

# The Economist

JANUARY 7TH-13TH 2017

# Now we're talking



Turkey torn apart

Theresa Maybe, Britain's indecisive PM

Nestlé goes on a health kick

Meet China's Shakespeare

## Voice computing comes of age

# “If you need to get from A to B, think of me!”

**Kojo**, CEO of Kojo's Bikes

Kojo turned his life around with one idea: renting out his bike and saving the money for his education. Kojo's business has quadrupled since then. He now has four bikes and plans on having bike shops all across Africa one day.



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Barack Obama expelled 35 **Russian diplomats** and imposed new economic sanctions in retaliation against Russian hackers' interference in America's election. American intelligence agencies say that Russia released stolen e-mails of Democratic Party officers in order to aid the campaign of Donald Trump. Vladimir Putin declined to strike back, winning praise from Mr Trump.

A gunman attacked a night-club in Istanbul during New Year's Day festivities, killing at least 39 people. Islamic State claimed responsibility. **Turkish** religious authorities who had criticised new year's celebrations as un-Islamic condemned the attack. It came two weeks after a policeman shouting "Don't forget Aleppo!" fatally shot the Russian ambassador to Turkey.

Relations between **Israel** and America became strained when John Kerry, the soon-to-retire secretary of state, said that the Israeli government was undermining the prospects for a "two-state solution" with the Palestinians. His comments came soon after America abstained in the UN Security Council vote that criticised Israel's construction of settlements.

Politicians in the **Democratic Republic of Congo** struck a deal in which elections will be organised in 2017 and President Joseph Kabila will step down by the end of the year. Mr Kabila himself has not signed the deal, however.

**Argentina's** president, Mauricio Macri, dismissed the finance and treasury minister, Alfonso Prat-Gay. He left apparently because of disagreements over the structure of the economic team. Mr Macri split the finance ministry into two. Luis Caputo, the new finance minister, will be responsible for borrowing. A new treasury minister, Nicolás Dujovne, will oversee tax and spending.

A battle between **gangs** at a prison in the Brazilian state of

Amazonas left 56 inmates dead. Some were decapitated; severed limbs were stacked by the entrance.

Odebrecht, a **Brazilian** construction company, and Braskem, a petrochemical firm in which it owns a stake, pleaded guilty to bribing officials and political parties to win contracts in Latin American and African countries. The companies agreed to pay a penalty of at least \$3.5bn, the largest settlement ever in a global bribery case.

**Stockmarkets** had a good 2016. The S&P 500 rose by 10% over the 12 months and the Dow Jones by 13%. The FTSE 100 recovered from its Brexit wobbles to end 14% up; Russia's RTS index soared after the election of Mr Trump to finish 52% higher; and Brazil's Bovespa rose by 39%, despite, or because of, the defenestration of the president. But Italy's main index fell by 10%, and China's Shanghai Composite never fully recovered from its turbulent start to 2016, ending the year 12% lower.

Donald Trump picked Jay Clayton, a legal expert on mergers and acquisitions, to be the next head of the **Securities and Exchange Commission**.

The European Central Bank raised its estimate of the capital shortfall at **Monte dei Paschi di Siena** to €8.8bn (\$9.1bn). The troubled Italian bank has requested a bail-out from the government after running out of time to raise new capital privately.

Shortly before Christmas, **Deutsche Bank** agreed to pay \$7.2bn to settle with America's Department of Justice for mis-selling subprime mortgage securities, about half the amount the regulator had initially sought. **Credit Suisse** agreed to pay \$5.2bn to resolve claims. But **Barclays** rejected a settlement, prompting the department to file a lawsuit.

**Ford** made a u-turn when it scrapped plans for a new factory in Mexico to build compact cars, and diverted some of the investment to a plant near Detroit to produce electric vehicles. Ford stressed that this was a commercial decision. Donald Trump had criticised the proposed Mexican factory when he campaigned on the theme of saving American jobs.

Meanwhile, Paul Ryan, the most senior Republican in the House of Representatives, said that Congress was not going to

raise **tariffs**, portending what may be one of his biggest fights with Mr Trump.

Luis Videgaray was rehabilitated in **Mexico's** government by being appointed foreign minister. Mr Videgaray resigned as finance minister after suggesting that Donald Trump visit Mexico last year, a hugely unpopular move at the time.

**Japan's** prime minister, Shinzo Abe, paid his first visit to the American naval base at Pearl Harbour. He expressed "sincere and everlasting condolences" to those who died in Japan's attack on it 75 years ago. Soon after, however, his defence minister, Tomomi Inada, paid a visit to Yasukuni Shrine in Tokyo where Japanese war criminals are honoured among the war dead.

The **British** government appointed Sir Tim Barrow, a former ambassador to Russia, as its new ambassador to the EU, three months before it is due to trigger negotiations over Brexit. This followed the early exit of Sir Ivan Rogers from the job. His resignation note decried "muddled thinking" by ministers.

Other economic data and news can be found on pages 64-65



# Now we're talking

Voice technology is making computers less daunting and more accessible



ANY sufficiently advanced technology, noted Arthur C. Clarke, a British science-fiction writer, is indistinguishable from magic. The fast-emerging technology of voice computing proves his point. Using it is just like casting a spell: say a few words into the air, and a nearby device can grant your wish.

The Amazon Echo, a voice-driven cylindrical computer that sits on a table top and answers to the name Alexa, can call up music tracks and radio stations, tell jokes, answer trivia questions and control smart appliances; even before Christmas it was already resident in about 4% of American households. Voice assistants are proliferating in smartphones, too: Apple's Siri handles over 2bn commands a week, and 20% of Google searches on Android-powered handsets in America are input by voice. Dictating e-mails and text messages now works reliably enough to be useful. Why type when you can talk?

