the indispensable strategic power" in the region, it was gentle stuff—a reiteration of seven decades of settled policy. Hardly controversial, either, were her remarks in favour of a liberal international order: "While non-democracies such as China can thrive when participating in the present system, an essential pillar of our preferred order is democratic community." Yet Geoff Raby, a former ambassador to Beijing, condemned the speech as "peculiar" and "odd" coming just before a visit to Australia by China's prime minister, Li Keqiang.

On occasion, the government itself seems equally eager not to offend. During Mr Li's visit, authorities in China detained Feng Chongyi, a Chinese academic who lives in Australia and has criticised China's persecution of human-rights lawyers. In public, at least, Mr Turnbull was shamefully silent over the case, even though the Australian media was in uproar. In fact, Mr Turnbull even tried to push ahead with a parliamentary vote to ratify an extradition treaty with China. A previous conservative government had concluded the treaty ten years ago. Chinese authorities had been piling on the pressure to ratify it. Ms Bishop kept defending the treaty doughtily, even as the predicament of Mr Feng drew attention to the glaring flaws in China's legal system.

But even if the government was keen to ingratiate itself with China by ratifying the treaty, Australia's parliament was having none of it. A loose alliance of opposition parties and rebellious MPs from the ruling coalition indicated they would vote it down, forcing the government to call off the vote days after Mr Li's departure. That is not the only time Australia has tied itself in knots over its dealings with China. Every time a Chinese firm tries to buy a big Australian business, be it a power company or a cattle station, the government hums and haws over whether the purchase should be blocked, with little consistency.

China, of course, has few qualms about pushing Australia around. Some of those Chinese students, for instance, jump to the orders of the Chinese embassy when shows of patriotism are required. On university campuses they vociferously oppose anything deemed critical of the Communist Party. Rent-a-crowds materialise to denounce the Dalai Lama. Patriotic Chinese businesses have made donations to Australian politicians, apparently in the hope of securing a friendlier diplomatic stance. And China is not above using its commercial clout to punish countries that anger it, even if it rarely makes the threat explicit. South Korean firms doing business in China are currently suffering boycotts and bureaucratic persecution because their government had the cheek to allow the deployment of an American anti-missile system that the Chinese government is unhappy about.

Standing up to China is made all the harder by doubts about the strength of America's commitment to Australia in particular and Asia more broadly: Donald Trump is both unpredictable and sceptical of alliances (and he famously hung up testily during a recent call with Mr Turnbull). More than at any time since at least the second world war, Australia feels vulnerable.

Too bloody wrong

Yet just as it makes little sense any longer to subordinate Australian policy unquestioningly to America, it makes even less sense to fall in with all Chinese demands. Giving way to bullying, after all, only tends to encourage it. Allan Gyngell, a former intelligence chief and author of a new book on Australian foreign policy, "Fear of Abandonment", does not think dealing with China needs to be "all that difficult", so long as Australia is prepared to approach China "with clear eyes". Wouldn't it be nice, adds a former colleague of his, if Australia just said "no" to China from time to time, and made it clear that it was prepared to bear the cost? ■

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Xi Jinping

The loyal family

BEIJING

Why Xi Jinping puts so much emphasis on allegiance to himself

ALL politicians demand loyalty, but some politicians demand more loyalty than others. Xi Jinping, China's president, is in the Napoleon class—Napoleon the pig, that is, who taught the creatures of George Orwell's "Animal Farm" the slogan: "Comrade Napoleon is always right."

Over the past few months a parade of dignitaries has professed undying allegiance to Mr Xi and the Communist Party he leads. The trigger was a party decision in October to anoint Mr Xi as the "core" of the leadership. Soon afterwards, his six colleagues in the Politburo's Standing Committee began laying on the flattery with a trowel. In March one of the committee's members, Yu Zhengsheng, said Mr Xi's status as core reflected "the fundamental interests of the party and people". Such statements remind many observers of the adulation once accorded to Mao Zedong. Given that Mr Xi and many other leaders are "princelings" (sons of the first generation of Communist leaders), they also seem like the swearing of fealty to the king by medieval courtiers.

The list of vociferously loyal subjects is long. Since the start of the year the country's chief corruption investigators, the bosses of the state-security and cyber-security agencies and representatives of state-run media have all pledged "absolute loyalty" to Mr Xi. The president's numerous promotions of high-ranking army officers have usually involved expressions of allegiance by those newly elevated.

The displays of obsequiousness are different from those during a mini-cult of Xi early last year, when songs in praise of the president circulated widely online and state-controlled media began gushing about "Papa Xi" and his glamorous wife, Peng Liyuan ("Mama Peng"). On that occasion it was unclear whether Mr Xi himself approved. Within a few weeks, the media began toning down their Xi-loving language (though signs of public devotion still surface, such as during an international football match in January in the southern province of Guangxi—see picture).

Hail, Xi

Now that the subservience is being directed by the party's highest institutions, it is evident Mr Xi is directly involved. The loyalty-swearing campaign is also different from past practice. In the late 1970s Deng Xiaoping, after taking over as China's leader, forbade personality cults and sought to build up China's institutions, emphasising "collective" decision-making. So did his successors, Jiang Zemin and Hu Jintao. Mr Xi's less diffident approach was evident soon after he came to power in November 2012. His name appeared in the party's flagship newspaper, *People's Daily*, more than twice as often during his first 18 months as the party's general secretary as did the names of his predecessors during the equivalent periods of their rule.

Mr Xi may see some benefit in demanding loyalty at this juncture. He is widely seen as the most powerful Chinese leader since Mao. But he wants to make sure that his allies get the most important jobs in a reshuffle late this year after a five-yearly party congress. Demanding that party officials swear loyalty to him is a way of being doubly sure that he gets his way.

But that is not all there is to it. There has been an increase in demands for obedience not only to Mr Xi himself but also to the party. In 2014 the president said loyalty to the organisation was the first requirement for national leaders. As *Qiushi*, the party's main theoretical journal, put it: "There is no 99.9%. It is 100% pure and absolute loyalty and nothing less." Such rhetoric reflects Mr Xi's worries about the party's authority and cohesion at a time of wrenching social and economic change.

Even more than his predecessors, Mr Xi believes that a strong party is vital. When he took over, party discipline was slack: corruption was rife and officials routinely flouted orders. As recently as November Mr Xi said that, even among senior officials, "there are those whose conviction is not strong enough and who are not loyal to the party." He argues that the Soviet Union collapsed because its rulers lost faith in themselves. Mr Xi is determined not to let that happen in China.

Cracking down on disloyalty is partly aimed at turning the party into a more disciplined and effective instrument of control. This has involved suppressing intra-party debate. Last year the party reminded members that they must not criticise the central leadership's decisions. Mr Xi has revived the practice of holding what are called "democratic life meetings". At these, ▸▸

officials are supposed to reflect on how they can work more closely with national leaders. "Intensified central power will doubtless help the enforcement of reforms," said Deng Maosheng, who runs the party's central policy-research office.

There is even a new drive to ensure that the party's 88m members pay their dues, which range from 0.5% to 2% of post-tax salary (evasion is widespread). Mr Xi is insisting that such fees be handed over on time every month, and in person. This is, in effect, another loyalty test. Paying your dues "is a process of alerting yourself to the party's spirit," said an article in February in a newspaper published by the Central Commission for Discipline Inspection, the agency in charge of enforcing party rules. The party boss of Yunnan province berated his fellow Communists for failing to hand over the money as required. "Some people ask their secretaries to do it for them," he said disgustedly. "It's all wrong."

After years of rule-bending, some find it difficult to snap to attention. Officials in Beijing still bemoan a widespread tendency among party members to ignore its regulations. But there has been no open sign of resistance to the loyalty campaign—onerous though it sometimes is. In February the foreign minister, Wang Yi, indicated he would skip a meeting of the Group of 20 largest economies in order to attend a party session on loyalty. He decided to go to the G20 at the last minute, but only after receiving dispensation not to attend the party event. At around the same time, officials postponed a meeting of Japan's and China's ruling parties, apparently to avoid a clash with the loyalty gathering.

Ever since the Communists took over in 1949, they have debated what kind of party they want. Mao distinguished between "reds" (good Communists) and "experts" (people who knew what they were talking about). Mao said he wanted reds. Deng put more faith in experts. Mr Xi seems to be shifting back. In January the party's Central Organisation Department, which is in charge of personnel, told five government ministries to put "good political quality" at the top of the list of requirements for senior officials. It was much the same when Napoleon's propagandist, Squealer, rebuked farmyard animals for praising the courage of Boxer, a cart horse. "Bravery is not enough," said Squealer. "Loyalty and obedience are more important." ■

Regional development

Building a megacity from scratch

SHANGHAI

Xi Jinping has plans for a metropolis that will dwarf New York

THROUGHOUT Chinese history, the dawn of new dynasties often involved moving the entire capital, imperial palace and all, to a new city. By those dynastic standards, Xi Jinping's ambitions are modest. He simply wants to shift some of Beijing an hour's drive to the south. But by the standards of modern urban development, his vision is grand indeed. All going well, the new area, known as Xiongan, will cover 2,000 square kilometres, nearly three times the size of New York City or Singapore. A "first-class international city", as the planners put it, will rise from land that is home today to scrubby fields, a large lake and a series of drab towns.

China, which sometimes opts for modesty in unveiling plans lest they fall flat, did not hold back on April 1st when it revealed those for the "Xiongan New Area" in Hebei province. An official statement described Xiongan's development as a "strategy crucial for the next millennium". It compared the project to the creation of China's two most spectacular built-from-scratch urban expanses: Shenzhen, a metropolis next to Hong Kong, and Pudong, Shanghai's glittering financial district.

The point of Xiongan is to tame Beijing's surging population, which has caused gridlock on its streets and exacerbated a chronic shortage of water. The capital has been trying for several years to encourage people to move out of its core districts. To make commuting easier, it has been improving transport links with nearby cities. By the end of 2017 the municipal government is due to relocate from the centre to Tongzhou, a suburb to the east. But

Xiongan is the first entirely new city to feature in the effort. It is named after Xiong and Anxin, two counties in Hebei that will form the bulk of its territory along with a third county, Rongcheng—see map.

Beijing will still serve as the capital. But businesses and universities unrelated to that function will be urged to move to Xiongan. Mr Xi wants the new city to have a "beautiful environment", with high-tech industries and efficient transport. By the end of its first phase (time unspecified), it will cover 100 square kilometres, almost double the size of Manhattan.

In China bedlam often ensues in the rush to build. There has already been a taste of this in Xiongan. Within hours of the announcement about the new city, speculators were flocking to the area's existing property developments to buy up whatever was available. Highways leading to it were clogged with cars. Its housing prices tripled. To rein in the exuberance, the government ordered a halt to all property transactions in the new area.

Jokes abound on social media about the wealth that Xiongan's rural residents will soon enjoy (if officials forgo their common practice of seizing land for little compensation). One was a spoof ad, written as if by someone from the countryside whose marriage prospects now look bright: "Male, 53, two acres in Xiongan, seeking woman, 25 or younger, beautiful, preferably with study-abroad experience".

It would be unwise to bet all on Xiongan's rise. Over the years China has tried to build numerous new cities, several of which have been costly failures. More than a decade ago the government declared that the Binhai New Area, a vast development in Tianjin, would be north China's answer to Shenzhen and Pudong. It has never taken off. Another stillborn project was Caofeidian, an "eco-city" in the Bohai Gulf. Internet censors have been deleting any doubts that netizens have been raising about Xiongan. An article asking whether the new city would be the second Shenzhen or the second Caofeidian disappeared soon after it was published online.

But Xiongan has a big thing going for it: the full backing of Mr Xi. News broadcasts showed the president touring the area and chairing a meeting about its development. So long as Mr Xi remains China's leader—ie, at least for the next five years—building Xiongan will be a priority.

Whether this is a good idea is another question. Taking Beijing as it exists today—a city of more than 20m people with 19 subway lines, dozens of universities, a large cluster of high-tech firms and umpteen road and rail connections to other large cities—and trying to make it work better might be more sensible. Yet given all of the capital's urban maladies, the temptation to start with a clean slate is hard for planners to resist. ■

Health-care reform

Prescription for the future

How hospitals could be rebuilt, better than before

IN A nondescript part of Cleveland, in a room known as the bunker, a doctor, nurses and medical technicians gather to keep watch over 150 patients in special-care units and intensive-care beds. Their patients are scattered around the region, in clinics that have no specialists covering the night shift. On a wall of beeping screens the bunker team members track their charges' vital signs. They can zoom in on any patient via a camera at the foot of each bed. "These here are PVCs [premature ventricular contractions]; they're bad things," says Jim Goldstein, a cardiac technician, pointing to a graph of a patient's heartbeat. The PVCs are getting worse, warns a flashing light. It's time to alert a nurse on the ground.

Health-care providers such as the Cleveland Clinic, the big American hospital group that runs this remote intensive-care unit (ICU), are rethinking the way hospitals work. Today, hospitals are where patients go for consultations with specialists, and where specialists, with the help of medical technicians and pricey machinery, diagnose their ills. They are also the main setting for surgery and medical interventions such as chemotherapy; and where sick people go for monitoring and care. But high-speed internet, remote-monitoring technology and the crunching of vast amounts of data are about to change all that. In the coming years a big chunk of those activities—and nearly all the monitoring and care—could move elsewhere.

Plenty of other institutions are trying to grab some of the work—and profits—that will be displaced, including primary-care groups, insurers and health-management organisations. And technology firms are already playing a bigger part in health care as phones become more powerful and patients take control of their own diagnosis and treatment. But the more far-sighted hospitals are hoping to remain at the centre of the health-care ecosystem, even as their role changes.

"When I think of the hospital of the future, I think of a bunch of people sitting in a room full of screens and phones," says Toby Cosgrove, the Cleveland Clinic's head. In such a vision, a hospital would resemble an air-traffic control tower, from which medical teams would monitor patients near and far to a standard until recently only possible in an ICU. The institution itself would house only emergency cases and the priciest equipment. The only in-hospital consultations would be those requiring the expertise of several specialists working in a team. Patients inside the building would be cared for better. But fewer people would be admitted, as hospitals co-ordinated care remotely and led population-wide efforts to keep people well.

Hospitals have already been reinvented several times. During the Middle Ages they were run by religious institutions and offered little more than shelter and palliative care for the poor, and a place to die. After the advent of modern medicine during the Enlightenment, ambitious institutions such as Westminster and Guy's, in London, developed into complex organisations that combined care, treatment, research and education. Poor-relief moved elsewhere; smaller institutions closed or merged; doctors specialised and clustered in big cities; and nursing was professionalised under Florence Nightingale and her successors.

Temples to healing

The transformation in the coming decades will be as wrenching as any hospitals have yet seen. And health-care reform is always difficult, as is clear from a glance at Britain's creaking National Health Service, France's near-bankrupt system—or the interminable battles in America over the future of Obamacare. Fast-ageing populations and the rising cost of new treatments will further complicate the transition. But the need for change is pressing. In the past half-century the burden of disease in all but the poorest countries has shifted. Communicable diseases are no longer the big problem; now it is chronic ones related to unhealthy lifestyles and longer lifespans. The gap between populations' health needs and the care offered by systems organised around hospitals has grown ever wider.

Picturing what hospitals could be, if the various obstacles are overcome, means abandoning long-held assumptions about the delivery of care, the role of the patient and what makes a good doctor. The first is ▸▸

what should happen where. "A hospital can also be at home," says Lord Ara Darzi, a surgeon and professor at Imperial College London, a university that runs teaching hospitals. Just as online banking made life more convenient for consumers and freed up branch staff for complex queries, online health care could mean fewer people need to come to hospitals to be cared for by them. Last year half of consultations offered by Kaiser Permanente, an integrated American health-care firm that runs many hospitals, were virtual, with medical professionals communicating with patients by phone, e-mail or videoconference.

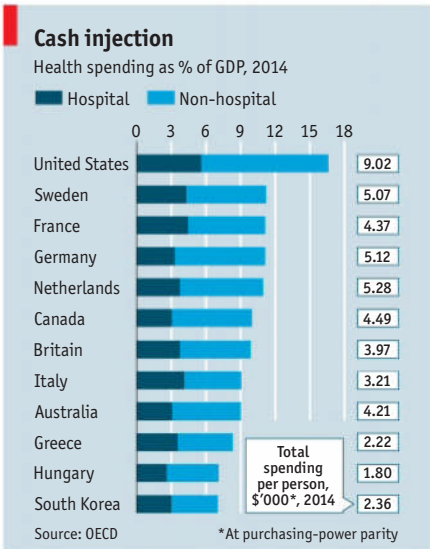
The main limitations today, says Kari Gali, a paediatric nurse-practitioner for the Cleveland Clinic who takes such video-calls, are that she cannot look into children's ears or listen to their chests. As these and more sophisticated diagnostics, including blood tests and virtual imaging, become available remotely, more patients could receive hospital-quality care without leaving home. Gupta Strategists, a Dutch research company, reckons that around 45% of care now given in Dutch hospitals could be done better at home.

Shifting almost all dialysis and chemotherapy out of hospitals is further off, but is on the way. And with better remote monitoring some chronically ill patients who now need to be in hospitals will be able to stay at home, only coming in when their conditions deteriorate. Moving care outside institutions will both save money and raise standards, by making patients more comfortable and reducing infection rates.

Each to their own

For all this to happen, primary care and home support will need to improve. Kaiser shows what such "integrated care" might look like. It offers a host of alternatives to a hospital visit, from its website to kiosks to urgent-care centres, which are cheaper, often more convenient for minor ailments and equipped to deal with disease management and prevention, and the social issues that increase ill-health. "If we get a hospitalisation of a diabetic patient in a coma, that's a failure of our system," says Bernard Tyson, Kaiser's boss. He blames skewed financial incentives to have "heads in beds" for much over-hospitalisation.

Banner Health, a large non-profit American health system, runs 28 hospitals and several specialised facilities across six states. Its Tele-ICU programme, for which Philips, a Dutch health technology firm, provides equipment, programming and software support, has its headquarters in Phoenix. It manages care for critically ill patients who may be thousands of miles away. Under its "intensive ambulatory care programme", patients are helped to leave hospital earlier than is usual for their conditions. They remain under constant monitoring and care in their own homes,



and can "beam in" by video to talk to a doctor or nurse at any time of day. After a pilot study with Philips, Banner Health thinks this telehealth programme could reduce admissions by nearly half, and cut costs by a third.

For patients who must still be admitted to hospital, the experience could be much more convenient and pleasant. Hospitals could operate more like a cross between a modern airport and a swish hotel, with mobile check-in, self-service kiosks for blood and urine tests and the like, and updates on patients' and relatives' phones. For pre-planned visits an algorithm could decide which tests are needed before a patient leaves home. Some of these could be done in advance and the results streamed directly to patients' electronic records.

Health-care managers are already waking up to the fact that a patient's environment affects outcomes such as recovery times and success rates. Some are aiming for pristine, white and clinical; others for pastels, seashells and classical music. The latter can all be found in Kaiser's Manhattan Beach Medical Office, in Los Angeles, which is also planning yoga and cooking classes for patients. The new Karolinska University Hospital, in Stockholm, has SKr118m ($13.2m) worth of art and lots of glass to maximise light, both intended to aid healing. It will be much quieter and calmer than a typical city hospital, says Annika Tibell, the medical director; instead of flashing alarms and loudspeakers, staff will have discreet personal buzzers. Kaiser has switched from neonatal wards to private rooms in its new hospitals. All these may seem like luxuries, but patients who cannot sleep recover more slowly. Some hospitals have had acoustic levels at night of over 70 decibels, the equivalent of a nearby vacuum-cleaner.

But the biggest upgrades to hospitals are needed behind the scenes. Johns Hopkins Hospital, in Baltimore, has built a NASA-inspired "command centre" to manage its patient flows. Surrounded by 22 beeping flat-screens, live video-streams and lots of phones, staff members wearing headsets orchestrate the 1,100-bed institution around the clock. GE Healthcare, a medical-technology firm, helped mix, filter and present data streams in new ways—even including information such as the weather. Bed-planning has gone from an art to a science with the help of programs that predict demand with great precision and warn when a crunch is approaching. The centre stays in touch with nearby institutions whose patients require its specialists' input, but not to be physically present. The aim is to "maximise the number of patients with access to Hopkins' expertise", says Jim Scheulen, the director.