This is a huge shift. Simple though it may seem, voice has the power to transform computing, by providing a natural means of interaction. Windows, icons and menus, and then touchscreens, were welcomed as more intuitive ways to deal with computers than entering complex keyboard commands. But being able to talk to computers abolishes the need for the abstraction of a "user interface" at all. Just as mobile phones were more than existing phones without wires, and cars were more than carriages without horses, so computers without screens and keyboards have the potential to be more useful, powerful and ubiquitous than people can imagine today.

Voice will not wholly replace other forms of input and output. Sometimes it will remain more convenient to converse with a machine by typing rather than talking (Amazon is said to be working on an Echo device with a built-in screen). But voice is destined to account for a growing share of people's interactions with the technology around them, from washing machines that tell you how much of the cycle they have left to virtual assistants in corporate call-centres. However, to reach its full potential, the technology requires further breakthroughs—and a resolution of the tricky questions it raises around the trade-off between convenience and privacy.

## Alexa, what is deep learning?

Computer-dictation systems have been around for years. But they were unreliable and required lengthy training to learn a specific user's voice. Computers' new ability to recognise almost anyone's speech dependably without training is the latest manifestation of the power of "deep learning", an artificial-intelligence technique in which a software system is trained using millions of examples, usually culled from the internet. Thanks to deep learning, machines now nearly equal humans in transcription accuracy, computerised translation systems are improving rapidly and text-to-speech systems are becoming less robotic and more natural-sounding. Computers are, in short, getting much better at handling natural language in all its forms (see Technology Quarterly).

Although deep learning means that machines can recognise speech more reliably and talk in a less stilted manner, they still don't understand the meaning of language. That is the most difficult aspect of the problem and, if voice-driven computing is truly to flourish, one that must be overcome. Computers must be able to understand context in order to maintain a coherent conversation about something, rather than just responding to simple, one-off voice commands, as they mostly do today ("Hey, Siri, set a timer for ten minutes"). Researchers in universities and at companies large and small are working on this very problem, building "bots" that can hold more elaborate conversations about more complex tasks, from retrieving information to advising on mortgages to making travel arrangements. (Amazon is offering a \$1m prize for a bot that can converse "coherently and engagingly" for 20 minutes.)

## When spells replace spelling

Consumers and regulators also have a role to play in determining how voice computing develops. Even in its current, relatively primitive form, the technology poses a dilemma: voice-driven systems are most useful when they are personalised, and are granted wide access to sources of data such as calendars, e-mails and other sensitive information. That raises privacy and security concerns.

To further complicate matters, many voice-driven devices are always listening, waiting to be activated. Some people are already concerned about the implications of internet-connected microphones listening in every room and from every smartphone. Not all audio is sent to the cloud—devices wait for a trigger phrase ("Alexa", "OK, Google", "Hey, Cortana", or "Hey, Siri") before they start relaying the user's voice to the servers that actually handle the requests—but when it comes to storing audio, it is unclear who keeps what and when.

Police investigating a murder in Arkansas, which may have been overheard by an Amazon Echo, have asked the company for access to any audio that might have been captured. Amazon has refused to co-operate, arguing (with the backing of privacy advocates) that the legal status of such requests is unclear. The situation is analogous to Apple's refusal in 2016 to help FBI investigators unlock a terrorist's iPhone; both cases highlight the need for rules that specify when and what intrusions into personal privacy are justified in the interests of security.

Consumers will adopt voice computing even if such issues remain unresolved. In many situations voice is far more convenient and natural than any other means of communication. Uniquely, it can also be used while doing something else (driving, working out or walking down the street). It can extend the power of computing to people unable, for one reason or another, to use screens and keyboards. And it could have a dramatic impact not just on computing, but on the use of language itself. Computerised simultaneous translation could render the need to speak a foreign language irrelevant for many people; and in a world where machines can talk, minor languages may be more likely to survive. The arrival of the touchscreen was the last big shift in the way humans interact with computers. The leap to speech matters more. ■

## Japan's economy

# The second divine wind

The strong dollar has given Abenomics another chance. Now corporate Japan must do its bit



could have guessed how much he would have to smile about.

The prospect of stronger spending in America, which has raised bond yields and strengthened the dollar against the yen, has rekindled some optimism about Abenomics, Mr Abe's campaign to lift the economy out of its decades-long stagnation. At the Bank of Japan's most recent meeting, one policymaker said that the prospects for growth and reflation stand at a "critical juncture". They likened conditions to those of 2013 and early 2014, when the currency was cheap, the stock-market was buoyant and inflation was rising. That momentum was not sustained. On its fourth anniversary, Abenomics has found a second wind. But this time Mr Abe must tackle the weak link in his programme: corporate Japan.

## The golden hoard

The ability of Abenomics to lower borrowing costs, weaken the yen and lift share prices was never much in doubt. The problem is that these gifts to Japanese industry have generated disappointingly meagre increases in domestic investment, wages and consumption. Many firms would rather hold cash or securities than make big capital outlays (although counting R&D as investment, as Japan's new statistics do, improves the picture). They have also been happier paying one-off bonuses or hiring temporary workers than increasing the base pay of core workers, which would be harder to reverse. Abenomics has run into a bottleneck of corporate timidity.

JAPAN'S prime minister, Shinzo Abe, was the first foreign leader to meet Donald Trump after his improbable election victory. The photographs show him smiling almost as broadly as the new president-elect. But not even Mr Abe

Business leaders argue that Japan is an uninviting place to invest, not least because it already has a large stock of capital, paired with a dwindling population (see page 17). But if the Japanese are an increasingly scarce and precious commodity, corporate Japan has a funny way of showing it. Despite low unemployment, real wages have declined under Abenomics. Last month the boss of Dentsu, Japan's biggest advertising agency, said he would resign after an investigation concluded that overwork drove an employee to suicide. Japan's core workers cannot easily be fired, but nor can they easily quit, because their skills and status in a firm are not seamlessly transferable elsewhere. That limits their bargaining power.