In future, rather than checking patients' vital signs only at intervals, or parking ICU-nurses next to beds, live data-streams from medical machines and wearable devices could flow straight to such command centres, where supercomputers could screen them for anything worth bringing to the attention of medical staff. Doctors in the command centre, or even in their own homes, could be at patients' bedsides virtually with a swipe of a touchscreen. All this would not only make the hospital safer and more efficient; it would also give medical staff a more complete record of patients' progress.

In Kaiser's Oakland Medical Centre, the nurses in the neonatal unit, among the most sensitive departments in any hospital, do not need to watch the babies as closely as they used to, because algorithms ping an alarm to their phones whenever there is something to worry about. The unit automatically goes into lockdown if anyone takes an infant, tagged with a bar code, to the exit. Soon Karolinska hospital will equip every patient with a vital-signs tracker. In the Cleveland Clinic's recently opened Avon Hospital, sensors track whether staff have washed their hands before entering a patient room: lights flash on their badges if not.

Cleared for landing

A command centre could watch over patients not only in hospitals, but also at home. Wearable devices that track vital signs, contact lenses that monitor blood-sugar levels and smart-stitches that measure the pH level of fluid in wounds would all mean fewer patients in hospital for monitoring. When he speaks of how such remote monitoring could improve care for his leukaemia patients, the eyes of Matthew Kalaycio, an oncologist at the Cleveland Clinic, light up. If his phone warned him of a worrying change in a patient's temperature, he could wake the patient with a call even before he felt anything and tell him to come to hospital or, if caught early enough, to take medication to resolve

the problem at home.

All this monitoring would bring two new risks: mass hypochondria, as patients obsessed over their data and flooded hospitals with requests for consultations; and alarm fatigue, in both patients and medics. The antidote would be an intelligent monitoring system combining all the different data-streams, filtering out the least relevant and alerting staff only when needed. A computer taught to recognise deviations from standard recovery would be able to alert medical staff to aberrations. For example, a pneumonia patient who does not shake off a fever after two days of antibiotics needs attention. Most others simply need to complete the course of drugs, and get some rest.

Physician, heal thyself

As well as enabling doctors to monitor patients more effectively, technology could also improve their skills, increase their reach—and, sometimes, take their jobs. Although hospital managers insist that technology would not replace staff, this is of course nonsense. Basic tasks, such as carting laundry around, are already being taken over by robots. Everyday care, such as keeping patients clean, could be next. Radiologists and pathologists, whose skills are primarily visual, are at risk of being elbowed aside by machines.

Engineers at Imperial College London recently developed Deep Medic, a computer program that assesses scans of patients with head injuries for signs of brain trauma. Today, these are diagnosed by a doctor who pores over MRI scans. Deep Medic can do the job in seconds. Brain tumours could be next. Such diagnoses would be cheaper and more accurate than possible with the human eye.

But mostly such technological advances would make doctors better, not replace them. The Cleveland Clinic is putting Watson, IBM's robot that learns to reason as it is fed data, through medical school. It could soon join doctors on their rounds. University Hospital Marburg, in Germany, recently began using Watson to improve the diagnosis and treatment of rare diseases (one early success was to help trace mysterious stomach symptoms to water snails in a patient's aquarium, leading to a diagnosis of bilharzia, a tropical disease). The smartphones in doctors' pockets could replace the stethoscopes around their necks. Machines do not get emotional or tired, nor do they struggle to distinguish whether a newborn baby is blue (and thus in need of urgent intervention) or pink.

The surgeon's job, too, could be transformed. Today, the use of robots in the operating room is limited because they must be steered manually with a joystick. In future robots might be able to carry out some standard procedures such as hip replacements autonomously, with a surgeon getting things started and the robot doing the rest. With more complex operations, a supercomputer linked to a real-time virtual-reality (VR) machine could help walk surgeons through their operations. It could, for example, highlight where a tumour sits in the liver and warn a surgeon about impinging on an artery, just as a satnav warns of traffic jams ahead.

Sricharan Chalikonda, a surgeon at the Cleveland Clinic, says he can imagine scrubbing up "full Robocop-style", with a helmet with built-in VR goggles giving him fighter-pilot "super-vision" and gloves that give him "super-hands". His team has already worked with 3D prints of patients' organs; the next big leap would be to project live images, showing the blood flowing through them. Microsoft HoloLens, clever virtual-reality goggles, is already being used to teach students about anatomy; cadavers can be cut up, which is useful, but to observe biological processes such as circulation in action only a live or VR body will do. In the future, every big hospital could have a Star Trek-style holodeck where surgeons could plan and rehearse complex operations on a 3D projection of the patient. Advances in minuscule robotic tools could correct for the imperfections of the shaky, too-large human hand, allowing fewer and smaller cuts than keyhole surgery as it is currently practised.

With quicker and less invasive treatments, recovery times would fall. Medical errors would become less frequent, as would the need for repeat operations. Surgeons in the control tower might, eventually, operate on patients all round the world. "I can totally see myself sitting here at my desk, guiding three operations in three different locations," says Mr Chalikonda, as he leans back in his chair.

As technology amplified the reach of each health-care professional, one useful consequence would be to ease a looming labour shortage. Without a big leap in productivity America alone will lack up to 90,000 doctors by 2025. And worldwide demand for health care is growing as lives—and that part of them lived in poor health—grow longer. The World Bank estimates that by 2030 the number of health-care workers will need to double, compared with 2013—an extra 40m workers globally. High rates of stress and burnout are already a problem in health care; if workloads continue to increase they will only rise further. But if medical staff are made more productive with the help of computers, monitoring devices and robots, they can be freed up to do the work that only humans can do, and helped to do it better and more happily.

If full advantage is to be taken of new medical technologies, not only medical professionals, but patients, too, will have to take on a new role: more like co-pilot than passenger. Illegible charts at the end of the bed—literally out of patients' reach—would be replaced by a constantly updated electronic health record accessible on any device, by doctor, nurse or patient. The Cleveland Clinic already streams patient records, including test results, to "MyChart", a site and app through which patients can also contact their physicians.

In many Kaiser hospitals, a flat-screen television on the wall gives patients information about their recovery and what they must do before they can go home. It may not be long before patients can be given access to the same sights and sounds as their doctors, for example by streaming the sound of a stethoscope to a headset or the view from an otoscope to a screen. Mr Tyson wants people to become as interested and engaged in their bodies as they are (or, at least, as he is) in their cars. He thinks that with the right technological and medical support they would be able to spot, and respond to, raised cholesterol as quickly as they would to low tyre pressure.

The modern hospital is a great achievement. And, in some form, it is sure to survive. "There will always be hospitals where patients with complex needs go for multidisciplinary diagnosis and treatment by teams of specialists," says John Deverill of GE. He predicts that separate facilities will spring up to provide common surgical interventions, such as joint replacements or cataract removals, to benefit from scale. And hospitals will also continue to be needed to treat emergency cases.

Beam me better, Scotty

The next iteration of the hospital, however, is tantalisingly within reach—and it is more the co-ordinating node in a network than a self-contained institution. "We have reached the peak of bringing patients to the healing centres—our hospitals," says Samuel Smits of Gupta. "We are on the brink of bringing the healing to patients." ■

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Indian e-commerce

Delayed delivery

MUMBAI

Once darlings of the global startup scene, the sheen has come off Indian consumer internet firms

THE promise of virgin commercial territory up for grabs, startups vying to lure investors' money even faster than they burn through it, and Amazon trying to capture all the spoils: the recent scramble for the Indian online consumer has had more than a whiff of the late-90s dotcom boom about it. The exuberance seemed justified. India is the world's fastest-growing large economy, its consumers increasingly clutching smartphones and fattening wallets. Online shopping, worth just $1bn five years ago, seemed to be growing so fast that it would exceed $100bn by 2020.

The boom has ended not with a pop, as in 2000, but a whimper. Online sales, after more than doubling in 2014 and nearly trebling in 2015, were nearly flat in 2016 (see chart). Analysts are scrambling to lower their forecasts. Given that total retail consumption in India grows by around 18% a year, and internet penetration went up by two-fifths last year, e-commerce if anything looks to be losing ground.

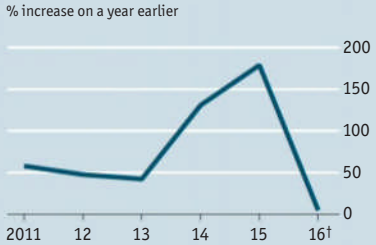
That is sobering news for many. In the 18 months to December 2015, investors put $9bn into Indian startups, often at eye-popping valuations. Forrester, a research group, now reckons that the market will grow to $48bn by 2020. That may not be enough to sustain the five big general online retailers—Flipkart and Snapdeal, two established Indian firms that are trying to fend off Amazon, as well as a pair of smaller firms, Paytm and ShopClues. A long tail of niche firms peddles everything from taxi rides to cinema tickets.

They all hope that 2016 will prove to have been a blip. Some factors that slowed sales growth may have been one-offs; some changes were in fact welcome. An unhealthy cycle had developed, whereby investors backed e-commerce firms that showed strong sales growth, which then used the cash to fund discounts needed to attract more customers, who were unprofitable but boosted sales growth, attracting new investors, and so on.

According to RedSeer, a consultancy, by 2015 some 20-30% of all e-commerce sales were to middlemen who were buying heavily discounted merchandise from the big companies and selling it on nearer its full price, pocketing the difference. But a deluge of funding in 2015 turned to drought in 2016. Firms ceased subsidising unprofitable sales and concentrated on limiting their losses, which dented overall sales.

All over the shop

India, online sales*
% increase on a year earlier



Sources: Company reports; IAMAI; Euromonitor; Credit Suisse
*Gross merchandise value of goods sold
†Estimate

The authorities also put a dampener on the market, by reiterating a year ago that e-commerce firms have to act mostly as matchmakers between buyers and sellers (as eBay does in most countries), not sell their own inventory. Companies already skirt the rule using subsidiaries, but it became harder to do so. The sudden "demonetisation" of large bank notes in November hurt online sales (around two-thirds of Indian buyers of goods online are paid with cash upon delivery).

Not all online firms have been equally affected by the slowdown. By all accounts Amazon continued to grow; it now claims to be the market leader. Flipkart, which also claims to be the biggest Indian e-commerce firm, struggled in early 2016 amid mass departures of senior staff; it appears to have recovered somewhat since. Snapdeal, formerly beloved of investors, is now a distant third. SoftBank, a Japanese investor with a one-third stake, is reportedly seeking to sell it to Flipkart, even if that means investors getting less money back than the nearly $2bn they put in.

Some observers are questioning whether the long-term promise of Indian e-commerce still holds. Increasingly, executives hint in private that the market is far smaller than their former marketing material suggested. "Most people talk about India being a 1.2bn consumer market. It's not," Ashish Hemrajani, founder of BookMyShow, a ticketing site, told a conference recently. Though smartphone usage is rising quickly, there are perhaps 200m-250m Indians with internet access and credit or ▸▸

debit cards, most of them in big cities. But only a proportion of this total is actually inclined to shop online. The number of active online shoppers reached 35m-40m in 2015, and has not grown much since then, says Arya Sen of Jefferies, a bank.

The funding drought of 2016 seems to be easing. But so-called "down rounds", in which companies accept investment based on valuations significantly below their peaks, are now the norm. Both Flipkart and Ola, a ride-hailing firm, are having to endure them.

This duo have been at the vanguard of calls for protection from foreign competition. Sachin Bansal, a co-founder of Flipkart, has complained about unfair "capital dumping", notably by Amazon, which has pledged $5bn to its Indian subsidiary. Both Amazon and Uber failed to crack China, and are hoping for redemption in India. They can deploy oodles of capital generated by non-Indian operations. Along with the top brass at Ola, Mr Bansal has pleaded with the government to follow the Chinese model of restricting foreign companies from operating in India.

Such tactics are little more than "crying foul after playing the game", says Radhika Aggarwal, ShopClues' co-founder. Fears that Alibaba, a deep-pocketed Chinese rival, could gatecrash the market in earnest (it is currently a large investor in Paytm's parent company) are rising. Rakuten, an aggressive Japanese e-commerce firm, is also said to be preparing to enter the market, which is still big enough to tempt.

Cart game

Needless to say, Flipkart and Ola still welcome foreign capital that goes into their own coffers. They certainly need it. The big Indian e-commerce firms are probably losing $2bn-2.5bn a year in total. Optimists hope the end of the funding froth will have kiboshed only firms with bad business plans. Even the large players are focusing on niches, such as fashion or groceries, that have fatter margins than gizmos such as smartphones (roughly half of all sales now), which are barely profitable. Amazon aside, the focus is on finding ways of making more money from existing customers rather than finding new ones.

It also bodes well that founders have pointedly shifted their focus from sales to profits. The question is whether customers will buy as much online if they no longer receive a subsidy from venture capitalists every time they check out. The assumption used to be that the Indian e-commerce market had room for all firms to thrive. Now the consensus is that only the implosion of the weakest can lift returns so that investors become willing to pour in more money, allowing the Indian champions to take on the likes of Amazon. And if this year is no better than last, even that will be called into question. ■

Fox News

The $13m factor

NEW YORK

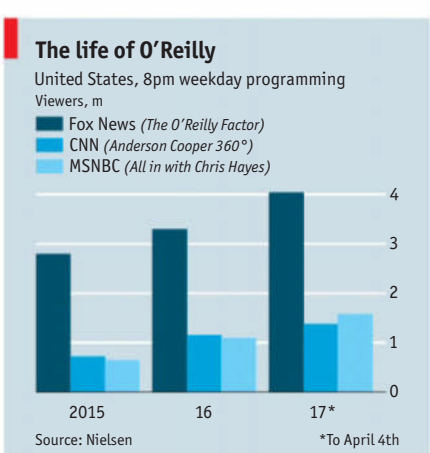
More allegations about goings on at Rupert Murdoch's Fox News

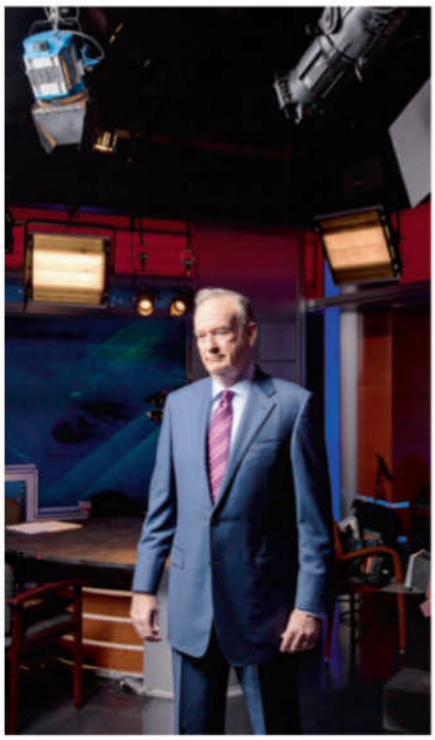
EVEN for Rupert Murdoch and Fox News, no strangers to controversy, the allegations against Bill O'Reilly present an extreme test. On April 1st the *New York Times* published an investigative report that described accusations of sexual harassment and other inappropriate behaviour from at least seven women against the presenter. He and the network, the paper said, have paid about $13m to five women since 2002 to settle cases where they alleged such behaviour. Mr O'Reilly denied the merits of the claims.

The news came less than nine months after Roger Ailes, the network's founding boss, stepped down following multiple sexual-harassment claims against him. This week around 50 advertisers left Mr O'Reilly's programme, "The O'Reilly Factor", among them several car brands, including Mercedes-Benz and Toyota's Lexus, as well as GlaxoSmithKline, a drugs company. The National Organisation for Women has called for him to be fired.

All eyes are on Mr Murdoch, who has been running Fox News himself since he pushed out his friend, Mr Ailes. Mr O'Reilly has probably been just as valuable to him. Long the most-watched presenter in cable news, his audience has surged higher still since the election of Donald Trump. His show is averaging 4m viewers a night this year (see chart), helping make Fox News the most-watched cable channel in America. Mr Trump this week spoke out in Mr O'Reilly's defence.

An advertiser revolt will hurt, but on its own it is unlikely to make Mr O'Reilly's ouster inevitable. Buyers place ads across multiple programmes on a network; many ads will shift to other Fox News shows. Nor





Lights, camera, where's the action?

is advertising the biggest source of Fox News revenue. SNL Kagan, a research firm, estimates that Fox News will collect more than $900m in advertising revenue this year, but close to double that—$1.7bn—from fees paid by cable and satellite providers to carry the channel to 89m homes. An initial statement from 21st Century Fox, the parent company of Fox News, was supportive of Mr O'Reilly. The network recently renewed his contract. In a statement, Mr O'Reilly also stated that he is a vulnerable target of lawsuits seeking to harm him and Fox News.

Yet the scandal is probing the limits of Mr O'Reilly's worth. One executive with a big ad-buying agency in New York was at first sceptical of the impact of the scandal when there was no initial concern from clients, but noted a herd effect developing later to leave the programme (though not the network). Whether Mr Murdoch buckles under the pressure may also depend on his potential replacements for Mr O'Reilly. He has already replaced another departing star, Megyn Kelly (one of Mr Ailes's accusers, and a target of Mr Trump), with Tucker Carlson, a conservative commentator who is doing very well.

Any decision will involve Mr Murdoch's sons—Lachlan, a co-executive chairman of the parent company with his father, and James, the CEO. They reportedly played a part in ousting Mr Ailes. But they have said nothing publicly this week and their views remain unclear. Much as the scandal is gauging the worth of Mr O'Reilly to Fox, it may also be a test of forces within the Murdoch family. ■

Pharmaceuticals

A world of pain

WASHINGTON, DC

Makers and distributors of opioid painkillers are under scrutiny

BETWEEN 1999 and 2014 sales of prescription opioid drugs almost quadrupled in America, an increase that came not simply in response to patient suffering but because more of the population are addicted to these powerful drugs. Such is the demand for them, Americans now consume four-fifths of the global supply.

Growth on this scale has been profitable for some: OxyContin, a popular opioid made by Purdue Pharma, a drug company in Stamford, Connecticut, has made its manufacturer tens of billions of dollars (see chart). But more broadly it has spelled tragedy. Deaths from opioid use in America quadrupled over the same period. About 90 people die every day, according to the Centres for Disease Control and Prevention.

That dissonance between corporate success and private pain has become a matter of public interest. On March 28th Senator Claire McCaskill, a Democrat from Missouri, said that she would investigate the role that pharma firms played in creating the opioid crisis. Through a committee that oversees issues of homeland security and government affairs, she has written to five makers of prescription painkillers—Purdue Pharma, Depomed, Janssen/Johnson & Johnson, Insys Therapeutics and Mylan. She is demanding internal corporate documents stretching back over five years.

Ms McCaskill wants to know exactly how firms marketed their drugs and what they knew about the risks of addiction and abuse. In particular, she wants to find out if companies used calculated sales-and-marketing strategies that involved encouraging doctors to prescribe opioids for a wider category of causes of pain than they would otherwise have done and downplaying the risk of addiction.

This is not the first time such questions have been raised. In a case in 2007, the parent company of Purdue Pharma and three current and former executives there pleaded guilty to criminal charges that they misled regulators, doctors and patients about OxyContin's risk of addiction and potential for abuse. Purdue promoted the drug, which is long-acting, as posing a lower risk of abuse and addiction than shorter-acting painkillers—such as Percocet and Vicodin. The firm admitted it had made statements about its drug that were "inconsistent" with approved prescribing information. In other words, the firm had incorrectly told doctors that OxyContin was less prone to abuse than other opioid medicines. The firm agreed to pay $600m and the three executives paid $34.5m in fines.