There are signs of change. The investigation and resignation at Dentsu—like the huge losses unveiled by Toshiba, a troubled conglomerate (see page 47)—may be a paradoxical sign of progress, of problems long hidden now coming to light. The composition of Japan's workforce is slowly changing, with greater numbers of workers, especially women, on more flexible contracts that are more exposed to market forces, for better or worse. The government's next budget will help by raising the amount that second earners, usually women, can make before their spouses lose a generous tax exemption.

But a bigger shove is needed. The government ought to retain a tax exemption for all couples, regardless of how much the second earner makes. It should redesign corporate taxes to discourage the hoarding of profits. If annual wage negotiations in the spring yield disappointing results, blunter options, like big rises in the minimum wage, exist.

Abenomics has succeeded in stemming deflation during a difficult few years when many other big economies looked in danger of succumbing to it. If the reflationary trend of recent months persists, the global economy may become more supportive of Abenomics. But for Japan to prosper, Japan's firms must swap caution for courage. ■

## Trumponomics

# Men of steel, houses of cards

The president elect's team needs to realise that America's economy is not like a steel mill



IT MUST seem to Donald Trump that reversing globalisation is easy-peasy. With a couple of weeks still to go before he is even inaugurated, contrite firms are queuing up to invest in America. This week Ford cancelled a \$1.6 billion new plant for small cars in Mexico and pledged to create 700 new jobs building electric and hybrid cars at Flat Rock in Michigan—while praising Mr Trump for improving the business climate in America. Other manufacturers, such as Carrier, have changed their plans, too. All it has taken is some harsh words, the odd

tax handout and a few casual threats.

Mr Trump has consistently argued that globalisation gives America a poor deal. He reportedly wants to impose a tariff of 5% or more on all imports. To help him, he has assembled advisers with experience in the steel industry, which has a rich history of trade battles. Robert Lighthizer, his proposed trade negotiator, has spent much of his career as a lawyer protecting American steelmakers from foreign competition. Wilbur Ross, would-be commerce secretary, bought loss-making American steel mills just before George W. Bush increased tariffs on imported steel. Daniel DiMicco, an adviser, used to run Nucor, America's biggest steel firm. Peter Navarro, an economist, author of books such as "Death by China" and now an adviser on ►

► trade, sees the decline of America's steel industry as emblematic of how unfair competition from China has hurt America.

But the steel business is not a model for trade policy in general and companies are capable of being tricksy, too. Mr Trump may simply be looking for good headlines, but if he wants more, his plans threaten to be an expensive failure.

### The miller's tale

One reason is that Paul Ryan, the Speaker of the House of Representatives, said this week that Congress would not be raising tariffs. Executive orders are bad politics and can get Mr Trump only so far. Another is that Ford's plans are not as simple as they look. It will still build its new small car in Mexico—at an existing plant (see page 48). But above all, Mr Trump gravely underestimates the complexity of messing with tariffs.

The men of steel are right to complain about China. Its government has indeed subsidised its steelmakers, leading to a glut that was dumped on the world market. Successive American governments have put up tariffs to protect domestic pro-

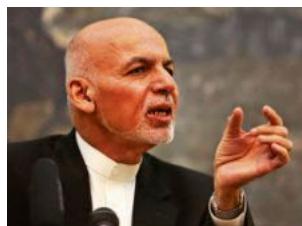
ducers (in 2016 the Obama administration placed a tariff of 52% on cold-rolled Chinese steel), as has the European Union.

Yet this way of thinking fails to deal with the question of whether an ample supply of cheap steel courtesy of a foreign government is really so terrible: it benefits American firms that consume steel—and they earn bigger profits and employ more people as a result. Moreover, trade in most goods and services is not like steel. America's biggest import from China is electrical machinery. China's government does not subsidise the overproduction of iPhones which are then dumped on the market, causing iPhone-makers in America to be laid-off. Instead, a smartphone might be designed and engineered in California and assembled in China, using components made or designed in half a dozen Asian and European countries, using metals from Africa. Likewise, every dollar of Mexican exports contains around 40 cents of American output embedded within it. For producers of such goods, tariffs would be a costly disaster. American steelmakers might seek out government protection. Apple and its kind will not. ■

### Fixing failed states

## First peace, then law

### How to save nations from collapse



EIGHT years ago Ashraf Ghani and Clare Lockhart wrote a book called "Fixing Failed States". Now Mr Ghani is in a position to follow his own advice. He is the president of Afghanistan, a state that failed in the 1990s and could fail again.

State failure causes untold misery (see page 43). Broadly defined, it is the main reason poor countries are poor. Its chief cause is not geography, climate or culture, but politics. Some countries build benign, efficient institutions that foster economic growth; others build predatory ones that retard it. South Sudan is an extreme example of predation. Its politics consist of warlords fighting over oil money. The warlords also stir up tribal animosity as a tool to recruit more militiamen. The state makes Big Men rich while ordinary folk subsist on food aid.

### Ashes to assets

Afghanistan must overcome several hurdles to avoid the same fate. Since Barack Obama pulled out most of the NATO troops supporting the government, the Taliban, an Islamist militia, has recaptured parts of the country. In the past year it has been fought to a stalemate. But were Donald Trump to withdraw the remaining American forces, the jihadists would probably take over again. The last time they were in power they banned female education, crushed gay people with bulldozers and hosted Osama bin Laden, so the stakes are high.

As a first step, Mr Trump should maintain at least the current level of air support, training and funding for the Afghan army. He should also ramp up pressure on Pakistan to stop letting the Taliban use its territory as a rear base. (Pakistan insists it is doing all it can; no one believes it.)

Foreign military support can buy time for a fragile state to build the right kind of institutions. This worked in Sierra Leone

and Liberia, two war-scorched African nations where UN peacekeepers gave new governments breathing-space to start afresh. It worked in Colombia, too, where American support helped the government drive back the drug-dealing leftist insurgents of the FARC and force them to the negotiating table, producing a historic peace deal in 2016. However—and this is the lesson of Iraq—good government cannot be imposed from outside. National leaders have to want it and work for it, overcoming stiff resistance from the militia bosses and budget-burling ministers who benefit from its absence.