Ms McCaskill's inquiry is not the only one drug firms face. The Department of Justice (DOJ) has alleged that kickbacks were offered to encourage drug prescriptions and also that, as a result, health insurers were defrauded. In December the DOJ arrested former senior staff at Insys Therapeutics on charges that they led a conspiracy to bribe doctors to unnecessarily prescribe patients a pain medication based on fentanyl (an opioid that is up to 50 times as powerful as heroin), defrauding the insurers who had to cover the drug's cost. The Drug Enforcement Administration has also taken action against firms for failing to control the "diversion" of prescription drugs to illicit uses. Earlier this year McKesson, a San Francisco-based pharma distributor, agreed to pay $150m for failing to report suspiciously large orders of drugs.

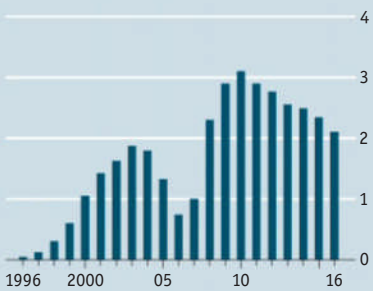
Increasingly, too, counties and cities are filing lawsuits against manufacturers for their role in the opioid epidemic. There may be further legal action against the firms that distribute opioid medicines, acting as intermediaries between pharma firms and pharmacies. Some have been named in lawsuits.

Nora Volkow, director of the National Institute on Drug Abuse, says that pharma companies are not the only ones to blame for the opioid crisis. She points to well-meaning efforts to implement procedures to make sure that pain was not undertreated in hospitals. Direct-to-consumer advertising of opioids may also have encouraged overuse. Only America and New Zealand allow pharma firms to advertise drugs directly to patients.

The scrutiny on the industry is nonetheless intensifying. The number of opioid prescriptions being given is no longer rising, and may be falling. The same cannot be said for drugs firms' legal woes. ■

Jagged little pills

United States, OxyContin sales, $bn



Source: QuintilesIMS

Entrepreneurs in Africa

Hurdles for hubs

ADDIS ABABA

The going is tough for African tech hubs and startup incubators

"YOU are either part of the solution or part of the problem," it says in painted letters on a wall. "Stay hungry, stay foolish," says the wall opposite. An old rickshaw sits among beanbags and a vase of flowers rests on an ancient oil barrel in the corner. "We wanted the space to feel like Google," says Eleni Gabre-Madhin, the founder of blueMoon, a new agribusiness incubator that opened in Addis Ababa in February, without a trace of irony.

Incubators and their cousins, accelerators, provide hands-on training and mentoring, and often a physical space, to help early-stage business ideas develop. In Silicon Valley they find capital for startups and take a slice of equity in return for their services. Ms Gabre-Madhin says that blueMoon draws inspiration from Y Combinator, an American accelerator founded in 2005 whose investees include Dropbox and Airbnb. The new firm's first cohort of startups will train at the office for four months, and it will give each a small cash injection in exchange for a 10% stake.

That is a rarity in Africa's startup scene. A simpler and more common model is for "tech hubs" to provide office space, some networking events and fast broadband internet. A recent survey counted over 300 such facilities on the continent. One of the first hubs was iHub in Nairobi, launched in 2010, which has an incubation arm focused on mobile technology, called m:lab. But m:lab, like many of its kind, is not a real incubator: it was founded with grant support from the World Bank and takes fees from, but not equity in, the companies that it nurtures.

Becoming a proper incubator has proved tricky. Hypercube Hub in Zimbabwe closed in 2015 after operating for less than two years, having failed to find a sustainable business model. A seed fund and incubator based in Nairobi called ▸▸

88mph closed in 2015 after struggling along for four years; its Nigerian spin-off, 440.NG, was discontinued after the first cohort graduated—the return on capital to the founder was insufficient. Only one genuine incubator, Raizcorp in South Africa, is profitable without grant funding. Almost all are waiting for their first big payout.

Many incubators lack experienced mentors to guide young businesses. In a country like Ethiopia, home to few internationally successful businesses, finding qualified staff is a headache. Even in more sophisticated Nigeria, mentors can be substandard. Some actively harm young startups by, for example, pushing them into raising capital too early.

Just as entrepreneurs need decent mentors, incubators need good entrepreneurs if they are to make any money. In Africa, says Nicolas Friederici of Oxford University, incubators have disappointed because they are a supply-side solution: there are still too few promising startups in need of their services. Many of the best entrepreneurs have already left for other places.

When Michael Oluwagbemi set up Wennovation Hub in Lagos in 2011, he found he had to teach wannabe entrepreneurs how to write applications and design websites before he could even launch the formal incubation programme. "The incubator in Africa is basically a finishing school and four months of it is not enough," he says. ■

Clothing companies

Green is the new black

Looking good can be extremely bad for the planet

STYLE is supposedly for ever. But the garments needed to conjure up eternal chic are spending less time on shop racks and in homes than ever before. Global clothing production doubled between 2000 and 2014, as apparel firms' operations became more efficient, their production cycles became quicker and fashionistas got more for their money. From just a few collections a year, fast-fashion brands such as Zara, owned by Spain's Inditex, now offer more than 20; Sweden's H&M manages up to 16.

Dressing to impress has an environmental cost as well as a financial one. From the pesticides poured on cotton fields to the washes in which denim is dunked, making 1kg of fabric generates 23kg of greenhouse gases on average, according to estimates by McKinsey, a consultancy. Because consumers keep almost every type of apparel only half as long as they did 15 years ago, these inputs quickly go to waste.

Living in the garb age

The latest worry is shoppers in the developing world, who have yet to buy as many clothes as rich-world consumers but are fast catching up (see chart).

Most apparel companies know that sooner or later, consumers' awareness of this subject will rise. That is a worry. Various furores in the 1990s and afterwards over the working conditions of people making goods for firms such as Nike, Walmart and Primark badly damaged brands. The clothing industry cannot afford to appear so ugly again.

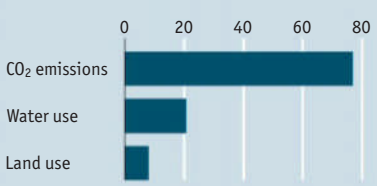
One obvious way in which firms can answer environmental concerns is to use renewable energy to power their facilities. Beyond that, they can cut back sharply on water and chemical use; and they can develop new materials and manufacturing processes that reduce inputs.

The record in this regard is mixed. H&M was the largest buyer in the world of "better cotton" last year—that is, cotton produced under a scheme to eliminate the nastiest pesticides and encourage strict water management. It grows in 24 countries and represents about 12% of the 25m tonnes of cotton produced each year globally. Kirsten Brodde of Greenpeace also notes that H&M has eliminated toxic per- and polyfluorinated chemicals from its lines (which are used to make garments waterproof). Nike's Flyknit method of weaving items, including trainers, reduces waste by 60% in comparison with cutting and sewing. Flyknit products have a large following: revenues from the line came to more than $1bn in the last fiscal year.

Wardrobe malfunction

Environmental impact if 80% of emerging markets achieve Western levels* of clothes shopping

% increase per person 2015-25, forecast



Source: McKinsey *Assumes levels stay constant

But for many firms, research and development into new materials and methods is not a priority. Plenty do not measure their overall environmental impact. And introducing green collections can even carry a risk for brands, reckons Steven Swartz of McKinsey. It is possible that a shopper will move on from wearing a consciously green T-shirt to viewing other kinds of clothing as the trappings of planetary destruction.

A handful of brands encourage customers to recycle old clothes by returning them to stores. But almost all apparel today is made of a mix of materials—very often including polyester. Separating them out is difficult and mechanical methods of recycling degrade fibres. Chemical methods are too expensive to be viable. Shipping second-hand clothes off to countries in Africa and Asia is also a bust. Even if local markets are large enough to absorb them, the poorer quality of polyester-mixed garbs means they do not survive long.

More durable apparel could help. Tom Cridland, a British designer, creates men's clothing that is designed to last three decades thanks to strong seams and special treatments to prevent shrinking. He expects revenues of $1m this year, but admits that his model will be hard to scale. Patagonia, a maker of climbing and hiking gear, sends vans to campuses to help students patch up jackets and trousers. It helps others with greenery, too. After discovering a type of material for wetsuits that, unlike neoprene, requires no oil to make, Patagonia shared the find with surfing brands such as Quiksilver. Such innovation is badly needed. Style may be forever but today's model of clothing production is not. ■

Oil and technology

Data drilling

The oil industry struggles to enter the digital age

IT SOUNDS like a spectacular feat of engineering. Employees of Royal Dutch Shell located in Calgary, Canada, recently drilled a well 6,200 miles (10,000km) away in Vaca Muerta, Argentina. In fact, the engineers of the Anglo-Dutch oil major were using computers to perform what they call "virtual drilling", based on their knowledge of Fox Creek, a shale bed in Alberta, which has similar geological features to Argentina's biggest shale deposit. They used real-time data sent from a rig in Vaca Muerta to design the well and control the speed and pressure of the drilling. On their second try, they completed the well for $5.4m, down from $15m a few years ago. "It's the cheapest well we've drilled in Argentina," says Ben van Beurden, Shell's chief executive.

Shell is not alone in deploying computer wizards alongside geologists in an attempt to lower costs in an era of moderate oil prices. The industry as a whole is waking up to the fact that digitisation and automation have transformed other industries, such as commerce and manufacturing, and that they have been left behind. Technology firms and consultancies are knocking on their doors peddling alluring concepts like the "digital oil rig" and the "oilfield of the future". Some argue that the embrace of digital technologies could be the next big thing after the shale revolution that started to transform oil and gas production in America a decade ago. But this is an industry that embraces new technologies only in fits and starts.

Off to new platforms

Once, Big Oil was at the forefront of digitisation, pioneering the use of 3-D seismic data and supercomputers to help find resources. But priorities changed, especially during the past decade when oil prices rose above $100 a barrel and the primary goal was to find more of it, whatever the cost. Whizzy new technology took second place. Ulrich Spiesshofer, chief executive of ABB, a Swedish-Swiss automation-technology company, says the oil industry puts to use in exploration activities barely 5% of the seismic data it has collected. During production of oil, less than 1% of data from an oil rig reaches the people making decisions, reckons McKinsey, a consultancy.

It is the process of extracting oil and gas that is considered most ripe for digitisation and automation. Drilling often takes place miles below the surface in rock formations where drill bits and pipes can be broken or snagged, which halts activity for long periods. Baker Hughes, an oil-services firm, has recently developed what it calls the first automated drill bit, capable of self-adjusting depending on the nature of the rock. McKinsey says undersea robots are also being deployed to fix problems.

Above the surface, efforts are under way to reduce the amount of people and plant on oil rigs, helping improve safety in a dangerous industry. James Aday, a veteran oil driller now at Wood Mackenzie, a consultancy, says that on the drilling platform itself, automation is not new. Others say that more rigs are being controlled semi-remotely; in the Gulf of Mexico, engineers in Houston use real-time data from oil rigs to make decisions, reducing the cost of shuttling them by helicopter to rigs. "The aim is to bring the data to the expert, not the expert to the data," says Peter Zornio of Emerson, an automation firm. "There's a huge incentive to get the people and the choppers off the platform."

Wider use of data, sensors and automation will produce new challenges for the industry. It will have to learn about cybersecurity—oil rigs are critical infrastructure—and invest in ways to prevent theft of data. But digitisation may also attract millennials to replace an ageing workforce, where mass retirement is a looming threat.

As to whether the workforce could shrink across the industry in the digital age, ultimately geologists and engineers believe technology will not put them out of a job, because producing oil is art as well as science. Nor will tech startups be likely to overcome the barriers to entry—such as high capital requirements—that protect incumbents. But they add to a sense, born out of the shale revolution, that innovation will make oil and gas more accessible and that the days when oil was considered a scarce resource are long gone. ■

De La Rue

Swapping notes

A money printer's plans for the future

THOMAS DE LA RUE set up shop more than 200 years ago, printing newspapers, then playing cards and stamps. In 1860 a contract to print banknotes for Mauritius started a transformation. Today De La Rue is the largest commercial banknote and passport printer, involved in aspects of the production of currencies for 140 countries, and passports for over 40.

The British firm's chief executive, Martin Sutherland, is relatively relaxed about the much-heralded death of cash. Despite advances in payments technology, and a shift to cards in Europe, the total demand for cash has proven remarkably resilient. Transaction values are rising rapidly in emerging economies, where hard currency is still the norm. De La Rue expects world demand for banknotes to grow by 3-4% a year for the foreseeable future.

But there are problems nonetheless. Even at the best of times, note production, which accounts for over 70% of the company's revenues, is a volatile business. Contracts are lumpy. State-owned printers often call in commercial printers at short notice to manage spikes in demand, which are unpredictable. On top of that, national authorities are demanding better value. They are running cut-throat tendering processes rather than relying on existing relationships. Some are sourcing individual components—such as design, paper or security features—from multiple suppliers, rather than buying the entire package from a single provider. Others have gone still ▸▸

further: thanks to the Indian government's "Make in India" campaign, for example, a former big customer of banknote paper is now making its own.

The consequence of such trends has been falling prices and a build-up of excess capacity in the industry. De La Rue had to warn investors about its profits repeatedly in the years leading up to 2015 (since then, profits have exceeded expectations).

The company's answer has been to try to expand its offerings of technology-led security products. Cash itself is getting more secure: polymer banknotes use complex holographic images to guard against forgers. They are longer lasting, so need to be replaced less frequently, but command a higher price. In 2012 De La Rue became the second of only two companies to produce the plastic (Innovia, based in Britain, is the other) and has printed notes for several authorities, including, most recently, the Bank of England. Demand for the material is forecast to rise by 10% a year in the near future (a kerfuffle over traces of animal fat in the new notes seems likely to be resolved by using palm oil instead).

De La Rue also expects demand for passports and for other security identification to grow. A significant proportion of the world's population remains unrecorded—UNICEF estimates that a quarter of the world's children under the age of five are unregistered, for example. But the market for physical tokens, broadly speaking, could consolidate over time, says John Nelson of Smithers Pira, a market-research firm. Driving licences, social-security documents and passports may be merged into a single ID. The market could even disappear altogether: from 2019 onwards the Australian government, for example, wants to speed up border checks by replacing passport control with biometric scans.

De La Rue is responding to such threats by selling end-to-end services, not just physical products. It has new software packages that allow governments to manage the entire passport-issuing process, for example. It wants to help governments manage civil-registration data on births, marriages and deaths.

The last prong of Mr Sutherland's strategy is to apply the company's anti-counterfeiting expertise to product authentication. The OECD estimates that the market for counterfeit goods was worth $461bn in 2013, with luxury goods, electronics and tobacco most likely to be faked. De La Rue currently sells secure stamps that help governments verify that the appropriate tax on, say, cigarettes, has been paid. Its labels are also used by Microsoft to track and verify software products. There should be room to expand. Mr Sutherland reckons that luxury brands, especially, will become good customers; some already authenticate their products. If so, money will not be the firm's only cash cow. ■

Tesla

Revving up, a bit

The electric-car manufacturer increases deliveries

ELON MUSK, a Silicon Valley entrepreneur, has had two bits of good news recently about his various bets on new technology. SpaceX, his privately-held launch company, last month became the first successfully to reuse a rocket to put a satellite into orbit. And this week Tesla, his electric-car manufacturer, at last hit its production targets.

Some analysts doubted Tesla would meet its goals after a series of production difficulties. But the carmaker said first-quarter deliveries were just over 25,000 vehicles, a record for the firm and a 69% increase over the same period in 2016. Some 13,450 were its sleek Model S saloons and about 11,550 were the firm's new SUV, the Model X. This puts Tesla on track to produce the 50,000 vehicles it has promised to make in the first half of this year. That is good progress. But Tesla is going to have to crank production up by an awful lot more to make the 500,000 cars a year which Mr Musk wants to see pouring off the production line by 2018, let alone the 1m intended for just two years later.

To reach those volumes, Tesla is counting on its forthcoming Model 3. Priced at around $35,000, the new car will cost around half that of the other two models. Due to begin production later this year, the Model 3 is supposed to take Tesla into the mass market, where it will face stiff competition from plug-in vehicles produced by existing mass manufacturers, including GM, Nissan and BMW.

Bringing any new car to market burns cash, and Tesla has been busy raising funds. On March 24th Tencent, a Chinese internet giant that owns WeChat, a popular messaging service, paid $1.8bn for a 5% stake in Tesla. Tencent could help accelerate Tesla's drive into the vast Chinese market, where some 28m cars were sold last year. With Donald Trump trying to dismantle some environmental standards in America, China seems likelier to push green technologies. It is already the world's biggest market for electric cars; some 700,000 plug-in cars are expected to be sold there this year. But to compete against low-cost local brands, Tesla urgently needs to start churning out its cheaper car.

Many investors are betting that Tesla can become a mass producer. This has pushed up the value of the firm's shares, which have increased by 38% since the start of 2017. On April 3rd Tesla's market capitalisation exceeded $48bn, overtaking Ford (at $45bn). Ford may not be as technologically glamorous but it is well-versed in mass-producing cars, having made 6.7m last year. An awful lot will be riding on the Model 3. If Tesla fails to hit future targets then a cashflow crisis may loom. Investors, though, will have an exit: the company's brand and whizzy technology are easily valuable enough to drive the firm into the arms of a bigger manufacturer that can hit its numbers.

Why on Earth did you park here?

Schumpeter | The anti-mogul

Time Warner's boss calls the top of the television business

THERE is a hawk in Central Park that sometimes dismembers its prey on the balcony outside Jeff Bewkes's office. Guts are splattered around in the kind of Darwinian spectacle that any self-respecting media baron should appreciate as he plots plans for future world domination. Mr Bewkes, however, only manages a laconic shrug when he mentions the feathered predator.

The boss of Time Warner is an anti-mogul in more ways than one. In an industry long-dominated by imperious tycoons intent on amassing power—think of Rupert Murdoch, or Viacom's Sumner Redstone in his heyday—Mr Bewkes has shrunk a content empire, not expanded it. He is about to sell it to AT&T for $109bn in the fifth-biggest takeover of all time. If the deal goes through shareholders will have made a 341% return during his tenure (including spin-offs and dividends), making Time Warner one of the best-performing big firms in America during that time.

Beneath his laid-back surfer persona, Mr Bewkes has been ruthless but in the rational pursuit of his owners' interests, not his own vanity. His tenure can be split into three parts—culling, defending and preparing to exit on a high.

Back in 2000 Time Warner had become a corporate catastrophe after being bought by AOL, a web firm pumped up by the dotcom bubble. Upon taking charge in 2008 Mr Bewkes dusted off the lessons from the MBA he had picked up at Stanford University and his time spent at HBO, the group's subscription video-on-demand service, where he was known for giving creative types space to invent hits such as "The Sopranos" and "Sex and the City". He restructured the firm to focus it on its competitive advantage—visual content. In 2009 he spun off AOL. That year he also offloaded the cable distribution business, which hooked up too few homes to be able to compete. It was later bought by Charter, a rival. In 2014 he got rid of Time Inc, a magazine group.

The core business that is left is one of the two greatest agglomerations of video content in the world, together with Disney's library. HBO has 134m subscribers—in America they buy the service via pipes that are supplied by cable, telecommunications and satellite firms. Turner, another subsidiary, sells bundles of sports and TV shows to the pipe firms—its channels include CNN. Warner Brothers is Hollywood's second-biggest studio.

But the business model is deeply flawed. Conventional media firms are a cross between artists and merchants, who buy or create content and resell it with a large markup. Time Warner's sales are 2.3 times the size of its content budget. It has no direct relationship with viewers, so cannot collect the customer data that are becoming central to most businesses. The bulk of its sales are from traditional sources: advertising and fees from pipe companies and cinema chains.

Internet-based services, such as Netflix and Amazon Prime, are exploiting this shortcoming, bypassing the middlemen and selling content directly to customers. Netflix costs about $10 a month, compared with up to $100 for a cable-TV package. It collects copious data on its viewers in order to serve them better. A war is raging to make the best TV: over 400 original shows are made a year, about double the number half a decade ago. Meanwhile, people are spending more and more time on social media and YouTube. Americans aged 18-24 spend around half as much time watching live TV as they did in 2010.

You might think that a firm such as Time Warner would have had its innards ripped out by now. But its share of the free cash-flow that the content industry (defined broadly to include pipe firms, media groups and internet-platform firms such as Google and Amazon) generates has risen from 3% to 4% in the past five years. Mr Bewkes's defence has had several elements. He has spent heavily on content, ploughing $12.5bn a year into shows such as "True Detective". He has cranked up the prices he charges the pipe firms—fees paid by them rose by 12% last year—while improving the bundles of shows sold and making more films available on demand. Time Warner has been willing to sell content to the internet firms. And it has copied Netflix with a new internet service called HBO Now. It only has 2m users but is growing fast.

Yet Mr Bewkes must know that, like the best shows, the TV business cannot carry on for ever—at least, not while maintaining its plump margins. The new entrants have deep pockets. And when Time Warner and other media firms raise the fees they charge the pipe firms, the latter pass this on to consumers. At some point the tolerance of American TV-watchers for being gouged by their cable firms must end.

Time Warning

AT&T has offered a stonking price, half of it in cash, far more than the lowball bid that Fox, Mr Murdoch's firm, offered in 2014 and which Mr Bewkes sensibly rejected. It can give Time Warner a direct relationship with viewers. A mobile user watching a Warner film could be tracked and the data used to sell smart advertising. Antitrust regulators may insist that these data are made available to other content companies, lowering their value. Even so, the two firms argue that being under common ownership will still make sense because they can launch new services faster. Before the election Donald Trump, who regards CNN as "fake news", slammed the deal as bad for consumers. But the signals from the government are more favourable of late. Wall Street's arbitrageurs reckon the odds of it being approved this year are over 75%.

For Mr Bewkes that will be a poignant moment. A creative powerhouse will pass into the hands of a regulated monolith that lays copper in the ground and has a quarter of a million staff, none of whom gets paid to discuss plot twists and dolly shots. Yet the truth is that traditional media moguls who cling on to their empires have yet to show that their business models can survive the internet. Inside Mr Bewkes's office, as well as outside on its balcony, there is no room for syrupy sentimentality. ■

Also in this section

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Japan's labour market

Wanted: stroppier employees

TOKYO

Japan's workers are hugely in demand but strangely undemanding

TRIMLY DRESSED deliverymen, polite and punctual, are ubiquitous in Japan. So it was shocking to see one of them kicking his parcels and hurling his trolley outside a block of Tokyo flats after apparently finding no one at home. Captured on a camera phone last December, this incident of "parcel rage" went viral, forcing Sagawa Express, one of Japan's biggest delivery companies, to say sorry to its customers. Many Japanese will have felt sympathy, though, for the video's frazzled star.

Over 10% of the country's firms admit that some workers frequently put in more than 100 hours of overtime in a month. A manager at a nuclear plant in Fukui prefecture worked twice that long in February 2016 before killing himself two months later. The problem is especially acute in low-skilled service industries. Over the past two decades, e-commerce has vastly increased the number of parcels handled by firms like Sagawa. Last year, one employee committed suicide after being violently bullied by his boss.

In a survey in 2015 by the Japan Institute of Labour Policy and Training, some workers blamed their own lack of ability for why they put in so many extra hours. Others dutifully replied that overtime was necessary to achieve satisfactory results. But the two most common responses were straightforward economics: lack of staff and extreme fluctuations in demand.

Both of these forces are leaving their mark on Japan's labour market. The number of people of working age (15-64 years old) has fallen by about 3.8m since December 2012, when Shinzo Abe, Japan's prime minister, returned to power. But the number of people actually working has increased by 2.2m. Almost everybody seeking a job has one: unemployment fell to just 2.8% in February, the lowest rate since 1994. Demographic decline has collided with an upswing in labour demand.

This combination should be highly inflationary. Scarce workers should be demanding higher wages, forcing firms to charge their customers higher prices. But pay and prices remain subdued. In their negotiations with employers, Japan's labour unions have shown none of the aggression that the Sagawa delivery man inflicted on his parcels. Although base pay (excluding bonuses and overtime) has stopped falling in the past two years, it increased by only 0.2% in 2016. That has left inflation well below the 2% target pursued by the Bank of Japan (BOJ).

They work hard for their money

Japan, labour compensation

Nominal % change on a year earlier

Source: Government statistics

Japan's wages remain flat partly because strong demand has resulted in an increase in the supply of labour rather than its price. Japan now hosts more than 1m foreign workers, up from 680,000 in late 2012. More importantly, the number of women and elderly men in work has increased by more than 2m over that period. Some of these extra hands have been pushed into work by financial anxieties. But others are pulled by economic opportunity. Mr Akira, who guides traffic with an illuminated baton outside a Burger King in Tokyo, is one of the latter. Aged 73, he prefers to stay physically active by earning money from a job rather than paying money to a gym. With the extra yen, he can afford to take his wife on bus trips to hot springs in Nikko and Kusatsu.

The rising share of part-timers in Japan's workforce has also dragged down average pay gains. The aggregate compensation of all employees combined (which reflects employment gains and pay gains) increased by 2.3% in nominal terms last year, the fastest rate this century (see chart).

Market forces do not affect large swathes of Japan's workforce. The pay of full-time workers in big firms is not responsive to labour-market tightness, according to a study published by the BOJ. These beneficiaries of life-time employment do not fear layoffs in hard times and cannot expect pay rises in good. But these workers do demand higher pay to offset past inflation. So, if peripheral workers' pay rises by enough to lift consumer prices a little, that will eventually result in stronger core ▸▸

wages, adding to inflationary momentum.

To attract and retain workers, some firms are offering perks other than pay. They are allowing employees to settle in one place, rather than yanking them from one branch to another at short notice. The government is also encouraging people to clock off at 3pm on the last Friday of each month (so-called "Premium Friday"). Many unions are also bargaining for shorter workweeks. Last month Rengo, Japan's leading union federation, reached a deal with the country's largest business lobby to limit overtime to less than 100 hours a month in "busy" periods (and 45 hours at other times). The cap may be enshrined in legislation due later this year.

Obstacles to a shorter workweek remain. An online survey suggested that fewer than 4% of Tokyo workers left work early on the first "Premium Friday" at the end of February. Legal overtime limits will also be hard to enforce. Matsuri Takahashi, a 24-year-old employee at Dentsu, an advertising company, leapt from the third floor of her dorm on Christmas Day 2015. She had put in more than 100 hours of overtime in a month, but her managers had encouraged her to fake her timesheets.

Any new legislation might, however, send a signal that the old ways will no longer work, says Toko Shirakawa, a journalist who sat on a council appointed by the government to propose workplace reforms. Some parcel-delivery companies have reached the same conclusion. Yamato Transport, which runs a door-to-door service, said last month that it is slashing overtime and raising basic charges for the first time in 27 years. It is also setting up thousands of lockers at places like train stations where deliverymen can leave parcels if no one is at home. That should spare employees the hassle of a repeat visit, and save their packages from a good kicking. ■

Buttonwood | Top-heavy

America has a worryingly hefty weight in the global stockmarket

THE aims of a stockmarket index are threefold. First, to reflect what is actually going on in the market; second, to create a benchmark against which professional fund managers can be judged; and third, to allow investors to assemble well-diversified, low-cost portfolios. On all three counts there are reasons to worry about the MSCI All-World Country Index, one of the most widely used gauges of the global stockmarket.

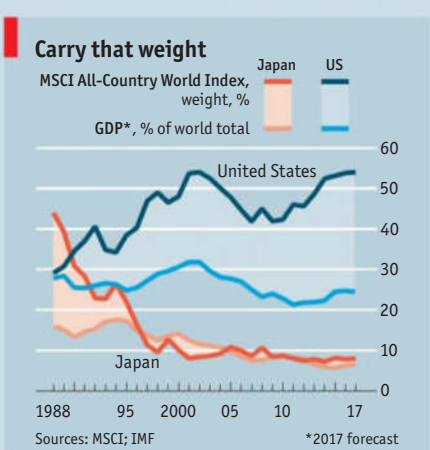
That is because the American market has a weighting of 54% in the index, as high as it has ever been (it reached the same level in 2002). In other words, anyone using the index to monitor the market is seeing a picture heavily distorted by Wall Street. The relative performance of international fund managers against the index will largely depend on how much exposure to America they are willing to take on. Anyone buying a tracking fund is, in effect, making a big bet on the American market. Things are worse if investors track the MSCI World Index, which covers only developed markets. In that benchmark, America's weight is 60.5%.

There is nothing wrong with the way that MSCI calculates its indices; the weights reflect how America dominates global markets. And with world index funds having fees as low as 0.3% a year, they look a tempting option. But there are worrying parallels with the way that Japan dominated the index in the late 1980s.

At its peak, the Japanese market was 44% of the MSCI index. That was far more than double the Asian economy's share of global GDP (see chart). Investors were enthusiastic about Japanese multinationals like Toyota and Sony; the talk then was of the rest of the world needing to learn from the Japanese model. Japan's companies were free from the threat of takeover and able to pursue long-term plans without worrying about short-term profits.

The American stockmarket's index weight is also more than double the country's share of global GDP. The gap has widened since the start of the millennium, because America's share of world GDP has been on a downward trend. Today's investors are wildly enthusiastic about America's all-conquering technology groups, such as Google, Facebook and Amazon. They, too, are either shielded from the threat of takeover by special shareholder structures or, in the case of Amazon, have persuaded investors that long-term growth is more important than short-term profits. Other countries only wish they could create technology giants with the same reach as one of America's titans.

Do such parallels mean that America is doomed to follow the same path as Japan, whose stockmarket weight steadily dwindled until it fell back in line with its contribution to global GDP? Not necessarily. China's stockmarket weight is much smaller than its GDP share because its A-shares, mainly owned by domestic investors, are excluded by MSCI. In any case a country's stockmarket is not an exact replica of its domestic economy; only around half of the profits made by S&P 500 companies are earned at home.



Still, investors may grant a higher valuation to a country's stockmarket because they perceive it to have attractive fundamentals. The American market is nothing like as highly valued as Japan's was in the late 1980s, when sceptics were told that Western valuation methods did not work in Tokyo. But American companies trade on a multiple of 21 times last year's earnings, compared with 18 for Europe, 17 for Japan and 14 for emerging markets. On a cyclically adjusted basis (averaging profits over ten years), the ratio of the American market to earnings is as high as it was in the bubble periods of the late 1920s and 1990s. And it is worth remembering that those corporate profits are still very high, relative to GDP, by historical standards.

Perhaps all these things can be justified. America may have better prospects for economic growth than the rest of the developed world, not least because of its favourable demography. Its technology giants may be less vulnerable to competition than the Japanese multinationals of the late 1980s because they benefit from "network effects", or natural monopolies. And profits may have shifted to a higher level in a world where trade unions are weak, the cost of capital is low and business is very mobile.

Nevertheless, an investment in the MSCI indices is an implicit bet on three things: the importance of the American market; the valuation placed on American companies; and the robustness of profits' share of American GDP. This is not the kind of lower-risk option those buying an index fund probably have in mind.

Economist.com/blogs/buttonwood

Trade

Back to the 1980s

Donald Trump's review of trade deficits is a blast from the past

"WE are in a trade war," said Wilbur Ross, Donald Trump's commerce secretary, on March 31st. That day Mr Trump duly loosed off a couple of warning shots, announcing two trade-related executive orders. (He forgot to sign them in the ceremony itself.) As tactics go, this was hardly shock and awe. Rather, it was supposed to suggest that nastier weaponry is on the way.

The first executive order was aimed at making trade rulebreakers "face the consequences". Some bits were vague: officials have 90 days to develop and implement a plan to combat customs violations. Others seemed trivial. The government has lost $2.3bn of revenue over 14 years from importers going bankrupt before paying duties; almost half of this relates to imports of fresh garlic and preserved mushrooms.

The second executive order seemed more in keeping with Mr Trump's (trade) warmongering. Officials have 90 days to produce an "omnibus" report, naming the trading partners with which America had a "significant" trade deficit in goods in 2016 and shaming them if the reasons for that deficit are "unfair". Based on what it finds, Mr Trump promised to "take necessary and lawful action".

Top of the naughty list will be China, which accounts for almost half of America's trade deficit in goods. Mr Ross already has his eyes on its state-owned enterprises, excess supply of steel and aluminium, and its barriers to American car exports. Academic economists agree that Chinese imports have cut the number of American manufacturing jobs. But it is still unclear what exactly the Trump administration will do about any abuses it finds. Indeed, until Robert Lighthizer, Mr Trump's chosen trade representative, is confirmed, keeping Congress friendly means holding fire.

For clues as to what might eventually transpire, however, note that Mr Lighthizer and Mr Ross are both veterans of trade battles with Japan in the 1980s. Then, surging car imports prompted union members to stage sledgehammer smashings of Japanese cars. American steelmakers complained about cheap steel imports, and the semiconductor industry moaned about an unfairly closed Japanese market.

Then, as now, industry-wide tariffs and quotas fell foul of international trade commitments but safeguards, including anti-dumping and countervailing duties, were allowed if domestic industry could show it was being injured. The Trump administration seems keen to follow the latter course. On March 28th it announced an investigation into imports of Chinese aluminium foil. But there can be side-effects. In 1984 Ronald Reagan rejected a request from copper producers for protective duties because of the effect on producers of pots and pans.

The Reagan administration favoured "voluntary export restraints", whereby the Japanese government would promise to curb exports. These were politically easier than a duty, and more legal than a quota. A Japanese promise in 1981 to restrict car exports to America did lead to a temporary halt in their increase. But they too had unintended consequences: the restrictions boosted car prices by almost 40% in 1984, according to calculations by Robert Crandall at the Brookings Institution, a think-tank. Japanese exporters enjoyed fatter profit margins, too—hardly the intention.

Export restraints are now illegal under the rules of the World Trade Organisation (WTO). In any case, for an internationally-traded commodity like steel, a bilateral deal would do nothing to help American producers if steel flows to other markets, depressing world prices. Reagan's trade team negotiated with both Japan and the EU. Today, a bilateral deal with China alone might work politically but would probably falter economically.

Squashing a trade deficit can involve curbing imports or boosting exports. Peter Navarro, director of the White House National Trade Council, appears to think that trade deals might involve persuading the other country to buy more American goods. Mr Ross has said that his first emphasis will be boosting American exports by removing trade barriers.

The experience of the semiconductor industry could provide a guide. The 1980s disputes had more to do with how supply chains were set up than tariffs or regulations. Without a specific barrier to remove, the Reagan government negotiated a target of 20% for the foreign market share in the Japanese semiconductor market.

The policy drew sharp criticism from economists who worried that this restriction on domestic Japanese companies would lower competition and raise prices. They worried too about the kinds of cronyism it might encourage if American industries worked out that they could lobby for other governments to be pushed into buying more of their stuff.

In the event, foreign market share rose and even Douglas Irwin, a vocal critic of the policy, admits that in practice it was not the disaster he had feared. Ultimately, though, the policy ended, partly because the Japanese government hated poking small companies into buying more American semiconductors (some newspapers reported that Japanese companies dumped the semiconductors into Tokyo Bay), and partly because of the hypocrisy of America simultaneously pushing for economic liberalisation and managed trade.

A deal to buy more American corn, wheat or planes might appeal to the Chinese. But the 1980s has one final lesson. During the first half of the decade, despite tough trade measures, the deficit surged because of loose fiscal policy and tight monetary policy. Amid talk of a fiscal splurge and the Federal Reserve raising rates, Mr Trump should take note. Winning a war means picking the right battles. ■

Brexit and the Irish economy

From farm to pharma

DUBLIN

Why at least one EU member outside Britain is praying for a soft Brexit

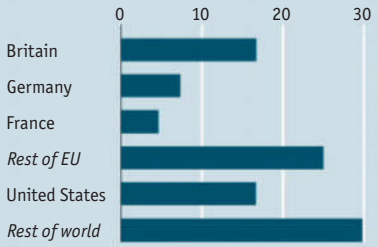
IN 1962 Tony O'Reilly, head of the Irish Dairy Board, had an idea that would help transform Ireland's economy. He wanted to create a premium brand for Irish butter to break into the growing British market. The new product, named Kerrygold and backed with a large marketing budget, was sold in half-pound packs in a parchment wrapping so shoppers could inspect the butter's quality. Its success was an inspiration to other exporters and changed perceptions of Irish business.

Half a century on, the Irish economy has been transformed into a global trading hub. Some 90% of its exports are shipped by multinational companies. Many of these are American giants such as Intel, a chipmaker, and Pfizer, a drugs firm. But some are home-grown food firms, such as Kerry Group. Observers speak of a dual economy: a "modern" capital-intensive part, powered by foreign direct investment (FDI), usually from America; and a "traditional" jobs-intensive food business, which still looks to the British market. The prospect of Brexit is pulling these two parts of the economy in opposing directions.

For decades Ireland has appealed to foreign companies as a low-tax, English-speaking entry point to Europe's single market. Brexit, in effect, removes a big rival for such mobile capital. Since Britain voted to leave the EU, there has been a "significant increase in inquiries" from firms considering a move to Ireland, says Martin Shanahan, boss of IDA Ireland, the state development agency. Much interest comes from banks and insurance companies, worried that London-based subsidiaries will lose the right to sell financial services in other EU countries. But the IDA's phone lines were already busy. Many tech firms have chosen Ireland for their European headquarters. LinkedIn, a professional-network site, has built an office for 1,500 staff, having started with three people in 2010. Huawei, a Chinese telecoms firm, already has three centres in Ireland.

Land of milk and chips

Ireland, exports of goods and services
2015, % of €234bn total



Source: Central Statistics Office

Ireland's indigenous industries have correspondingly shrunk in importance. When sales of Kerrygold took off in the 1960s, almost three-quarters of Irish goods exports went to Britain. Now just 13% do, a share that rises to 17% including services (see chart). Yet many analysts reckon that the damage from Brexit to Ireland's food exporters will swamp any positive impact on high-tech FDI. Ireland is just one link in a global-tech supply chain: only a fraction of the value added to exports originates there. In contrast, the local content of Ireland's food exports to Britain is high: weighted by Irish jobs, Britain's export share would be around a quarter, according to John FitzGerald and Patrick Honohan of Trinity College, Dublin. Half of Ireland's farm exports go to Britain and some would face tariffs of almost 60% in the event of a "cliff-edge" Brexit, in which trade reverts to WTO rules. Ireland's exporters to Europe rely on Britain as a land-bridge, because shipping goods to the continent is more troublesome than carrying them by lorry. A quarter of Ireland's imports come from Britain, partly because British chains own supermarkets in Ireland.

Brexit could thus be devastating to rural Ireland while boosting the sort of FDI that benefits its bigger cities, notably Dublin. Ireland is already so geared to the global business cycle that a country which a few years ago was suffering a brutal housing bust now faces housing shortages, as FDI and migrants flood back.

Yet a soft Brexit would be welcome in both parts of Ireland's dual economy. Dublin has always been more of a complement than a rival to the City of London, so it benefits from the latter's global status. A gentler Brexit that allows for a continuation of tariff-free flows for a time after Britain leaves the EU will give time for Irish food producers to reorient to other European markets. That won't be easy. Ireland would need to create a more distinctive brand for its beef, notes Dan O'Brien, of the Institute of International and European Affairs, and "try flogging Irish Cheddar cheese to the French". The reassuring lesson of Kerrygold butter is that Ireland has adapted well in the past. ■

Economic development

Shrink wrap

Why the history of economic growth should be all about recessions

"THROUGHOUT history, poverty is the normal condition of man," wrote Robert Heinlein, a science-fiction writer. Until the 18th century, global GDP per person was stuck between $725 and $1,100, around the same income level as the World Bank's current poverty line of $1.90 a day. But global income levels per person have since accelerated, from around $1,100 in 1800 to $3,600 in 1950, and over $10,000 today.

Economists have long tried to explain this sudden surge in output. Most theories have focused on the factors driving long-term economic growth such as the quantity and productivity of labour and capital. But a new paper* takes a different tack: faster growth is not due to bigger booms, but to less shrinking in recessions. Stephen Broadberry of Oxford University and John Wallis of the University of Maryland have taken data for 18 countries in Europe and the New World, some from as far back as the 13th century. To their surprise, they found that growth during years of economic expansion has fallen in the recent era—from 3.88% between 1820 and 1870 to 3.06% since 1950—even though average growth across all years in those two periods increased from 1.4% to 2.55%.