Mr Ghani has the right priorities. First, establish a degree of physical security. Next, try to entrench the rule of law. Both are hard in a nation where suicide-bombers kill judges and warlords grow rich from the poppy trade. Yet he has made progress. The Afghan army is becoming more capable. Tax collection has improved, despite the economic shock of the American troop drawdown. Corruption, though still vast, is being curbed in some areas.

This is not a side issue. If ordinary Afghans see the state as predatory, they will not defend it against the Taliban. Right now the jury is out: most Afghans are terrified of the Taliban, but trust in the government is low, too. Mr Ghani needs time to implement his reforms; donors must be patient.

After a civil war ends somewhere, Western donors often pour in more money than the damaged state can absorb, and pull back when results disappoint. NGOs parachute in, poach the best staff with higher wages and form a costly parallel state that will one day pack up and go. This undermines national institutions. It would be better if donors scaled up their largesse gradually, channelled it through national coffers where possible and stuck around for the long run.

None of this will succeed if a country's leaders do not want it to. In South Sudan neither of the two main warlords is interested in nation-building, so donors have no one to work with. But in Kabul they do. They should not cut and run. ■

## British politics

# Theresa Maybe

After six months, what Britain's new prime minister stands for is still unclear—perhaps even to her



**W**ITHIN hours of the Brexit referendum last summer David Cameron had resigned, and within three weeks Theresa May had succeeded him as prime minister. The speed of her ascent to power, on July 13th 2016, without a general election or a full-blown Tory leadership contest, meant that Mayism was never spelt out in any manifesto or endorsed by the electorate. Yet the new prime minister soon made clear the scale of her ambitions for Britain. Not only would she make a success of Brexit, she would also set in motion a sea-change in social mobility to correct the “burning injustices” faced by the down-trodden, and reshape “the forces of liberalism and globalisation which have held sway...across the Western world.” Her allies talked of an epochal moment, comparable to Margaret Thatcher’s break with the past in 1979. The feeble condition of the Labour opposition gave Mrs May control of a one-party state. As for her mandate, she cited the referendum: a “quiet revolution” by people “not prepared to be ignored any more”.

Yet after half a year in office there is strikingly little to show for this May revolution (see pages 14–16). The strategy for Brexit, which is due to be triggered in less than three months, remains undefined in any but the vaguest terms, and seems increasingly chaotic. At home, the grand talk about transforming society and taming capitalism has yielded only timid proposals, many of which have already been scaled down or withdrawn. The growing suspicion is that the Sphinx-like prime minister is guarded about her plans chiefly because she is still struggling to draw them up.

### The emperor's new trousers

Mrs May built a reputation for dogged competence during six years at the Home Office, a tricky beat that has wrecked many political careers. She skilfully survived the Brexit referendum despite backing the losing side. In the abbreviated Conservative leadership race she stood out as the only grown-up; few Tories regret plumping for her over the unprepared and unserious other contenders. In negotiating Brexit, the hardest task for any prime minister since the second world war, she faces a powerful drain on political capital and governmental capacity. Half the country is against the idea and the rest may sour once its drawbacks materialise. Most of the civil servants implementing Brexit think it a mistake. If Britain’s next few years will be about avoiding traps, then the wary tenacity of Mrs May could be just what the country needs.

Yet caution has started to look like indecision. Her most senior official in Brussels has just resigned, saying that the government does not have a clear Brexit plan (see page 41). After six months it is hard to name a single signature policy, and easy to cite U-turns. Some are welcome: a silly promise to put workers on company boards, for instance, was abandoned; a dreadful plan to make firms list their foreign employees lasted less than a week; and hints at curbing the Bank of England’s independence were quietly forgotten. Selective “grammar”

schools will be resurrected—but only on a small scale, and perhaps not at all, given how many Tory MPs oppose the idea. Other reversals smack of dithering. The construction of a new nuclear plant at Hinkley Point was put in doubt, then given the go-ahead; a new runway at Heathrow airport was all but agreed on, then deferred until a parliamentary vote next year. “Just-about-managing” households were the prime minister’s lodestar for a week or so, then dropped. So were suggestions that Britain would seek a transitional deal with the EU after Brexit—until they were recirculated a few weeks later when Mrs May apparently changed her mind once again.

The cause of this disarray could be that Mayism itself is muddled. While vowing to make Britain “the strongest global advocate for free markets”, the prime minister has also talked of reviving a “proper industrial strategy”. This is not about “propping up failing industries or picking winners”, she insists. Yet unspecified “support and assurances” to Nissan to persuade the carmaker to stay in Sunderland after Brexit amount to more or less that. Her enthusiasm for trade often sits uncomfortably with her scepticism of migration. Consider the recent trip to India, where her unwillingness to give way on immigration blocked progress on a free-trade agreement.

### A citizen of nowhere

There is one lesson in the overdone comparison of Mrs May to Thatcher. The woman who really did transform Britain had a shambolic first term; privatisation and union reform, with which she is now associated, did not really get going until after 1983. Angela Merkel also made a shaky start as Germany’s chancellor. Mrs May could yet find her feet—and given the state of Labour, she will have time to do so, if Brexit does not provide her own party with a reason to oust her.

Yet Mrs May could turn out to resemble another, less obvious predecessor: Gordon Brown. He, too, was thin-skinned. Like her, he moved into Downing Street without an election, in 2007. He also started with a fearsome reputation and big promises. And when it became clear he had little idea what to do with the job he had so coveted, he flopped. The financial crisis paralysed his government because of his desire to micro-manage every decision.

There is more than a little of this in Mrs May. One person can just about run the Home Office single-handed. But being prime minister requires delegation—especially when Brexit looms so large. Care for the elderly is fraying. The National Health Service is running out of money. A housing shortage is worsening. Scotland and Northern Ireland are raising awkward constitutional questions. As long as every proposal has to be pored over by the prime minister, radical decisions of the sort needed to solve these problems will not be taken. To get a grip on Britain, Mrs May must learn to loosen hers.