Instead, shorter and shallower slumps led to rising long-term growth. Output fell in a third of years between 1820 and 1870 but in only 12% of those since 1950. The rate of decline per recession year has fallen too, from 3% to 1.2%.

So why have these "growth reversals" decreased in length and depth? In another paper** Messrs Broadberry and Wallis find that conventional explanations—such as demographic change or a sectoral shift from volatile agriculture to the more stable services sector—do not fully explain the shift.

More important is the rise of the rule of law, enabling disputes to be settled by impartial courts. Before the modern era, elites would fight between themselves for the spoils of growth and send the economy back to square one through wars, corruption and the like. Respect for courts to resolve disputes prevents this from happening. With populist politicians challenging the authority of judges once again across the world, that is food for thought.

* "Growing, Shrinking and Long Run Economic Performance: Historical Perspectives on Economic Development" by S. Broadberry and J. Wallis
** "Shrink Theory: The Nature of Long Run and Short Run Economic Performance"

Short-term lending

Principles and interest

America's payday-lending industry is being squeezed

IN MAY 2013 Gloria James borrowed $200 from Loan Till Payday, a lender near her home in Wilmington, Delaware. Rather than take out a one- or two-month loan for a $100 fee, as she had done several times before, she was offered a one-year loan that would set her back $1,620 in interest, equivalent to an annual rate of 838%. Ms James, a housekeeper making $12 an hour, agreed to the high-interest loan but quickly fell behind on her payments. After filing a lawsuit in federal court, a Delaware judge ruled that the loan in question was not only illegal but "unconscionable".

Her story is remarkably common. Americans who live pay cheque to pay cheque have few places to turn when they are in financial distress. Many rely on high-interest payday loans to stay afloat. But government efforts to crack down on the $40bn industry may be having an effect.

Roughly 2.5m American households, about one in 50, use payday loans each year, according to government statistics. The typical loan is $350, lasts two weeks, and costs $15 for each $100 borrowed. Although payday loans are marketed as a source of short-term cash to be used in financial emergencies, they are often used to meet chronic budget shortfalls—in 2015 more borrowers in California took out ten payday loans than took out one. Critics say the industry dupes its vulnerable customers into paying high fees and interest rates. And yet surveys show its customers are mostly satisfied, because payday loans are easy and convenient.

Regulation of payday lending in America has historically been the responsibility of states. Over a dozen use interest-rate caps to, in effect, ban payday loans. But lenders can get around these laws by registering as "credit service organisations", relocating to other states, or even working with Native American tribes to claim sovereign immunity.

At the federal level, Congress passed the Military Lending Act in 2006, capping loan rates to service members at 36%. More recently, the Department of Justice launched "Operation Choke Point", an effort to press banks into severing ties with businesses at risk of money-laundering, payday lenders among them. But the real crackdown on payday lending could come if the Consumer Finance Protection Bureau (CFPB), a watchdog, implements new regulations on high-interest loans. The rules include underwriting standards and other restrictions designed to keep borrowers out of debt; the CFPB estimates that they could reduce payday-loan volumes by more than 80%.

The threat of regulation may already have had an effect. The Centre for Financial Services Innovation, a non-profit group, reckons that payday-loan volumes have fallen by 18% since 2014; revenues have dropped by 30%. During the first nine months of 2016, lenders shut more than 500 stores and total employment in the industry fell by 3,600, or 3.5%. To avoid the new rules, lenders are shifting away from lump-sum payday loans toward instalment loans, which give borrowers more time to get back on their feet.

It would be premature to celebrate the demise of payday lenders. The Trump administration is likely to block the CFPB's new regulations. And even if the rules are pushed through, consumers may not be better off. Academic research on payday-lending regulation is mixed, with some studies showing benefits, others showing costs, and still others finding no consumer-welfare effects at all. A forthcoming paper by two economists at West Point concludes that the Military Lending Act yielded "no significant benefits to service members". ■

A Fed resignation

Lacking judgment

WASHINGTON, DC

The president of the Richmond Fed resigns

FOR almost five years inquiries have sought to establish how Medley Global Advisors, a research firm, revealed details of Federal Reserve minutes a day before they were publicly released in October 2012. On April 4th the saga took a sudden twist when Jeffrey Lacker, president of the Richmond Fed (and hence a member of the committee that sets interest rates), quit over the leak.

Mr Lacker spoke to Medley the day before it published its note, in which it revealed that there was "intense debate" within the Fed over the third stage of its quantitative-easing programme, that the central bank was poised to buy more Treasury bonds at a later date, and that the Fed had mulled a promise not to raise interest rates until unemployment fell below 6.5%. (Both the bond-buying and the promise did later happen.) According to Mr Lacker, who was the meeting's sole dissenter, when Medley mentioned confidential information on the call he "did not refuse or express his inability to comment and the interview continued". This, he said, "could have been taken...as an acknowledgment or confirmation of the information."

Lacker has sad finish

During an internal review into the leak in 2012 Mr Lacker kept mum about the fact that Medley had raised confidential information on the call. He revealed all only in 2015, during an investigation by external bodies including the FBI. His resignation comes six months before he was due to retire anyway. His lawyer told the *New York Times* that "no charges will be brought and the investigation as to him is complete."

Because he ran a regional Fed, Mr Lacker's exit does not add to the list of vacancies at the central bank which President Donald Trump has to fill. This includes one left by Daniel Tarullo, the de facto vice-chairman for bank supervision, who departed as planned on April 5th. Like all regional-bank presidents, Mr Lacker's successor will be chosen by a board of directors, some of whom are appointed by private banks. (Campaigners have long said that this is one of several ways in which the Fed is too cosy with the financial industry.)

The affair has been an embarrassment for the central bank, which has puzzled over how to reconcile its desire to talk to market participants with the need not to reveal confidential information. In 2011 it issued guidance urging rate-setters to avoid conversations that might appear to give any firm an inside edge. This seems to suggest that Mr Lacker should not have been on the phone with Medley in the first place.

Free exchange | Self-inflicted wounds

The political recklessness behind Venezuela's economic catastrophe

IT IS hard to convey the severity of Venezuela's unfolding crisis. Its extent is astounding: the economy shrank by 10% last year, and will be 23% smaller than in 2013 by the end of this year, according to IMF forecasts. Inflation may exceed 1,600% this year. The human details are more poignant: over the past year around three-quarters of Venezuelans have lost weight, averaging 8.7kg per person, because of a scarcity of food. No war, foreign or civil, is to blame for this catastrophe. Venezuela did this to itself. And its woes are deepening, as the regime of President Nicolás Maduro lurches towards dictatorship. Fifty years ago, Venezuela was an example to the rest of Latin America, a relatively stable democracy and not much poorer than Britain. How did this tragedy occur?

Venezuela's economy is built on oil—its leaders boast it has the world's largest proven reserves—and it is tempting to blame fickle crude prices for its woes. Oil accounts for more than 90% of Venezuelan exports. It helps to fund the government budget and provides the foreign exchange that the country needs to import consumer goods. Nearly everything of consequence in the economy, from toilet paper to trousers, is imported from abroad.

As oil prices soared in the 2000s, Venezuela found itself awash in cash. In 2014 the boom ended. The volume of dollars flowing into the country tumbled, presenting the new government of Nicolás Maduro, who had taken over after Hugo Chávez's death, with an unappetising menu of options. He could have allowed the currency, the bolívar, to tumble in value. Yet prices for imported goods would have soared as a result, the market's way of curtailing Venezuelan demand for products it no longer had the dollars to afford. Soaring prices would have violated the egalitarian spirit of Venezuela's Bolivarian government.

More important, it would have made the new president unpopular. Instead, Mr Maduro kept the wildly overvalued official exchange rate and rationed imports by tightening the government's control over access to hard currency. From early in the Chávez era, the government controlled the flow of dollars earned by the oil industry; importers had to prove they were trying to bring in something of value before being allowed to swap bolívars for greenbacks. Mr Maduro tightened the screws.

The effect was not as intended. As the flow of imports dried up, prices rose. Mr Maduro tried price controls; supply either evaporated or moved to the black market in response. The government's fiscal troubles added to the mess. With oil revenues slashed by half and the government deficit soaring, Mr Maduro might have opted to cut spending and broaden the tax base. But such measures must have looked like political poison to a freshly anointed president. Instead, Venezuela turned to the printing press to cover its bills. Devastatingly high inflation is further undermining the workings of the economy.

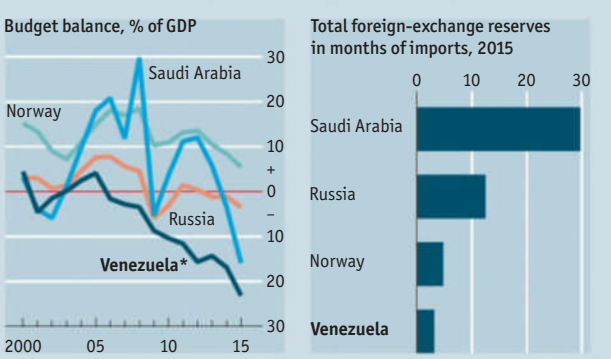
So oil is merely a scapegoat in Venezuela's tragedy. Economic dependence on oil is always fraught. Soaring oil prices place upward pressure on the exchange rate, leaving other, non-oil industries at a competitive disadvantage. That deepens an oil-exporting economy's dependence on crude, worsening the pain when prices eventually fall. Governments of oil-exporting countries know this, and often try to mitigate the risk. When times are good, some use inflows of hard currency to build up foreign-exchange reserves, which can be drawn down later to cover foreign-currency obligations and import bills; Saudi Arabia holds reserves worth more than $500bn, for example. Others use oil profits to fill sovereign-wealth funds, which invest in a diversified portfolio in order to reduce the economy's long-run exposure to petroleum. Norway's fund, which is intended to help pay for state pensions, is worth nearly $900bn.

Chávez had the good fortune to take office at the tail end of a two-decade swoon in oil prices, and to preside over a price surge. The money that came to Chávez, he spent. From 2000 to 2013, spending as a share of GDP rose from 28% to 40%: a much bigger rise than in Latin America's other large economies. Spending crowded out growth in foreign-exchange reserves. In 2000 Venezuela had enough reserves to cover more than seven months of imports; that dropped to under three months by 2013 (over the same period Russia's reserves grew from five months of import cover to ten, and Saudi Arabia's from four months to 37).

Why did Chávez not leave Venezuela better prepared for the inevitable crash? In his version of events, Venezuelans fared poorly during the long oil bust from 1979 to his ascent in 1999 not because crude was cheap but because capitalists robbed the people of their due. During his rule, Chávez increased public spending on social programmes and expanded subsidies for food and energy. Venezuelans felt the results, in higher incomes and improved standards of living. Chávez delivered, for a time.

Yet this narrative was always false. Those in power always have a greater incentive to buy off political threats than to invest in projects that will only bear fruit over time, possibly after they have gone. In oil-rich economies, they also have the means. Chávez expropriated and redistributed wealth to weaken enemies and woo allies. In his careless economic management, he undercut the oil wealth that funded Venezuelan socialism. His assaults on private firms left the country short of the expertise and capital needed to develop its resources. In recent years it has produced less oil than China and a quarter of the output of Saudi Arabia. Venezuela ate its seed corn despite record harvests.

Going nuts in Caracas

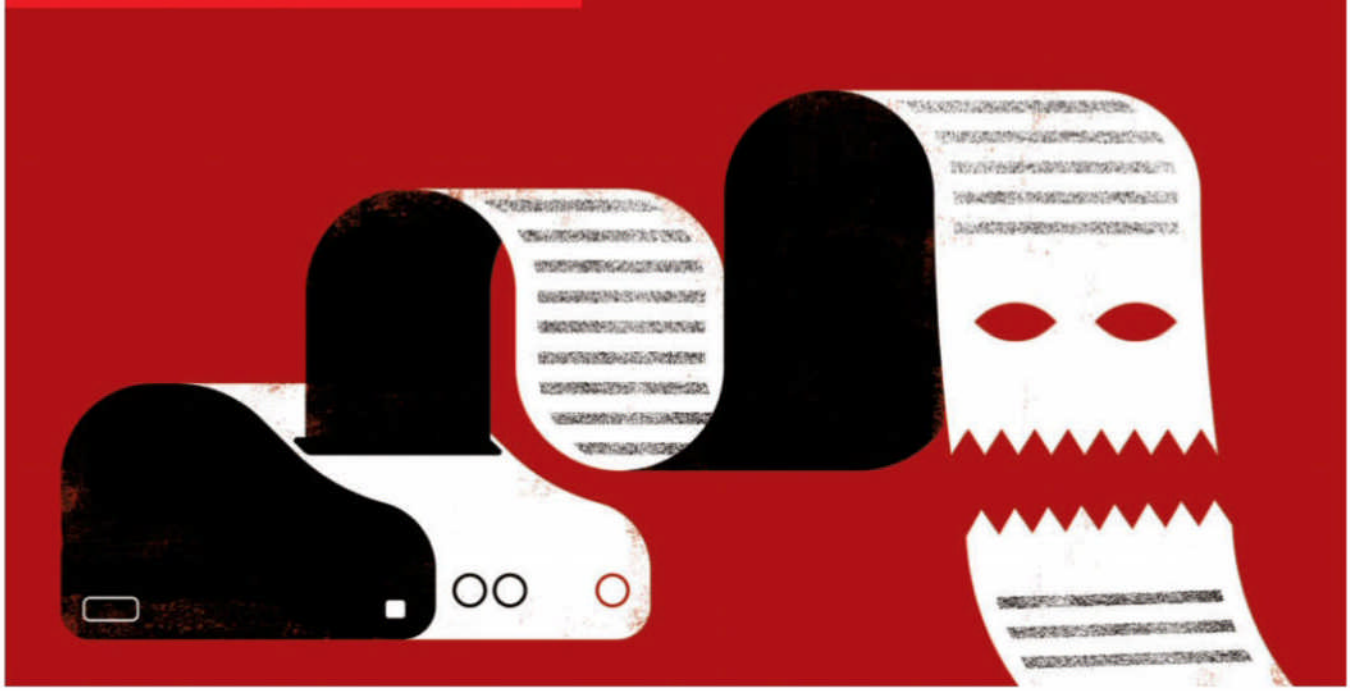


Sources: IMF; World Bank *Estimates from 2010

Darkness drops again

Venezuela was once the envy of Latin America, until a long stagnation in living standards brought a populist strongman to power. But popularity is hard to maintain. The greater the desperation of the populist, the greater the willingness to accept long-run risks in exchange for short-run pay-offs. Whether or not the populist survives to see it, the day of reckoning eventually arrives. And it is always the people that suffer most. ■

Economist.com/blogs/freeexchange



Computer security

Why everything is hackable

Computer security is broken from top to bottom. As the consequences pile up, though, things are starting to improve

OVER a couple of days in February, hundreds of thousands of point-of-sale printers in restaurants around the world began behaving strangely. Some churned out bizarre pictures of computers and giant robots signed, "with love from the hacker God himself". Some informed their owners that, "YOUR PRINTER HAS BEEN PWND'D". Some told them, "For the love of God, please close this port". When the hacker God gave an interview to Motherboard, a technology website, he claimed to be a British secondary-school pupil by the name of "Stackoverflowin". Annoyed by the parlous state of computer security, he had, he claimed, decided to perform a public service by demonstrating just how easy it was to seize control.

Not all hackers are so public-spirited, and 2016 was a bonanza for those who are not. In February of that year cyber-crooks stole $81m directly from the central bank of Bangladesh—and would have got away with more were it not for a crucial typo. In August America's National Security Agency (NSA) saw its own hacking tools leaked all over the internet by a group calling themselves the Shadow Brokers. (The CIA suffered a similar indignity this March.) In October a piece of software called Mirai was used to flood Dyn, an internet infrastructure company, with so much meaningless traffic that websites such as Twitter and Reddit were made inaccessible to many users. And the hacking of the Democratic National Committee's e-mail servers and the subsequent leaking of embarrassing communications seems to have been part of an attempt to influence the outcome of the American elections.

Away from matters of great scale and grand strategy, most hacking is either show-off vandalism or simply criminal. It is also increasingly easy. Obscure forums oil the trade in stolen credit-card details, sold in batches of thousands at a time. Data-dealers hawk "exploits": flaws in code that allow malicious attackers to subvert systems. You can also buy "ransomware", with which to encrypt photos and documents on victims' computers before charging them for the key that will unscramble the data. So sophisticated are these facilitating markets that coding skills are now entirely optional. Botnets—flocks of compromised computers created by software like Mirai, which can then be used to flood websites with traffic, knocking them offline until a ransom is paid—can be rented by the hour. Just like a legitimate business, the bot-herders will, for a few dollars extra, provide technical support if anything goes wrong.

The total cost of all this hacking is anyone's guess (most small attacks, and many big ones, go unreported). But all agree it is likely to rise, because the scope for malice is about to expand remarkably. "We are building a world-sized robot," says Bruce Schneier, a security analyst, in the shape of the "Internet of Things". The IOT is a buzzphrase used to describe the computerisation of everything from cars and electricity meters to children's toys, medical devices and light bulbs. In 2015 a group of computer-security researchers demonstrated that it was possible to take remote control of certain Jeep cars. When the Mirai malware is used to build a botnet it seeks out devices such as video recorders and webcams; the botnet for fridges is just around the corner.

Not OK, computer

"The default assumption is that everything is vulnerable," says Robert Watson, a computer scientist at the University of Cambridge. The reasons for this run deep. The vulnerabilities of computers stem from the basics of information technology, the culture of software development, the breakneck pace of online business growth, the economic incentives faced by computer firms and the divided interests of governments. The rising damage caused by computer insecurity is, however, beginning to spur companies, academics and governments into action.

Modern computer chips are typically designed by one company, manufactured by another and then mounted on circuit boards built by third parties next to other chips from yet more firms. A further firm writes the lowest-level software necessary for the computer to function at all. The operating system that lets the machine run particular programs comes from someone ▸▸

else. The programs themselves from someone else again. A mistake at any stage, or in the links between any two stages, can leave the entire system faulty—or vulnerable to attack.

It is not always easy to tell the difference. Peter Singer, a fellow at New America, a think-tank, tells the story of a manufacturing defect discovered in 2011 in some of the transistors which made up a chip used on American naval helicopters. Had the bug gone unspotted, it would have stopped those helicopters firing their missiles. The chips in question were, like most chips, made in China. The navy eventually concluded that the defect had been an accident, but not without giving serious thought to the idea it had been deliberate.

Most hackers lack the resources to mess around with chip design and manufacture. But they do not need them. Software offers opportunities for subversion in profusion. In 2015 Rachel Potvin, an engineer at Google, said that the company as a whole managed around 2bn lines of code across its various products. Those programs, in turn, must run on operating systems that are themselves ever more complicated. Linux, a widely used operating system, clocked in at 20.3m lines in 2015. The latest version of Microsoft's Windows operating system is thought to be around 50m lines long. Android, the most popular smartphone operating system, is 12m.

Getting each of those lines to interact properly with the rest of the program they are in, and with whatever other pieces of software and hardware that program might need to talk to, is a task that no one can get right first time. An oft-cited estimate made by Steve McConnell, a programming guru, is that people writing source code—the instructions that are compiled, inside a machine, into executable programs—make between ten and 50 errors in every 1,000 lines. Careful checking at big software companies, he says, can push that down to 0.5 per 1,000 or so. But even this error rate implies thousands of bugs in a modern program, any one of which could offer the possibility of exploitation. "The attackers only have to find one weakness," says Kathleen Fisher, a computer scientist at Tufts University in Massachusetts. "The defenders have to plug every single hole, including ones they don't know about."

All that is needed is a way to get the computer to accept a set of commands that it should not. A mistake may mean there are outcomes of a particular command or sequence of commands that no one has foreseen. There may be ways of getting the computer to treat data as instructions—for both are represented inside the machine in the same form, as strings of digits. "Stackoverflowin", the sobriquet chosen by the restaurant-printer hacker, refers to such a technique. If data "overflow" from a part of the system allocated for memory into a part where the machine expects instructions, they will be treated as a set of new instructions. (It is also possible to reverse the process and turn instructions into unexpected streams of data. In February researchers at Ben-Gurion University, in Israel, showed that they could get data out of a compromised computer by using the light that shows whether the hard drive is working to send those data to a watching drone.)

Shutting down every risk of abuse in millions of lines of code before people start to use that code is nigh-on impossible. America's Department of Defence (DOD), Mr Singer says, has found significant vulnerabilities in every weapon system it examined. Things are no better on civvie street. According to Trustwave, a security-research firm, in 2015 the average phone app had 14 vulnerabilities.

Karma police

All these programs sit on top of older technologies that are often based on ways of thinking which date back to a time when security was barely a concern at all. This is particularly true of the internet, originally a tool whereby academics shared research data. The first versions of the internet were policed mostly by consensus and etiquette, including a strong presumption against use for commercial gain.

When Vint Cerf, one of the internet's pioneers, talked about building encryption into it in the 1970s he says his efforts were blocked by America's spies, who saw cryptography as a weapon for nation-states. Thus, rather than being secure from the beginning, the net needs a layer of additional software half a million lines long to keep things like credit-card details safe. New vulnerabilities and weaknesses in that layer are reported every year.

The innocent foundations of many computer systems remain a source for concern. So does the innocence of many users. Send enough people an innocuous-looking e-mail that asks for passwords or contains what look like data, but is in fact a crafty set of instructions, and you have a good chance that someone will click on something that they should not have done. Try as network administrators might to instil good habits in their charges, if there are enough people to probe, the chances of trust, laziness or error letting a malefactor get in are pretty high.

Good security cultures, both within software developers and between firms and their clients, take time to develop. This is one of the reasons to worry about the Internet of Things. "Some of the companies making smart light bulbs, say, or electricity meters, are not computing companies, culturally speaking," says Graham Steel, who runs Cryptosense, a firm that carries out automated cryptographic analysis. A database belonging to Spiral Toys, a firm that sells internet-connected teddy bears through which toddlers can send messages to their parents, lay unprotected online for several days towards the end of 2016, allowing personal details and toddlers' messages to be retrieved.

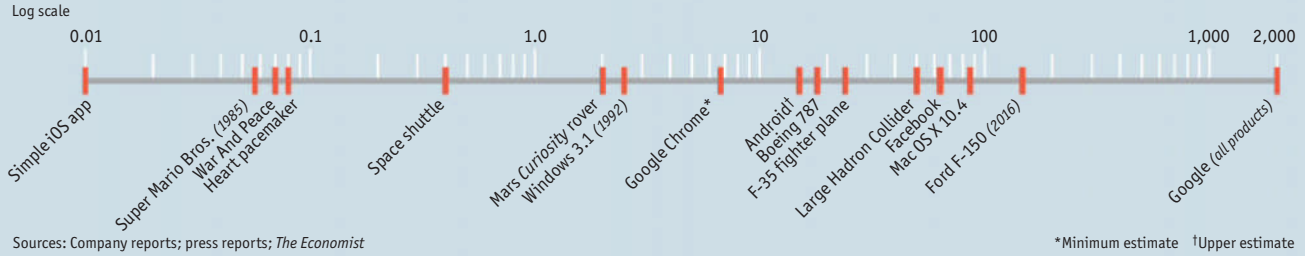
Even in firms that are aware of the issues, such as car companies, nailing down security can be hard. "The big firms whose logos are on the cars you buy, they don't really make cars," points out Dr Fisher. "They assemble lots of components from smaller suppliers, and increasingly, each of those has code in it. It's really hard for the car companies to get an overview of everything that's going in."

On top of the effects of technology and culture there is a third fundamental cause of insecurity: the economic incentives of the computer business. Internet businesses, in particular, value growth above almost everything else, and time spent trying to write secure code is time not spent adding customers. "Ship it on Tuesday, fix the security problems next week—maybe" is the attitude, according to Ross Anderson, another computer-security expert at the University of Cambridge.

To infinity and beyond

Lines of text/source code, m

Log scale



Sources: Company reports; press reports; *The Economist*

*Minimum estimate †Upper estimate

The long licence agreements that users of software must accept (almost always without reading them) typically disclaim any liability on the part of a software firm if things go wrong—even when the software involved is specifically designed to protect computers against viruses and the like. Such disclaimers are not always enforceable everywhere. But courts in America, the world's biggest software market, have generally been sympathetic. This impunity is one reason why the computing industry is so innovative and fast-moving. But the lack of legal recourse when a product proves vulnerable represents a significant cost to users.

If customers find it hard to exert pressure on companies through the courts, you might expect governments to step in. But Dr Anderson points out that they suffer from contradictory incentives. Sometimes they want computer security to be strong, because hacking endangers both their citizens and their own operations. On the other hand, computers are espionage and surveillance tools, and easier to use as such if they are not completely secure. To this end, the NSA is widely believed to have built deliberate weaknesses into some of its favoured encryption technologies.

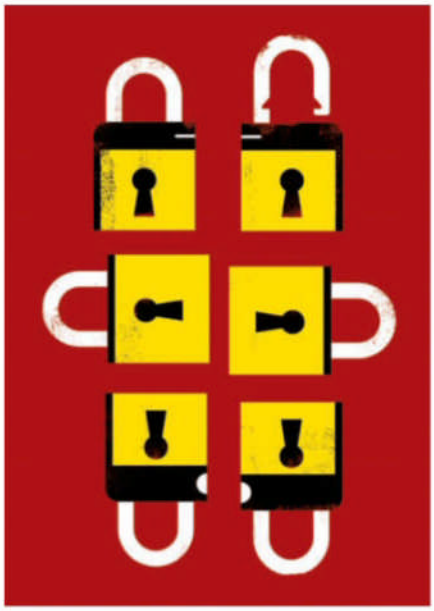
Increasingly paranoid android

The risk is that anyone else who discovers these weaknesses can do the same. In 2004 someone (no authority has said who) spent months listening to the mobile-phone calls of the upper echelons of the Greek government—including the prime minister, Costas Karamanlis—by subverting surveillance capabilities built into the kit Ericsson had supplied to Vodafone, the pertinent network operator.

Some big companies, and also some governments, are now trying to solve security problems in a systematic way. Freelance bug-hunters can often claim bounties from firms whose software they find fault with. Microsoft vigorously nags customers to ditch outdated, less-secure versions of Windows in favour of newer ones, though with only limited success. In an attempt to squash as many bugs as possible, Google and Amazon are developing their own versions of standard encryption protocols, rewriting from top to bottom the code that keeps credit-card details and other tempting items secure. Amazon's version has been released on an "open-source" basis, letting all comers look at the source code and suggest improvements. Open-source projects provide, in principle, a broad base of criticism and improvement. The approach only works well, though, if it attracts and retains a committed community of developers.

More fundamental is work paid for by the Defence Advanced Research Projects Agency (DARPA), a bit of the DOD that was instrumental in the development of the internet. At the University of Cambridge, Dr Watson has been using this agency's money to design CHERI, a new kind of chip that attempts to bake security into hardware, rather than software. One feature, he says, is that the chip manages its memory in a way that ensures data cannot be mistaken for instructions, thus defanging an entire category of vulnerabilities. CHERI also lets individual programs, and even bits of programs, run inside secure "sandboxes", which limit their ability to affect other parts of the machine. So even if attackers obtain access to one part of the system, they cannot break out into the rest.

Sandboxing is already used by operating systems, web browsers and so on. But writing sandboxing into software imposes performance penalties. Having a chip that instantiates the idea in hardware gets



around that. "We can have a web browser where every part of a page—every image, every ad, the text, and so on—all run in their own little secure enclaves," says Dr Watson. His team's innovations, he believes, could be added fairly easily to the chips designed by ARM and Intel that power phones and laptops.

Another DARPA project focuses on a technique called "formal methods". This reduces computer programs to gigantic statements in formal logic. Mathematical theorem-proving tools can then be applied to show that a program behaves exactly as its designers want it to. Computer scientists have been exploring such approaches for years, says Dr Fisher, but it is only recently that cheap computing power and usable tools have let the results be applied to pieces of software big enough to be of practical interest. In 2013 Dr Fisher's team developed formally verified flight-control software for a hobbyist drone. A team of attackers, despite being given full access to the drone's source code, proved unable to find their way in.

"It will be a long time before we're using this stuff on something as complicated as a fully fledged operating system," says Dr Fisher. But she points out that many of the riskiest computing applications need only simple programs. "Things like insulin pumps, car components, all kinds of IOT devices—those are things we could look at applying this to."

Most fundamental of all, though, is the way in which markets are changing. The ubiquity of cyber-attacks, and the seeming impossibility of preventing them, is persuading big companies to turn to an old remedy for such unavoidable risks: insurance. "The cyber-insurance market is worth something like $3bn-4bn a year," says Jeremiah Grossman of SentinelOne, a company which sells protection against hacking (and which, unusually, offers a guarantee that its solutions work). "And it's growing at 60% a year."

As the costs of insurance mount, companies may start to demand more from the software they are using to protect themselves, and as payouts rise, insurers will demand the software be used properly. That could be a virtuous alignment of interests. A report published in 2015 by PWC, a management consultancy, found that a third of American businesses have cyber-insurance cover of some kind, though it often offers only limited protection.

But it is the issue of software-makers' liability for their products that will prove most contentious. The precedents that lie behind it belong to an age when software was a business novelty—and when computers dealt mostly with abstract things like spreadsheets. In those days, the issue was less pressing. But in a world where software is everywhere, and computerised cars or medical devices can kill people directly, it cannot be ducked for ever.

"The industry will fight any attempt to impose liability absolutely tooth and nail," says Mr Grossman. On top of the usual resistance to regulations that impose costs, Silicon Valley's companies often have a libertarian streak that goes with roots in the counterculture of the 1960s, bolstered by a self-serving belief that anything which slows innovation—defined rather narrowly—is an attack on the public good. Kenneth White, a cryptography researcher in Washington, DC, warns that if the government comes down too hard, the software business may end up looking like the pharmaceutical industry, where tough, ubiquitous regulation is one reason why the cost of developing a new drug is now close to a billion dollars. There is, then, a powerful incentive for the industry to clean up its act before the government cleans up for it. Too many more years like 2016, and that opportunity will vanish like the contents of a hacked bank account. ■

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Religion in America

The good-news bearers

America's evangelicals have not always been allied with politicians. And they may not always be

The Evangelicals: The Struggle to Shape America. By Frances FitzGerald. *Simon & Schuster; 740 pages; $35*

VISIT an evangelical church in America on a Sunday morning, and you are likely to be embraced, perhaps literally, by fellow worshippers, then impressed by the pastor's scriptural exegesis. Depending on his text, and on the news, he may remind his flock that the devil walks among them, and of the risk—a perennial one for white evangelicals, as Frances FitzGerald's timely and enlightening book makes clear—that depravity may turn God away from their country. Yet in November four out of five of these decorous, Bible-loving Christians voted for an adulterous reality-television star who has said he has never sought divine forgiveness.

White evangelicals make up around a fifth of America's population, yet four decades after they became a central feature of public life they continue to baffle their compatriots. "The Evangelicals" was written before Donald Trump's victory, but it illuminates these contradictions. Ms FitzGerald, a Pulitzer prizewinning historian, shows how the rise of evangelical creeds, during the Great Awakenings of the 18th and 19th centuries, was itself a sort of populist revolt, by "a folk religion characterised by disdain for authority and tradition". It was not only anti-elitist but anti-intellectual, "a religion of the heart, as opposed to the head", in which puritanical harangues were leavened by the promise of a widely shared salvation and, after a born-again experience, a direct relationship with God.

Spread, often, by untutored preachers using vernacular storytelling, this was an insurgent faith suited to the frontier. Today its adherents seem sceptical of religious tolerance, but initially they advocated it, so as to compete with established churches. Rival attitudes to that kind of activism—whether to withdraw from the secular world and patiently await the Rapture, or to engage in the hope of speeding it along—form one of the axes around which Ms FitzGerald's narrative turns. The others include the tensions between the North and the evangelical heartland of the South, the argument over the fundamentalist belief in biblical inerrancy and the ongoing dispute over whether America should be a light unto the nations or an isolated refuge of piety.

Ms FitzGerald explains how, along with these internal conflicts, urbanisation, war and immigration shaped the evangelical world, just as evangelicals, "the most American of religious groups", helped to shape the nation. She concentrates, topically, on the rise of the evangelical right. Fundamentalism, she says, seemed to have been routed at the Scopes monkey trial of 1925, when William Jennings Bryan failed to defend the Bible's literal truth, or so many bystanders reckoned. But it recovered in the general religious boom after the second world war, energised by celebrity revivalists, above all Billy Graham, and by the dizzying social advances of the following decades, which many pastors vehemently resisted.

The presidential campaign of 1980, starring "a divorced former Hollywood actor who rarely attended church", saw an alliance emerge between Jerry Falwell's Moral Majority and the Republican Party; the relationship between the party and the Christian right has since wavered between passion and wariness, taking a toll on both sides. Falwell may be the book's single most important character. He not only led white evangelicals into mainstream politics, Ms FitzGerald writes, but injected the evangelical mode of thinking with them. Waging "holy war" against secular humanism, he "introduced the fundamentalist sense of perpetual crisis, and of war between the forces of good and evil".

Falwell is also a good example of Ms FitzGerald's method, and its success. This is a monumental study. Some of its detail—such as the varieties of religious experience that evangelical churches encompass, from Pentecostal charismatics and snake-handlers to the prosperity gospel—is gripping. Some of the theological rows, for example over the precise sequencing of the Apocalypse and the Second Coming, may weary lay readers. But the engines of her book, as of its subject, are the lives of leaders such as Falwell. His hard-living father, Carey Falwell, once killed an employee's cat and fed it to him as squirrel stew, and ▸▸

threw a drunkard into a cage with a bear.

Circuit-riding preachers, megachurch pastors, millionaire televangelists who traded on their audiences' willingness to suspend disbelief: she sketches her characters in gory technicolour. She is droll about their chicanery and non-judgmental about their conspiracy theories, prophecies and prejudices. There are fanatics and entrepreneurs, like Pat Robertson, a broadcasting impresario who ran for president in 1988 under the half-familiar slogan, "Restore the Greatness of America Through Moral Strength". There are charlatans who take to extreme lengths the presumption of forgiveness that is central to their faith's structure and appeal. These are mercurial, self-invented, quintessentially American lives.

False idols

By the administration of George W. Bush, white evangelicals' favourite president, their political agenda had narrowed. (Abortion, Ms FitzGerald notes, became a preoccupation only in the 1980s.) Partisanship intensified such that "Bill and Hillary Clinton were the Antichrist." Many evangelicals have become wedded to a seemingly un-Christian social policy that "elevated opposition to higher taxes and [Barack] Obama's health-care reform to the status of biblical absolutes". The Supreme Court's legalisation of gay marriage in 2015 was, for them, a calamity. Meanwhile, despite their egalitarian impulses, these congregations always had an authoritarian, patriarchal bent, the chain of command running from God to husbands and fathers. And so they, and America, arrived at Mr Trump.

It is a shame that Ms FitzGerald excludes black evangelical churches, with all their struggles and heroism. As she says, "theirs is a different story," but the two are intertwined—not only in the history of slavery and segregation, both defended by the Southern Baptists, the country's biggest Protestant denomination (and probably most outsiders' paradigmatic evangelical church). White and black evangelicals will converge in future as well: as she observes, white congregations are greying, so that, despite the nativism rife in many, their vitality will increasingly depend on attracting black and Hispanic members.

She does examine the quieter, but burgeoning, Christian left, a movement that emerged in the 1960s, aiming to recapture the spirt of reform that marked earlier evangelical eras. Likewise she refers to the growing subset of thinkers and activists who are orthodox in theology but renounce the bankrupting compact with the Republican Party and the fixation on sexual morality. These groups, who care as much about life after birth as before it, and value justice in the sublunary world as well as salvation in the next, are evangelicals too. ■

Markets

Evolving ideas

Adaptive Markets: Financial Evolution at the Speed of Thought. By Andrew Lo. *Princeton; 483 pages; $37.50 and £31.95*

ECONOMISTS have been accused of "physics envy", an obsession with constructing precise mathematical models instead of studying the real, messy, world. But a new book suggests that economists have been looking at the wrong science; they should have focused on biology.

The idea stems from the school of "behavioural economics" which observes that humans are not the kind of hyper-rational calculating machines that some models rely on them to be. As a result, markets are not always "efficient"—accurately pricing all the available information.

When Andrew Lo was a young academic, he presented a paper at a conference which showed that one of the key assumptions of the efficient market hypothesis was not borne out by the data. He was instantly told that he must have made a programming error; his results could not possibly be right.

Mr Lo, who is now a professor at MIT, has spent much of his career battling to steer economics away from such narrow-minded thinking. His grand idea is the "adaptive markets hypothesis". The actions of individuals are driven by intellectual short cuts—rules of thumb that they use to make decisions. If those decisions turn out badly, they adapt their behaviour and come up with a new rule to follow.

The theory is bolstered by experiments that show how humans make decisions. Psychological quirks include an unwillingness to take losses and a tendency to make patterns out of random data. These traits may once have been useful in evolutionary terms (that rustle in the bushes might not be a predator, but better safe than sorry) but are less helpful when making financial decisions.

Research has also shown what happens inside our brains when we make decisions. Winning money has the same effect on a brain as a cocaine addict getting a fix, while losing money has the same effect on risk-averse people as a nasty smell or pictures of bodily mutilation. Furthermore, it seems that emotion plays a significant part in gauging risks, and not always a negative one, acting as a "reward-and-punishment system that allows the brain to select an advantageous behaviour". If we do not fear the consequences of failure, we may act irresponsibly, just as small children need to learn to be wary of cars before crossing the road. Studies of people with brain damage show that "when the ability to experience emotions is removed, human behaviour becomes less rational."

When we apply our behavioural quirks to the markets, the result is a kind of fast-track evolution in which investment strategies are tested in a fast-changing environment. Mr Lo describes the hedge-fund industry as the "Galapagos islands of finance"; many thousands have been set up but the extinction rate is very high.

The theory may also explain why the economy can see long periods of stability followed by sudden crisis. Mr Lo writes that "Economic expansions and contractions are the consequences of individuals and institutions adapting to changing financial environments, and bubbles and crashes are the result when the change occurs too quickly."

The same process of adaptation occurs between the finance industry and its regulators, with the regulators always one evolutionary step behind the regulated. One answer, suggests Mr Lo, is to create a financial equivalent of America's National Transportation Safety Board (NTSB). Because the NTSB is not itself a regulator, it feels able to criticise both transport companies and regulations; that makes its conclusions genuinely independent.

Mr Lo makes a convincing argument and he also uses the book to lay out some interesting ideas—such as a huge, diversified fund that would invest in a range of potential cancer treatments. But while readers may nod their heads in agreement with the author, it is not clear what they should do next. The adaptive-markets theory does not really produce any testable propositions, or market-beating strategies. And regulators might benefit from his suggestions on monitoring financial risk but might still struggle to know what to do in response. Perhaps that is the point; evolution doesn't have an end game in mind. ■

Cognitive science

Mind meld

The Knowledge Illusion: Why We Never Think Alone. By Steven Sloman and Philip Fernbach. *Riverhead; 296 pages; $28. Macmillan; £18.99*

DO YOU know how a toilet works? What about a bicycle, or a zipper? Most people can provide half answers at best. They struggle to explain basic inventions, let alone more complex and abstract ones. Yet somehow, in spite of people's ignorance, they created and navigate the modern world. A new book, "The Knowledge Illusion" sets out to tackle this apparent paradox: how can human thinking be so powerful, yet so shallow?

Steven Sloman and Philip Fernbach, two cognitive scientists, draw on evolutionary theory and psychology. They argue that the mind has evolved to do the bare minimum that improves the fitness of its host. Because humans are a social species and evolved in the context of collaboration, wherever possible, abilities have been outsourced. As a result, people are individually rather limited thinkers and store little information in their own heads. Much knowledge is instead spread through the community—whose members do not often realise that this is the case.