For this, she must decide what the grand promises of her government actually amount to. The need for every policy to be agonised over in Downing Street, the secrecy over Brexit and the silence on the government’s broader plans for Britain all point to the same problem: Theresa Maybe does not really know what she wants. ■

**Snooping on shoppers**

You shone a light on the harrowing implications of the Chinese Communist Party's "social-credit system" ("Creating a digital totalitarian state", December 17th). But private industries, too, have implemented a social-credit system. Through Alibaba's finance arm, for example, Sesame Credit scores people based on their consumption habits and digital behaviour. The score can affect one's ability to take out a loan, buy movie tickets or even find a significant other (dating firms often require courters to display their credit scores).

The technology powering such systems has significant benefits for Chinese consumers and the businesses serving them. Alibaba and other Chinese firms make this technology available to market researchers, who use it to assess where a likely customer lives, where they typically shop and how much it costs to get them to a store. This has spurred significant investment in China from multinationals that want a slice of its retail pie, and has also helped China become the largest retail e-commerce market in the world.

**JOE NORA**  
Marketing director  
Export Now Digital Solutions  
Shanghai

**Ideas management**

One may easily take issue with Schumpeter, who believes that management theorists have gone astray by subscribing to the dead ideas of increasing competition, widespread enterprise, the growing speed of business operations and globalisation (December 17th). For anecdotal evidence disproving Schumpeter, just glance at the article that preceded his column. It was about the competitive success of Zara, a highly entrepreneurial company with a global footprint, and the edge it has attained by adjusting its clothing lines in lightning speed to the most current fashion ("Behind the mask of Zara",

December 17th).

Ranging more widely, the bone-breaking changes in such industries as retail and media are now reaching finance, with fintech. Ford will become an information-technology company competing at that industry's speed, using its autonomous cars and the services enabled by the internet of things. The cheap global connectivity of the internet, combined with the large and increasing share of information and knowledge in products, will obviate any political moves towards autarky.

**VLADIMIR ZWASS**  
Editor-in-chief  
Journal of Management  
Information Systems  
Saddle River, New Jersey

**Election advice for Italy**

Why do you recommend first-past-the-post elections in Italy ("Salvaging the wreckage", December 10th)? It is an inherently undemocratic voting system. Take the most recent British general election. In 2015 the Conservative Party won 330 seats with only 37% of the total vote, giving it a majority government without an actual electoral majority. The UK Independence Party got just one seat with 13% of the vote, whereas the Scottish Nationalists secured 56 seats with 5% of the vote.

The single-transferable vote, used in Ireland and Malta, is a better system, because it reflects the will of the electorate and keeps politicians more in tune with their constituents.

**MICHAEL RYAN**  
Dublin

**Nuclear v solar**

I doubt that the El Romero Solar Plant in the Chilean desert would power a city of a million people (Bello, December 10th). In fact, it would power 120,000 Chilean households today, and far fewer in the future, if the forecasts of rapid growth in demand materialise. Globally, electricity consumption far outpaces new solar and wind power. Car-

bon-free electricity generation as a percentage of overall generation has fallen. This is explained by both the decline of nuclear power and the failure of renewables to make up the difference.

In the United States alone, five nuclear plants have closed over the past several years. Together they generated as much electricity as all of America's solar plants and residential installations put together. Many more nuclear plants are at risk of closing in the Western hemisphere without any replacement in sight.

Clean electricity is likely to continue declining for years to come. Policymakers have been slow to realise that the mandated purchases of heavily subsidised renewables have depressed electricity prices. Even with very low fossil-fuel prices, ageing nuclear plants, which often have remaining lifetimes longer than new solar and wind facilities, are at a disadvantage. Yet they also do not pollute.

**CESAR PENAFIEL**  
New York

**Japan's broadside**

Lexington mentioned that Japan's new destroyer is named the *Izumo* (December 10th). The original *Izumo* was an armoured cruiser that served as the Japanese navy's flagship in China in the 1930s and 1940s. She saw battle in both the 1932 and 1937 Sino-Japanese wars, shelling Chinese positions from the middle of the Huangpu river in Shanghai. She also sank the last British gunboat and captured the last American gunboat in Shanghai in 1941.

By giving the new *Izumo* her name, and, indeed, nam-

ing the entire class of ships the *Izumo* class, Japan is sending a clear message to China.

**DOUG CLARK**  
Hong Kong

**With winter here...**

The British government's response to the crisis in care for the elderly is, as you say, "Too little, too late" (December 17th). You are also right that funding services for old people through local-government taxes often leaves the councils that need it the most with the least cash. But there is an even greater defect in the system.

Responsibility for care of the elderly is divided between the National Health Service and local councils, and their interests are usually diametrically opposed. Every elderly person who has to remain in hospital because there is no space in a care home is a financial gain for the council but a considerable cost for the hospital (as well as denying a bed to someone who needs it). The only way to resolve this conflict of interest is to put social care in the community under the control of the NHS. This is perfectly logical as it is a national "health" service not a national "hospital" service.

**DAVID TERRY**  
Droitwich, Worcestershire

**Grouping economists**

Professor Ben-Gad answered your call for a collective noun for economists with the admirable suggestion of "aggregate" (Letters, December 17th). But given the befuddling diversity of economic mantras and economists, that suggestion risks mixing apples and oranges.

There must be at least two other collective nouns for economists: an inefficiency and a disutility.

**DONALD NORBERG**  
Sturminster Newton, Dorset ■

# Executive Focus



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Leads a team of approx. 27 employees, including contractual employees. Should have an extensive understanding of financial and operational risk on a global scale, current working knowledge of international auditing standards and generally accepted auditing standards in the U.S., and preferably a background in development. Active Certified Internal Auditor qualification, and a Certified Public Accountant/Chartered Accountant or equivalent required; advanced degree (Master's or equivalent) in a relevant field. Proven track record of 15+ yrs. experience managing and delivering best practice internal audit services.