The authors call this the illusion of understanding, and they demonstrate it with a simple experiment. Subjects are asked to rate their understanding of something, then to write a detailed account of it, and finally to rate their understanding again. The self-assessments almost invariably drop. The authors see this effect everywhere, from toilets and bicycles to complex policy issues. The illusion exists, they argue, because humans evolved as part of a hive mind, and are so intuitively adept at co-operation that the lines between minds become blurred. Economists and psychologists talk about the "curse of knowledge": people who know something have a hard time imagining someone else who does not. The illusion of knowledge works the other way round: people think they know something because others know it.

The hive mind, with its seamless interdependence and expertise-sharing, once helped humans hunt mammoths and now sends them into space. But in politics it causes problems. Using a toilet without understanding it is harmless, but changing the health-care system without understanding it is not. Yet people often have strong opinions about issues they understand little about. And on social media, surrounded by like-minded friends and followers, opinions are reinforced and become more extreme. It is hard to reason with someone under the illusion that their beliefs are thought through, and simply presenting facts is unlikely to change beliefs when those beliefs are rooted in the values and groupthink of a community.

The authors tentatively suggest that making people confront the illusion of understanding will temper their opinions, but this could have the opposite effect—people respond badly to feeling foolish. Messrs Sloman and Fernbach show how deep the problem runs, but are short on ideas to fix it.

"The Knowledge Illusion" is at once both obvious and profound: the limitations of the mind are no surprise, but the problem is that people so rarely think about them. However, while the illusion certainly exists, its significance is overstated. The authors are Ptolemaic in their efforts to make it central to human psychology, when really the answer to their first question—how can human thought be so powerful, yet so shallow?—is the hive mind. Human ignorance is more fundamental and more consequential than the illusion of understanding. But still, the book profits from its timing. In the context of partisan bubbles and fake news, the authors bring a necessary shot of humility: be sceptical of your own knowledge, and the wisdom of your crowd. ■

Political manifestos

Time to smash the system

Rebel: How to Overthrow the Emerging Oligarchy. By Douglas Carswell. *Head of Zeus; 386 pages; £18.99*

DOUGLAS CARSWELL is not playing around when he calls his book "Rebel", with a clenched fist on the cover. An MP who abandoned the Conservatives for UKIP and has now left UKIP to become an independent, Mr Carswell is as angry with the ruling class as any street-fighting leftist. He is fond of quoting Thomas Piketty, and even admits to cheering when Jeremy Corbyn, a hard-line leftist, was elected leader of the Labour Party.

Mr Carswell thinks that a new oligarchy is the biggest threat to the welfare of mankind. The MP for Clacton is best known as one of the leaders of the campaign to take Britain out of the European Union. But he regards the EU as simply one manifestation of a much bigger problem. Big companies are tightening their hold over the global economy. Established parties are rigging the political system in their own favour. And business and politics are becoming ever more intertwined as companies offer jobs to ex-politicians. Journalists snobbishly dismiss populism as proof that their fellow citizens are bigots rather than as evidence that they are waking up to the fact that the system is rigged.

Carswell, party of one

Yet Mr Carswell has no time for the leftist solution—enlisting the state to regulate capitalism and redistribute wealth. This will make the problem worse by killing markets (which are the source of human progress) and entrenching political elites (who are the source of decay). He argues instead that crony capitalism needs to be replaced by real capitalism and rigged markets by real markets. The best way to stop bankers from privatising profits and socialising losses is to force them to risk their own capital, perhaps by turning investment banks back into partnerships. The best way to prevent super-companies from consolidating their grip on society is to make it easier for new companies to grow (for example by reducing the length and scope of patents). Mr Carswell is particularly impassioned about breaking up what he sees as political cartels. In his view, established political parties serve the interests of the oligarchy rather than the people. Thankfully modern technology makes it easier for insurgents to start parties from nowhere: Mr Carswell likes to boast of doing for himself, often on his laptop, what the established parties spend millions of dollars failing to do. One video that he made, on the case for Brexit, has been seen by over 1.4m people.

Mr Carswell concedes that many of the new radicals who have appeared in reaction to the oligarchy are a rum bunch: "the anti-oligarchs—and the chaos, confusion and redistribution of resources that they bring—will make the case for rule by a few." The electronic revolution needs to be a permanent one not only to overthrow the status quo but to keep the new radicals from ▸▸

wrecking the revolution.

Mr Carswell makes his case well. He is right that capitalism is going through a worrying period of concentration: the tech oligarchs now enjoy market shares not seen since the days of the robber barons. He is also right that today's meritocratic elite is hard to stomach, convinced that it deserves everything it has, because it owes its position to merit, and is addicted to self-righteous posturing. He sees many of the new radicals as little better: one reason he joined UKIP was to keep Brexit from being dominated in the public mind by the clownish Nigel Farage. But he is wrong to think that people-power is the answer. There is a good reason that America's Founding Fathers, whom Mr Carswell so admires, built up checks and balances to the will of the people: the people are often moved by short-term passions, swayed by demagogues, deceived by rumours. Crowds are often mad rather than wise. ■

French fiction

Yearning in the sandstorm

Compass. By Mathias Enard. Translated by Charlotte Mandell. *New Directions; 464 pages $26.95. Fitzcarraldo Editions; £14.99*

"THE East is a career," wrote Disraeli in his novel "Tancred". Lately, the Western devotion to that compass-point has fallen into intellectual disrepute. Critics such as Edward Said (who took Disraeli's axiom as an epigraph to his influential study, "Orientalism") have indicted scholars and travellers as the outriders of a predatory imperialism in Asia and the Middle East. "Compass", Mathias Enard's epic wrangle over the meanings of a passion for the East, won the Prix Goncourt in 2015, has been long-listed for the Man Booker International prize, and has just been published in English. The novel offers both a celebration and interrogation of the Orientalist imagination. With its torrential erudition, Mr Enard's insomniac monologue has inspired plaudits—and perplexity. "Desire for the Orient", admits Mr Enard's narrator, after citing Flaubert's erotic escapades in Egypt, "is also a carnal desire."

Mr Enard, an Arabic and Persian specialist, makes his lover of the East, Franz Ritter, a thwarted musicologist in Vienna. Over one delirious night, struck down by a mysterious ailment, Franz remembers perilous research trips to Aleppo and Palmyra (today, his beloved sites are "burning or burnt" by civil war), and to revolutionary Tehran. He re-imagines the lives of Orient-struck writers such as Goethe and Heine, or intrepid voyagers such as Jane Digby and Lady Hester Stanhope. And he evokes Orientalism as "reverie", as "lament"; as "a forever disappointing exploration".

Above all, Franz pines for his lost Sarah, a scholar from Paris who has adopted Buddhism and fled to Borneo. Like him, Sarah believes not in an archetypal West and East but in a two-way traffic of "sharing and continuity". For all its sandstorm of scholarship, translated with tireless eloquence by Charlotte Mandell, "Compass" aches with that simple yearning. "Only love" of a person or a culture, thinks Franz under the stars of Syria, "opens us up to the other". The narrator, whose wit sparkles beneath a burden of learning and loneliness, also tells us what happens when Said's name crops up among his prickly band of Orientalists: "It was like invoking the Devil in a Carmelite convent." ■

Art festivals

Athens on display

The Greek capital will co-host the Documenta art exhibition, sparking excitement and criticism

THE confluence of cutting-edge European art shows that take place in the same year only once every decade kicks off this month with the opening of the five-yearly Documenta exhibition. Usually sited only in Kassel, Documenta this year will start off on April 8th in Athens—the grimy but resilient survivor of an economic crisis that has already lasted nearly as long as America's Great Depression—and get going in the German city only later, in June. (The other two big shows of the year are the Venice Biennale, which opens in May, and an exhibition of sculpture that will be unveiled in Münster in June.)

Documenta will bring plenty of well-heeled tourists to Greece. It should also help the new state museum of contemporary art, known as EMST, the show's main venue, carve out a space on Europe's arts map. Other cash-strapped Greek museums will also get a boost from hosting Documenta's works. And Katerina Koskina, EMST's director, hopes that the attention will also bring attention to Greece's contemporary-art scene.

George Kaminis, the mayor of Athens, has made several public spaces available for performance-art pieces, which will dominate the first week of the exhibition, a nod at the growing popularity throughout the art world of audience participation. In Kotzia Square, flanked by elegant 19th-century buildings, Rasheed Araeen, a Pakistani artist, will invite people to share a meal under canopies inspired by a traditional Pakistani wedding tent. It will attract not only art-lovers but some of the more than 20,000 hard-pressed Athenians who eat at soup kitchens every day. And Mary Zygouri, a Greek artist, will show a film and stage a performance in Kokkinia, a left-wing industrial neighbourhood associated with Nazi executions of Greek resistance fighters. Ms Zygouri's film will draw on one provocatively put on in 1979 by Maria Karavela at a memorial to the resistance.

Some artists have tried to link the host cities. Marta Minujín, an Argentine artist, has gathered once-banned books in both Kassel and Athens to rebuild her "Parthenon of Books" (pictured), a work from 1983, in Kassel. A Greek airline will run regular flights between the two cities. But despite the best intentions, Documenta stirs mixed emotions in Athens. Yanis Varoufakis, the controversial former finance minister, calls it "disaster tourism". Athenians complain of "colonial attitudes" shown by the organisers. "It's hard to avoid the feeling Greece's misery is being exploited by Documenta," says a gallery owner. Fraught relations between Greece and Germany add to the tension. Alexis Tsipras, the left-wing prime minister, has moderated his anti-European rhetoric but to many Greeks, Germany is on a mission to throw the country out of the euro, however hard it tries to implement tough reforms demanded by creditors. Documenta's advance guard says there will be plenty of good art on display, but only if it helps visitors reimagine the world around them will it have truly succeeded.

Soon to re-appear

Appointments

As part of its "Young Graduates Program", the West African Development Bank (BOAD) is recruiting young graduates from prestigious diaspora universities and schools.

AREAS OF SKILLS

Financial analysis (corporate development and investment projects); specialization in financial engineering and risk management.

ELIGIBILITY

The following are the minimum requirements to be eligible for the "Young Graduates Program":

- A Master's or post-graduate degree (high school diploma + 5 five years of higher studies);
- Citizenship of a WAEMU member country
- Fluency in French and English.
- Relevant working experience of 0-2 years at most.

APPLICATION FORM

Each application form must contain the following documents:

- Curriculum vitae (CV);
- Certified true copy of the birth certificate;
- Copy of ID document (national ID Card or passport);
- Certified true copy of the degree or certificate of achievement for a degree completed in 5 years of higher education;
- Certified true copy of the transcript of the latest degree.

Applications from women and citizens of Guinea Bissau are highly encouraged.

Applications must be sent not later than 30 April 2017 to:

Monsieur le Directeur des Ressources Humaines (DRH)
Banque Ouest Africaine de Développement (BOAD)
68 Avenue de la Libération, BP: 1172, Lomé (TOGO)

Applications can also be transmitted to BOAD headquarters by email at:
boadsiege@boad.org.

This recruitment notice as well as a job application form (to be completed and transmitted by email) can be found on our website at ***http://www.boad.org.***

Tenders

DEMOCRATIC REPUBLIC OF THE CONGO
Société Congolaise de Fibre Optique
Central African Backbone 5 Project

Notice of an international invitation to tender relating to the construction of sections of the national telecommunication backbone (Kinshasa – Muanda), specifically the performance of civil engineering work, the supply and installation of fibre-optic cables, and the construction of passive shelters.

The Democratic Republic of the Congo has obtained a grant from the International Development Association / World Bank to fund the Central Africa Backbone 5 Project. It is intended that part of that financing will be used to build the section of the National Telecoms Backbone between Kinshasa and Muanda, hereinafter referred to as the "National Telecommunication Backbone Muanda-Kinshasa".

For that purpose, the "Société Congolaise de Fibre Optique" SOCOF SA hereby extends an invitation to interested companies (the "Bidders") to tender for work to build the National Telecoms Backbone Muanda-Kinshasa.

Bidders will be able to obtain the Tender Document from the 10th, April 2017 from:

SOCIETE CONGOLAISE DE FIBRE OPTIQUE SA (« SOCOF »)
N°03, Avenue Bas-Congo, 2ème étage, Gare Centrale, Kinshasa-Gombe,
Democratic Republic of the Congo.
Tel: +243 125 103 599
Email address: dpm@socof.net , copy to infos@socof.net

The Tender Document must be requested by mail, email, or in person from the SOCOF office, and the request must specify that it is a request for the Tender Document relating to the construction of sections of the National Telecoms Backbone ((Kinshasa – Muanda), specifically the performance of civil engineering work, the supply and installation of fibre-optic cables, the construction of technical centres (*"Demande du Dossier d'appel d'offres relatif à la construction du tronçon Kinshasa – Muanda du Backbone National de Télécommunications incluant les travaux de génie civil, la fourniture et la pose de câbles à fibres optiques avec shelters passifs "* in French). When the request is received and on payment of a non-refundable sum of USD 400, the Tender Document will be provided immediately or, if desired, sent in a sealed letter by SOCOF, which shall in no event be liable for any delays or losses suffered in its delivery.
Bids made by the Bidders, presented in accordance with the terms set out in the Tender Document, must be submitted by **11.00 am, Kinshasa Local Time on the 13th, June 2017** at the address stated in the Tender Document.
The SOCOF SA will refuse any application received after the aforementioned deadline.
Bidders will be informed about whether or not their application was successful according to the terms and conditions set out in the Tender Document.

Bidders may obtain additional information from SOCOF between the hours of 9am and 3.30pm, Monday to Friday.

LUISS University – Rome
Call for expressions of interest for 19 tenure track positions

LUISS University (www.luiss.edu) invites outstanding scholars to express their interest for tenure track positions in the areas of Data Science, Economics, Law, Management, Political Science, and Statistics. This recruitment campaign is part of a major international expansion initiative aimed at strengthening the University's reputation for excellence in research and high quality teaching.

Department of Business and Management

Assistant and Associate Professor in Banking and Corporate Finance

Associate or Full Professor in Organisation Studies (Organisational Behaviour)

Associate or Full Professor in Organisation Studies (Leadership)

Associate or Full Professor in Management (Creative Industries)

Associate or Full Professor in Entrepreneurship

Full Professor in Algorithmic Data Analysis (Computer Science)

Department of Law

Assistant Professor in Private Comparative Law

Associate or Full Professor in Italian Private Law

Department of Economics and Finance

Assistant Professor in Economics (Macro-Finance)

Assistant Professor in Economics (Microeconomics, Behavioural Economics, and Finance)

Associate or Full Professor in Econometrics

Associate or Full Professor in Statistics

Full Professor in Economics

Department of Political Sciences

Assistant Professor in Administrative Law

Assistant Professor in Political Science

Assistant Professor in Sociology of Communication

Associate Professor in History of International Relations

Full Professor in Political Science

About the University

Located in the heart of Rome, LUISS specialises in the Social Sciences to educate over 8,000 students from around the world. Since its founding, LUISS has developed privileged relationships with the business community - through its partnership with Confindustria, the Italian largest industry association – as well as with the legal practice, government institutions, and civil society. The LUISS educational approach is interdisciplinary and problem-led. With over 200 international academic partnerships, LUISS offers dual degrees with international universities in Europe, North America, and East Asia.

Candidates profile

We seek academics of the highest calibre, with a strong commitment to research and teaching, and the aspiration to contribute to LUISS international expansion. Successful candidates will show a passionate drive to become leading scholars in their own field: each position offers the opportunity to launch new research streams while teaching on preferred subjects.

For further information, please consult:
http://www.luiss.edu/expression-interest

Closing date: 1st May 2017.

Economic data

% change on year ago

	Gross domestic product			Industrial production	Consumer prices		Unemployment	Current-account balance		Budget balance	Interest rates, %	Currency units, per $	
	latest	qtr*	2017†	latest	latest	2017†	rate, %	latest 12 months, $bn	% of GDP 2017†	% of GDP 2017†	10-year gov't bonds, latest	Apr 5th	year ago
United States	+2.0 Q4	+2.1	+2.3	+0.5 Feb	+2.7 Feb	+2.4	4.7 Feb	-481.2 Q4	-2.8	-3.5	2.34	-	-
China	+6.8 Q4	+7.0	+6.5	+6.3 Feb	+0.8 Feb	+2.3	4.0 Q4§	+196.4 Q4	+1.7	-4.1	3.12§§	6.90	6.47
Japan	+1.6 Q4	+1.2	+1.2	+4.8 Feb	+0.2 Feb	+0.7	2.8 Feb	+186.5 Jan	+3.5	-5.3	0.07	111	110
Britain	+1.9 Q4	+2.7	+1.7	+3.2 Jan	+2.3 Feb	+2.7	4.7 Dec††	-115.7 Q4	-4.0	-4.0	1.06	0.80	0.71
Canada	+1.9 Q4	+2.6	+2.0	+3.5 Jan	+2.0 Feb	+1.9	6.6 Feb	-51.2 Q4	-2.7	-2.6	1.56	1.34	1.32
Euro area	+1.7 Q4	+1.6	+1.6	+0.6 Jan	+1.5 Mar	+1.6	9.5 Feb	+392.3 Jan	+3.0	-1.6	0.25	0.94	0.88
Austria	+1.7 Q4	+2.0	+1.6	-1.1 Jan	+2.2 Feb	+1.7	5.7 Feb	+6.6 Q4	+2.4	-0.9	0.50	0.94	0.88
Belgium	+1.2 Q4	+2.0	+1.4	-1.6 Jan	+2.3 Mar	+2.0	7.0 Feb	-2.0 Dec	+1.1	-2.7	0.75	0.94	0.88
France	+1.1 Q4	+1.7	+1.3	-0.4 Jan	+1.1 Mar	+1.3	10.0 Feb	-34.5 Jan	-1.0	-3.1	0.95	0.94	0.88
Germany	+1.8 Q4	+1.7	+1.6	nil Jan	+1.6 Mar	+1.8	3.9 Feb‡	+287.1 Jan	+8.2	+0.5	0.25	0.94	0.88
Greece	-1.4 Q4	-4.8	+1.2	+7.3 Jan	+1.3 Feb	+0.8	23.1 Dec	-0.6 Jan	-1.2	-6.4	7.10	0.94	0.88
Italy	+1.0 Q4	+0.7	+0.9	-0.5 Jan	+1.4 Mar	+1.4	11.5 Feb	+47.5 Jan	+2.5	-2.4	2.28	0.94	0.88
Netherlands	+2.5 Q4	+2.5	+2.0	+1.5 Jan	+1.1 Mar	+1.2	6.3 Feb	+64.8 Q4	+8.5	+0.5	0.49	0.94	0.88
Spain	+3.0 Q4	+2.8	+2.6	+7.2 Jan	+2.3 Mar	+2.2	18.0 Feb	+24.9 Jan	+1.5	-3.3	1.64	0.94	0.88
Czech Republic	+2.0 Q4	+1.6	+2.5	+9.6 Jan	+2.5 Feb	+2.4	3.5 Feb‡	+2.3 Q4	+0.7	-0.5	0.92	25.4	23.8
Denmark	+2.3 Q4	+1.9	+1.4	+2.5 Jan	+1.0 Feb	+1.2	4.3 Feb	+25.3 Jan	+7.1	-1.4	0.55	6.97	6.54
Norway	+1.8 Q4	+4.5	+1.8	+0.6 Jan	+2.5 Feb	+2.4	4.2 Jan‡‡	+18.1 Q4	+5.3	+2.8	1.62	8.60	8.35
Poland	+3.2 Q4	+7.0	+3.2	+1.2 Feb	+2.0 Mar	+1.8	8.5 Feb§	+0.5 Jan	-1.3	-3.2	3.44	3.96	3.75
Russia	+0.3 Q4	na	+1.4	-2.7 Feb	+4.2 Mar	+4.5	5.6 Feb§	+25.0 Q4	+2.8	-2.9	8.13	56.2	69.3
Sweden	+2.3 Q4	+4.2	+2.6	+4.1 Feb	+1.8 Feb	+1.6	7.4 Feb§	+23.7 Q4	+4.8	-0.4	0.57	8.97	8.15
Switzerland	+0.6 Q4	+0.3	+1.4	-1.2 Q4	+0.6 Feb	+0.5	3.3 Feb	+70.6 Q4	+9.7	+0.2	-0.13	1.00	0.96
Turkey	+3.5 Q4	na	+2.6	+4.2 Jan	+11.3 Mar	+9.7	12.7 Dec§	-33.2 Jan	-4.4	-2.1	10.95	3.69	2.83
Australia	+2.4 Q4	+4.4	+2.7	+1.0 Q4	+1.5 Q4	+2.1	5.9 Feb	-33.1 Q4	-1.3	-1.8	2.61	1.32	1.33
Hong Kong	+3.1 Q4	+4.8	+2.6	-0.7 Q4	-0.1 Feb	+1.7	3.3 Feb‡‡	+14.5 Q4	+5.9	+1.5	1.61	7.77	7.76
India	+7.0 Q4	+5.1	+7.2	+2.7 Jan	+3.7 Feb	+4.6	5.0 2015	-11.9 Q4	-1.0	-3.2	6.65	64.9	66.5
Indonesia	+4.9 Q4	na	+5.2	+4.5 Jan	+3.6 Mar	+4.3	5.6 Q3§	-16.3 Q4	-2.0	-2.1	7.07	13,321	13,219
Malaysia	+4.5 Q4	na	+4.4	+3.5 Jan	+4.5 Feb	+3.2	3.5 Jan§	+6.0 Q4	+3.1	-3.1	4.12	4.43	3.92
Pakistan	+5.7 2016**	na	+5.2	+0.8 Jan	+4.9 Mar	+4.9	5.9 2015	-4.9 Q4	-1.7	-4.8	8.07†††	105	105
Philippines	+6.6 Q4	+7.0	+6.4	+9.3 Jan	+3.4 Mar	+3.3	6.6 Q1§	+0.6 Dec	+0.8	-2.6	5.16	50.1	46.2
Singapore	+2.9 Q4	+12.3	+2.1	+12.6 Feb	+0.7 Feb	+1.1	2.2 Q4	+56.7 Q4	+19.3	-1.0	2.22	1.40	1.36
South Korea	+2.4 Q4	+2.0	+2.5	+6.6 Feb	+2.2 Mar	+1.8	5.0 Feb§	+97.6 Feb	+6.4	-1.0	2.14	1,124	1,155
Taiwan	+2.9 Q4	+1.8	+1.8	+10.6 Feb	+0.2 Mar	+2.1	3.8 Feb	+70.9 Q4	+11.5	-0.7	1.11	30.4	32.3
Thailand	+3.0 Q4	+1.7	+3.4	-1.5 Feb	+0.8 Mar	+1.3	1.1 Feb§	+46.8 Q4	+11.6	-2.0	2.59	34.5	35.3
Argentina	-2.1 Q4	+1.9	+2.7	-2.5 Oct	— ***	—	7.6 Q4§	-15.0 Q4	-2.7	-4.1	na	15.4	14.7
Brazil	-2.5 Q4	-3.4	+0.6	-0.8 Feb	+4.8 Feb	+4.5	13.2 Feb§	-22.8 Feb	-1.6	-7.7	9.83	3.09	3.67
Chile	+0.5 Q4	-1.4	+1.8	-7.6 Feb	+2.7 Feb	+3.0	6.4 Feb§‡‡	-3.6 Q4	-1.2	-2.1	3.98	657	675
Colombia	+1.6 Q4	+4.0	+2.4	-0.2 Jan	+4.7 Mar	+4.0	10.5 Feb§	-12.5 Q4	-3.6	-2.8	6.56	2,857	3,091
Mexico	+2.4 Q4	+2.9	+1.5	-0.1 Jan	+4.9 Feb	+5.0	3.5 Feb	-27.9 Q4	-2.6	-2.5	7.06	18.7	17.7
Venezuela	-8.8 Q4~	-6.2	-5.5	na	na	+562	7.3 Apr§	-17.8 Q3~	-1.5	-19.6	10.43	9.99	9.99
Egypt	+3.4 Q3	na	+3.9	+16.0 Jan	+30.2 Feb	+19.2	12.4 Q4§	-20.1 Q4	-6.2	-10.8	na	18.0	8.88
Israel	+4.3 Q4	+6.5	+3.9	+3.2 Jan	+0.4 Feb	+0.6	4.3 Feb	+12.4 Q4	+4.4	-2.3	2.17	3.65	3.82
Saudi Arabia	+1.4 2016	na	+0.8	na	-0.1 Feb	+2.0	5.6 2015	-24.9 Q4	-2.1	-7.3	3.68	3.75	3.75
South Africa	+0.7 Q4	-0.3	+1.1	+0.5 Jan	+6.3 Feb	+5.7	26.5 Q4§	-9.5 Q4	-3.6	-3.1	8.99	13.8	15.0

Source: Haver Analytics. *% change on previous quarter, annual rate. †*The Economist* poll or Economist Intelligence Unit estimate/forecast. §Not seasonally adjusted. ‡New series. ~2014 **Year ending June. ††Latest 3 months. ‡‡3-month moving average. §§5-year yield. ***Official number not yet proved to be reliable; The State Street PriceStats Inflation Index, Jan 29.53%; year ago 30.79% †††Dollar-denominated bonds.

Markets

	Index Apr 5th	% change on one week	Dec 30th 2016 in local currency	Dec 30th 2016 in $ terms
United States (DJIA)	20,648.2	-0.1	+4.5	+4.5
China (SSEA)	3,424.6	+0.9	+5.4	+6.2
Japan (Nikkei 225)	18,861.3	-1.9	-1.3	+3.5
Britain (FTSE 100)	7,331.7	-0.6	+2.6	+3.6
Canada (S&P TSX)	15,643.0	-0.1	+2.3	+2.3
Euro area (FTSE Euro 100)	1,177.6	+0.1	+5.9	+7.1
Euro area (EURO STOXX 50)	3,472.6	-0.1	+5.5	+6.7
Austria (ATX)	2,885.1	+1.7	+10.2	+11.4
Belgium (Bel 20)	3,808.8	+0.6	+5.6	+6.8
France (CAC 40)	5,091.9	+0.4	+4.7	+5.9
Germany (DAX)*	12,217.5	+0.1	+6.4	+7.6
Greece (Athex Comp)	670.0	+0.2	+4.1	+5.2
Italy (FTSE/MIB)	20,253.4	-0.1	+5.3	+6.4
Netherlands (AEX)	514.9	+0.3	+6.6	+7.7
Spain (Madrid SE)	1,047.7	+0.1	+11.0	+12.3
Czech Republic (PX)	980.8	-0.2	+6.4	+7.5
Denmark (OMXCB)	837.6	+1.9	+4.9	+6.0
Hungary (BUX)	32,405.1	+0.5	+1.3	+2.0
Norway (OSEAX)	765.0	+1.2	nil	+0.2
Poland (WIG)	59,369.7	+1.1	+14.7	+20.8
Russia (RTS, $ terms)	1,152.5	+2.5	nil	nil
Sweden (OMXS30)	1,558.6	-1.6	+2.7	+4.0
Switzerland (SMI)	8,640.5	-0.2	+5.1	+6.4
Turkey (BIST)	89,037.4	-0.3	+13.9	+8.5
Australia (All Ord.)	5,915.9	+0.1	+3.4	+8.5
Hong Kong (Hang Seng)	24,400.8	nil	+10.9	+10.7
India (BSE)	29,974.2	+1.5	+12.6	+17.7
Indonesia (JSX)	5,677.0	+1.5	+7.2	+8.4
Malaysia (KLSE)	1,744.7	-0.3	+6.3	+7.6
Pakistan (KSE)	47,577.3	-1.7	-0.5	-0.9
Singapore (STI)	3,176.6	-0.3	+10.3	+13.7
South Korea (KOSPI)	2,160.9	-0.3	+6.6	+14.5
Taiwan (TWI)	9,949.5	+0.9	+7.5	+14.2
Thailand (SET)	1,582.1	+0.5	+2.5	+6.3
Argentina (MERV)	20,683.0	+2.4	+22.3	+26.0
Brazil (BVSP)	64,774.8	-1.1	+7.6	+13.1
Chile (IGPA)	24,376.5	+0.4	+17.6	+19.8
Colombia (IGBC)	10,194.4	+0.4	+0.9	+6.0
Mexico (IPC)	49,207.6	+0.3	+7.8	+18.6
Venezuela (IBC)	45,494.9	+7.4	+43.5	na
Egypt (EGX 30)	13,290.0	+2.3	+7.7	+8.1
Israel (TA-100)	1,268.2	+1.2	-0.7	+4.7
Saudi Arabia (Tadawul)	7,050.9	+1.5	-2.6	-2.5
South Africa (JSE AS)	52,990.1	+1.0	+4.6	+3.9

The Economist poll of forecasters, April averages (previous month's, if changed)

	Real GDP, % change Low/high range 2017	2018	average 2017	2018	Consumer prices % change 2017	2018	Current account % of GDP 2017	2018
Australia	2.2/2.8	2.4/3.2	2.7 (2.6)	2.9	2.1	2.3	-1.3 (-1.4)	-1.7 (-1.9)
Brazil	0.1/1.3	1.5/4.0	0.6 (0.7)	2.4 (2.2)	4.5	4.6	-1.6	-2.0
Britain	1.1/2.0	0.7/1.7	1.7 (1.6)	1.2	2.7 (2.6)	2.7	-4.0 (-4.4)	-3.4 (-3.8)
Canada	1.5/2.6	1.5/2.7	2.0 (1.9)	2.0	1.9 (1.8)	1.9	-2.7 (-2.8)	-2.3 (-2.5)
China	6.2/6.8	4.2/7.0	6.5	6.2 (6.3)	2.3	2.4	1.7 (2.0)	1.7 (1.8)
France	1.1/1.6	1.1/1.8	1.3	1.5	1.3	1.3	-1.0 (-0.9)	-1.0
Germany	1.1/1.8	1.3/2.0	1.6	1.6	1.8	1.6	8.2 (8.3)	7.9 (8.0)
India	6.3/7.6	6.5/8.0	7.2	7.5 (7.6)	4.6 (4.8)	4.9 (5.0)	-1.0 (-1.1)	-1.4
Italy	0.6/1.1	0.6/1.1	0.9 (0.8)	0.9	1.4 (1.2)	1.2	2.5 (2.4)	2.3 (2.2)
Japan	0.3/1.6	0.3/1.7	1.2 (1.1)	1.0	0.7 (0.8)	1.0	3.5 (3.6)	3.6
Russia	0.8/2.6	0.9/3.0	1.4	1.7 (1.8)	4.5 (4.7)	4.4 (4.3)	2.8	2.5 (2.6)
Spain	2.3/2.9	1.6/2.8	2.6 (2.5)	2.2 (2.1)	2.2	1.5 (1.4)	1.5	1.5
United States	2.0/2.6	1.8/3.6	2.3	2.5 (2.4)	2.4 (2.3)	2.3	-2.8	-3.0 (-2.9)
Euro area	1.3/1.8	1.2/1.7	1.6	1.5 (1.6)	1.6	1.4	3.0 (2.9)	2.9 (2.8)

Sources: Bank of America, Barclays, BNP Paribas, Citigroup, Commerzbank, Credit Suisse, Decision Economics, Deutsche Bank, EIU, Goldman Sachs, HSBC Securities, ING, Itaú BBA, JPMorgan, Morgan Stanley, Nomura, RBS, Royal Bank of Canada, Schroders, Scotiabank, Société Générale, Standard Chartered, UBS. For more countries, go to: Economist.com/markets

Other markets

	Index Apr 5th	% change on one week	Dec 30th 2016 in local currency	Dec 30th 2016 in $ terms
United States (S&P 500)	2,353.0	-0.3	+5.1	+5.1
United States (NAScomp)	5,864.5	-0.6	+8.9	+8.9
China (SSEB, $ terms)	345.3	+1.7	+1.0	+1.0
Japan (Topix)	1,504.7	-2.4	-0.9	+3.9
Europe (FTSEurofirst 300)	1,497.6	+0.3	+4.8	+6.0
World, dev'd (MSCI)	1,845.9	-0.6	+5.4	+5.4
Emerging markets (MSCI)	969.2	-0.3	+12.4	+12.4
World, all (MSCI)	447.8	-0.5	+6.1	+6.1
World bonds (Citigroup)	898.7	-0.2	+1.7	+1.7
EMBI+ (JPMorgan)	804.1	-0.1	+4.1	+4.1
Hedge funds (HFRX)	1,221.7§	-0.1	+1.5	+1.5
Volatility, US (VIX)	12.9	+11.4	+14.0	(levels)
CDSs, Eur (iTRAXX)†	75.1	+0.8	+4.1	+5.2
CDSs, N Am (CDX)†	65.9	-2.4	-2.8	-2.8
Carbon trading (EU ETS) €	4.8	-1.8	-26.6	-25.8

Sources: IHS Markit; Thomson Reuters. *Total return index. †Credit-default-swap spreads, basis points. §Apr 4th.

Indicators for more countries and additional series, go to: **Economist.com/indicators**

The Economist commodity-price index

2005=100

	Mar 28th	Apr 4th*	% change on one month	one year
Dollar Index				
All Items	144.5	142.6	-2.1	+10.0
Food	153.7	150.9	-2.9	+0.7
Industrials				
All	134.8	134.0	-1.2	+23.4
Nfa†	141.7	139.5	-4.7	+18.1
Metals	131.9	131.6	+0.5	+26.0
Sterling Index				
All items	209.6	208.4	-3.6	+24.9
Euro Index				
All items	165.3	166.3	-2.7	+17.4
Gold				
$ per oz	1,255.3	1,256.8	+3.1	+2.2
West Texas Intermediate				
$ per barrel	48.4	51.0	-4.0	+41.8

Sources: Bloomberg; CME Group; Cotlook; Darmenn & Curl; FT; ICCO; ICO; ISO; Live Rice Index; LME; NZ Wool Services; Thompson Lloyd & Ewart; Thomson Reuters; Urner Barry; WSJ. *Provisional †Non-food agriculturals.

Tunnels of influence

David Rockefeller, banker and philanthropist, died on March 20th, aged 101

WHEREVER he went in the world—and in his 35 years at Chase Manhattan Bank, from 1946 to 1981, he ran up 5m air miles—David Rockefeller carried a small jar in his pocket. It was in case he found a beetle on the way. From the age of seven, partly from his own solitary, careful catching, partly from expeditions he sponsored, he built up a collection of 90,000 specimens from 2,000 species, carefully labelled and stored in airtight hardwood boxes at the 3,400-acre family place in Pocantico Hills. His preference was for woodborers, leaf-cutters and tunnellers, whose industrious activity changed the world in ways few people saw.

Networks, part-public, part hidden, were his speciality. As a Rockefeller, whose millions had bolstered Rockefeller University and the Rockefeller Centre and whose Picassos, Matisses and Cézannes filled the Museum of Modern Art, he was a fixture on the New York social, cultural and political scene. He did great things for the city, helping to revive Lower Manhattan and to build the World Trade Centre; while also holding its feet to the fire, during its bankruptcy in the mid-1970s, by demanding savage budget cuts and the sacking of thousands of workers. From his first job, as secretary to Fiorello La Guardia, every mayor of New York was drawn into his net.

His gaze went much further, however. As an international banker, he strove to give Chase a presence in every corner of the world. Some regimes were risky, to be sure. Some were bloodstained. But if a loan could be carefully crafted and secured, it should be offered. At times, his dogged diplomacy made openings where State Department officials hardly dared to tread. He forged banking deals with Leonid Brezhnev in the Soviet Union and Zhou Enlai in China, as well as with more amenable leaders in every continent except Antarctica. For the sake of "balance" for Chase in the Middle East, he buttered up both Israel and the Arabs. Fidel Castro once bounded across a room, to his embarrassment, to shake his hand.

Capitalism, American-style, was in his view a gift to the world as well as the grease of his career. The lure of profit created jobs and wealth, and empowered people, as no other system could. No one, therefore, should feel guilty about making money. Certainly "Senior" had not. The grand old man, John D., who sometimes shared his breakfast oatmeal with him, had felt no remorse about dominating the market when he ran Standard Oil. He made his millions but, as a good Baptist, gave away a tenth of it. Young David and his siblings, each heir to a trust containing $16m, were taught that great wealth conferred responsibility. He began by taking Thanksgiving baskets to the poor of New York, toiling up cabbage-reeking stairways with his liveried chauffeur by his side.

Old-money manners

He was often offered jobs in public service: treasury secretary, head of the Fed, ambassador to here and there. Both Republican and Democratic presidents asked him; as a moderate Republican of the old (now vanished) style, hating profligacy but with a social conscience, he might have served either. Yet his east-coast old-money manners, and his natural reserve, inclined him to be useful in the private sector. His discreet gathering of contacts had started in the war, when he was sent to Algiers to work for army intelligence: though of junior rank, he soon assembled a list of people who knew what was really going on. He also collected 131 beetles in his jars.

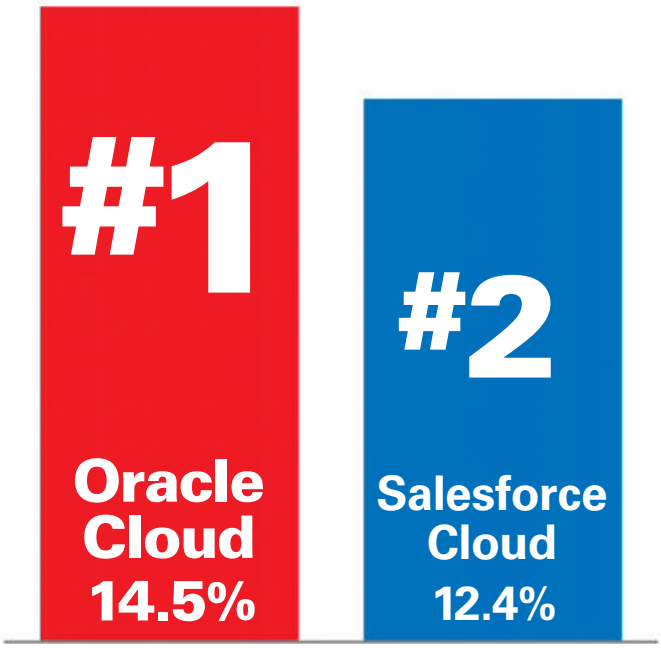
At Chase, which he headed from 1969 to 1981, he continued the habit of covert operations. His early years there were difficult; he was not considered a "real banker", had not been through their credit training programme and did not speak their language. Stymied at first in his efforts to expand overseas, but wishing to preserve civility and avoid confrontation, he set up semi-secret planning groups to steer the bank in that direction. A stumble in the mid-1970s saw a steep fall in earnings and a fat portfolio of non-performing loans. This was blamed on his internationalism; but for that he would never apologise.

Far from it. He was proud to be part of the so-called "secret cabal" that wanted a more integrated global structure, with America at the head of it. This was both in the country's interest, and its moral obligation. At the Council on Foreign Relations, at Bilderberg meetings, or on the Trilateral Commission which he founded in 1973, he relished discussing world affairs with people of equal quality and influence from North America, Europe and Asia. Their exclusiveness led many people to think these talking shops sinister, or an undisclosed tunnel to power. He found them just an invaluable way of linking the likeminded.

In all these efforts, he hoped the Rockefeller name would push matters forward. He never thought it a hindrance, though he was sad to note that for a time his children disowned it. With that name he was more apt to get through to people on the telephone. And in order to make his calls, he had amassed a second collection after the *Coleoptera* at Pocantico Hills: a Rolodex containing 150,000 names, eventually electronic, but originally on cards with handwritten notes of date and place. It was so large that it had its own office, beside his, in the Rockefeller Centre. From that room, his networks crept out to span the world. ■

Oracle #1
SaaS Enterprise Applications Revenue

1,000+ Employees Segment, 2015



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Source: IDC "Worldwide SaaS Enterprise Applications Market Shares, 2015: The Top 15 by Buyer Size," doc #US41913816, Dec. 2016; Table 4.
For the purposes of this report, SaaS enterprise applications include the following application markets: CRM, engineering, ERP, operations and manufacturing, and SCM.