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- Provide advice to the Governor on monetary policy and to Management in general in terms of economic analysis and research;
- Develop the department's work programme, with a particular emphasis on the strategic direction of its research activities;
- Organize, supervise and assess the department's work, in particular its contribution to the BCL's economic publications and to the department's research output;
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- PhD in economics or M.A. in economics with extensive experience in research and economic analysis;
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- Ability to communicate with peers, managers and policymakers; strong sense of efficiency, organization and time management.

To apply, please email your cv and motivation letter to [app8@egonzehnder.com](mailto:app8@egonzehnder.com) before February 15, 2017.

## Chief, Skills and Employability Branch



International Labour Organization

The International Labour Organization (ILO) is seeking to recruit a **Chief for its Skills and Employability Branch** within the Employment Policy Department at D1 level.

ILO is a specialized agency of the United Nations, mandated to promote social justice, employment and internationally recognized human and labour rights in the context of inclusive and equitable economic growth. It is the only tripartite UN agency, bringing together representatives of governments, employers and workers.

The ILO Employment Department is responsible for promoting full and productive employment by developing integrated employment, development and skills policies that maximize the employment impact of economic growth, investment and development and which are inclusive, gender sensitive, productive and sustainable. The Skills and Employability Branch has the responsibility for conducting comparative research, developing policy guidelines and tools, and promoting technical cooperation, in coordination with ILO field structure, supporting ILO tripartite constituents to improve the employability of workers, move young people into productive and decent work, and increase the productivity of enterprises through better quality and relevant training. This comprises work on skills policies and systems including apprenticeships, skills anticipation methodologies, skills recognition and financing systems, and policy coherence with national and sectoral development strategies.

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The Great Britain-China Centre (GBCC) promotes closer UK-China relations by building trust and understanding through dialogue and partnerships to develop the rule of law, good governance and prosperity within China. With a small core staff and team of project managers, the GBCC Executive Director leads the organisation and is a key player in UK China relationships at the most senior level.

Candidates for this role will have a proven ability to operate at senior levels in China and the UK; will be confident and experienced in working with business, government and political partners; and will have both the strategic and the operational skills to lead a project-based organisation. Experience of one of the technical themes relevant to GBCC – namely political engagement, governance, or rule of law – would be an advantage. Fluency in English and operational Mandarin is required.

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**EgonZehnder**

## Executive Focus

# Chief Executive Officer

## Challenging and rewarding entrepreneurial opportunity in Life Sciences

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The Coalition for Epidemic Preparedness Innovations (CEPI) has a clear purpose and that is to stop future epidemics by faster developing new vaccines for a safer world. This means creating vaccines for diseases of epidemic potential ahead of an outbreak to reduce loss of life and lessen the social and economic impact of infectious disease outbreaks. CEPI, established in 2016, is a new coalition of stakeholders from international organizations, governments, industry, public and philanthropic R&D funders, academia, NGOs and civil society groups. Together they will agree new ways of working to drive vaccine innovation to address public health threats, in alignment with the WHO Blueprint for R&D.

CEPI, in partnership with Carmichael Fisher, are now seeking to find a visionary Chief Executive Officer who can lead the coalition through this phase of growth and maximise the positive impact that CEPI can make in the years ahead.

### Key responsibilities

- To empower CEPI, the Board, secretariat and partners to create a vision and entity able to rapidly respond to vaccine R&D needs for emerging infectious diseases internationally
- To build a network of catalysed collaborators and to maximize synergies across industries and borders
- To strategically leverage the existing diverse set of mechanisms, institutions and organisations that support vaccine R&D

### Your credentials

- Demonstrable knowledge of global public health, outbreak prevention and vaccine R&D development
- A track record of resilience, sound judgment and decisiveness in pressured circumstances
- Outstanding communication skills and complex stakeholder management experience
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This is an exceptionally rare opportunity to be at the forefront of positive change and combine the best qualities of the public, private and philanthropic sectors to deliver new vaccines for a safer world.

To apply, please forward your CV with a covering letter, no later than Monday 23rd January 2017 to our executive search consultant, Tarquin Bennett-Coles at Carmichael Fisher at [tbennett-coles@carmichaelfisher.com](mailto:tbennett-coles@carmichaelfisher.com) or contact him for a confidential discussion on +44 (0) 20 3440 6907.

Please quote reference number CF2613 in the subject line of your email.

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A full position description will be sent upon receipt of nominations or expressions of interest to [WBG.VPINT@boyden.com](mailto:WBG.VPINT@boyden.com)

Deadline January 17, 2017.

Working for a World Free of Poverty



**Save the Children**

### The Opportunity

We are currently looking for a Director, Research and Evidence to join us in our London office. This is a new senior Leadership role in which you will provide global leadership to ensure a step change in the rigour, relevance, and strategic direction of our global evidence base, so that we can fully leverage our \$2bn international programming portfolio across 120 countries; ensure our ambitions for children, and become a knowledge leader on what works for children.

In order to be successful you will have:

- Extensive experience in applied implementation of data and evaluation systems to improve frontline practice in the development/humanitarian context.
- Extensive skills and experience in designing, managing and communicating quantitative and mixed method research and evaluation, using rigorous designs
- Demonstrable experience in the areas of research and evidence strategy development and implementation
- Proven leadership abilities, with the ability to mobilise and motivate individuals outside of your reporting line in a highly matrixed and federated environment

On a personal level you will be an inclusive and confident leader, with the gravitas to inspire and influence a wide range of stakeholders, and a belief in the mission and values of Save the Children.

This role offers a competitive salary, in the context of the sector, and a company pension scheme.

### The organisation

It's an exciting time at Save the Children as we start the implementation of our new 15-year global strategy – Ambition for Children 2030 – which focuses on achieving three Breakthroughs: no child dies from preventable causes before their fifth birthday, all children learn from a quality basic education, and violence against children is no longer tolerated.

Save the Children is a federated Membership organisation with 29 Members who are based across the globe and provide Save the Children International with the funds to carry out our international programming activities.

### Application information

Please apply using a cover letter and CV explaining why you would be suited to this role, and do also include your current and expected salary. Please send this all as a single document. A copy of the full role profile can be found at [www.savethechildren.net/jobs](http://www.savethechildren.net/jobs)

We need to keep children safe, so our selection process reflects our commitment to the protection of children from abuse.



## Steering the course

CHURCH ENSTONE AND MAIDENHEAD

### The making and meaning of a prime minister

**A**S A student at Oxford, Theresa May looked like a typical ambitious young Tory. The daughter of a vicar, she had been stuffing envelopes for her local Conservative association for years. She was a member of the Oxford University Conservative Association; it was at one of its discos that Benazir Bhutto, later the prime minister of Pakistan, introduced her to the man she would marry. She also joined the Oxford Union, a debating society where politicians in embryo learn to speechify, ingratiate themselves and stab each other in the back. She told a tutorial partner that she wanted to be prime minister.

Yet various things distinguished her from the classic Tory hack. For one, she did not read philosophy, politics and economics (PPE), the course designed to train future elites. She read geography. For David Willetts, who was minister for universities in the 2010-15 coalition government in which Mrs May was home secretary, this distinction is more than incidental.

He notes that PPEists (like David Cameron, Mrs May's predecessor, and indeed Lord Willetts) tend to concentrate on Britain's sectoral strengths—its booming service industries, its great universities, the City—whose success might trickle down to poorer areas, or into whose orbit residents of poorer areas might be persuaded to

move. By contrast Mrs May cares about places, their preservation and people's attachment to them, an attitude which makes her particularly concerned with down-and-out areas that need help picking themselves up.

In this she is well-suited to her times. Britain's vote for Brexit (the responsibility for whose realisation she inherited from Mr Cameron) was partly a cry of protest by parts of the country that felt left behind, excluded from its successes, or overwhelmed by rapid change. It showed how much people's sense of belonging in the place where they live mattered to them, and the value they placed on stability and order. The prime minister's talk of reviving manufacturing, reducing immigration and tackling corporate excess plays well to such feelings. The public likes her considerably better than it did Mr Cameron two years into the previous parliament, and much better than the lamentably led Labour Party (see chart on next page). In a YouGov poll published on January 3rd, every region, every social class and every age group said she would be a better prime minister than Jeremy Corbyn, the Labour leader.

The outlook, education and character of a leader always matter; but with Mrs May they matter more than usual. Most prime ministers travel on tracks of tradition, convention and precedent. The legal, political, economic and diplomatic complexities of Brexit have put paid to that. A costly and possibly bitter divorce must be negotiated. Trade deals with the remainder of the EU, and possibly the rest of the world, must be struck. A new immigration regime must be established, economic shocks contained, partners reassured, Scotland held in the union, peace in Northern Ireland preserved and painful fractures in British society closed. There are no precedents. It is for Mrs May to create her own; to make choices that dwarf most of those that confronted her predecessors.

A prime minister who had won a general election, or even a contested party leadership campaign, would have had to give some sense of how she would make such choices. But Mrs May has done neither of those things. Thus for an idea of how she reads the lay of the unknown land ahead, and how adept she will prove at navigating it, it pays to look closely at who she is and where she came from.

### Onward Christian soldiers

Mrs May was born in 1956 to the Reverend Hubert Brasier and his wife Zaidee. When she was a girl her father became vicar of St Kenelm's in Church Enstone, a cinematically idyllic huddle of golden stone houses amid the drystone walls and rolling fields of the Cotswolds. Her ecclesiastical upbringing has prompted comparisons to Angela Merkel (whose father was a Lutheran pastor in East Germany) and Gordon Brown, Tony Blair's successor as Labour prime minister (whose father was a Presbyterian minister in Fife, near Edinburgh). All three grew up in households dominated ➤

by the moral and practical duties imposed by the life of the church; all were thereby furnished with an unflashy, serious and cautious character.

Her vicarage childhood lives on in Mrs May's very English traits. She drinks Earl Grey tea, reads Jane Austen, watches James Bond films, regularly attends church in her constituency (Maidenhead, a posh town in the Thames valley) and adores cricket. Echoes of this can be seen in her leadership. Anglicanism often combines stormy, kingdom-of-God language with a restrained conservative culture: hymns about crusaders and the devil belted out before tea and biscuits. In her first months as prime minister Mrs May, too, has been bolder in her rhetoric than in her actions—big ideas have received little follow-through, or been dropped altogether. There is a touch of her cricketing hero, Geoffrey Boycott, about her too. It is hard not to detect her admiration for the stolid style of the Yorkshire batsman in her matter-of-fact demeanour. When her aides say “She just gets on with the job” it is the sort of praise their boss would like.

A social reformism rooted in her Anglican upbringing and practice (“part of who I am and therefore how I approach things”, she has said) has been a constant of her career. When the voters of Maidenhead first sent her to Westminster in 1997 she was, in this respect, to the left of her party. In 2002 she warned her colleagues and their supporters that they had become known as “the nasty party”. The following year, as shadow transport minister, she argued for more state intervention in the economy, a more nuanced relationship with trade unions and limits on fat-cat excesses.

All of this lives on in her premiership. When, having lost the Brexit referendum, Mr Cameron resigned, Mrs May enumerated the inequities of modern Britain as she launched her campaign to succeed him: boys born poor die nine years earlier than others; children educated in state schools are less likely to reach the top professions than those educated privately; many women earn less than men.

When she became prime minister she repeated some of these “burning injustices” on the steps of Downing Street. She has talked up a new generation of state-run grammar schools (schools, like the one she attended, that are allowed to select their pupils through competitive exams) to give clever children from poor backgrounds a leg up. She has hinted at worker representation on company boards; she has lamented the effect of the Bank of England’s low interest rates on savers.

Mrs May patently stands apart from many of her colleagues in ways that go beyond this reformism; there is a social distance, too. Some say it has to do with the isolating shock of losing both of her parents when she was relatively young. Oth-

ers cite her experience of diabetes—the prime minister must inject herself with insulin several times a day. But the best explanation is her career as a woman educated at a provincial grammar-school (the granddaughter of domestic servants, no less) in a party dominated by public-school boys given to cavalier confidence and clever-clever plans. When her allies praise Mrs May’s methodical style and her disdain for chummy, informal “sofa government”, they are channelling her long-held exasperation with the know-it-all posh boys—particularly Mr Cameron and George Osborne, his chancellor.

The prime minister has little time for the parliamentary village, avoiding its bars and tea rooms, declining dinner-party invitations in London—let alone in Brussels, or Washington, D.C. She is the opposite of cosmopolitan. “If you believe you’re a citizen of the world, you’re a citizen of nowhere,” she told her party conference in October. She struggles with the small talk that oils diplomatic (and cabinet) wheels. The European Council summit on December 16th saw the prime minister fiddling awkwardly with her cuffs as fellow leaders air-kissed behind her. She is far more at home in her constituency on the banks of the Thames. Her house in the village of Sonning sits by what Jerome K. Jerome, a Victorian humorist, described as “the most fairy-like little nook on the whole river”. Here, in her natural habitat, she is by all accounts witty, relaxed and gregarious.

### Ordering their estate

Mrs May’s time running the Home Office, a department institutionally obsessed with order and control, earned her a reputation for inscrutability, formality and obsession with detail (“she was always asking for more papers in her red box,” says one lieutenant). She worked well with people with whom she had things in common, like Lynne Featherstone, the Liberal Democrat minister whose commitment to introduc-

ing gay marriage she shared. But she excluded and ignored those—like Jeremy Browne and Norman Baker, Ms Featherstone’s two successors in the department—with whom she did not.

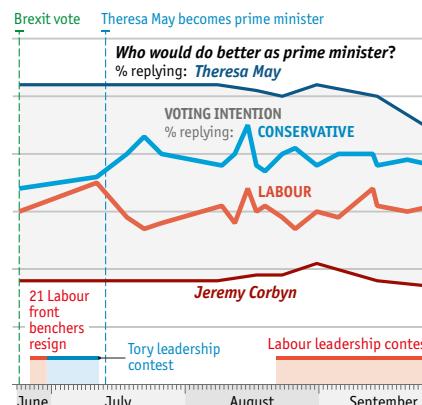
She clashed with Michael Gove, then the education secretary, over measures to deal with extremism in schools and with Mr Osborne over immigration—she wanted to tighten up Britain’s student visa regime. She was typically one of the last ministers to agree on her department’s budget in the annual financial round. She also had a run-in with Boris Johnson, then mayor of London, over three water cannon he bought without seeking the Home Office’s necessary—and, in the event, withheld—approval. The incident serves her inner circle as a house parable showing the perfidy of civil servants (who talked Mr Johnson into the idea), the folly of ill-scrutinised decisions, the danger of informal structures and the comeuppance of those who do not do things Mrs May’s way.

In Downing Street Mrs May has imposed the centralised, formal working practices that she honed at the Home Office. The day is governed by the 8.30am meeting, a shoeless free-for-all under Mr Cameron that now has a strict invitation list. Blue-sky thinking and speculation about the headlines that evening are out; firm instructions to staffers are in. In the prime minister’s office a table and chairs (and vases of hydrangeas) have replaced the sofa. Ministers and staffers must submit papers earlier than under Mr Cameron, to allow her to work through them late in the evening (he would do them the next day). The whole machine is run by a small, powerful team centred on her two chiefs-of-staff, Fiona Hill and Nick Timothy.

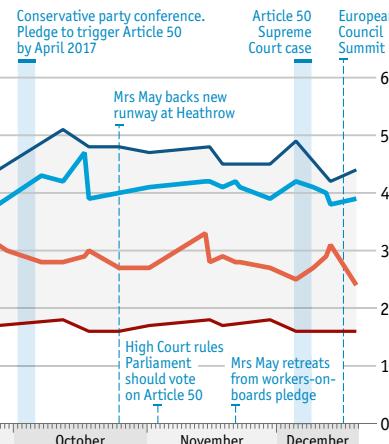
Cabinet and sub-cabinet meetings are venues for serious discussion, not Potemkin forums with pre-decided outcomes. Having for the most part distributed ministerial portfolios evenly between Leavers and Remainers, Mrs May appointed three ►

### The one-party state

Britain, 2016



Sources: ICM; Ipsos MORI; Opinium; YouGov



► people who, unlike her, campaigned for Brexit to the departments most concerned with bringing it about—Mr Johnson to the Foreign Office, Liam Fox to a new Department for International Trade and David Davis to a new Department for Exiting the EU. Giving the Brexit-related jobs to paid-up Brexiteers insulates her from criticisms of not supporting the policy. It also cannily reduces the chance of a single Brexiteer emerging as a rival if the process's outcome disappoints the diehard Leavers.

One minister says that, whereas the cabinets of Mr Blair and Mr Brown were furious power struggles, and Mr Cameron's cabinets mostly shams, Mrs May's cabinet features open discussions in which the prime minister really listens. Another claims that she is more interested in evidence than her predecessor was and praises the fluency with which she shifts between subjects. Acolytes insist that the mighty chiefs-of-staff produce decisions that have been properly tested (not so under Mr Cameron) without prime ministerial overload (not so under Mr Brown).

Most of all, though, these arrangements give the prime minister what she most covets: control. Even close allies call Mrs May a control freak—and as is often the case, the freakery comes at the expense of trust and efficiency. The “Nick and Fi” filter on policies creates a bottleneck delaying urgent measures (new funding to soothe the social-care crisis was unveiled almost a month later than planned). Apparent priorities—like those grammar schools—have failed to turn into flagship policies. The suggestions of workers on boards, government meddling in monetary policy and obligations on firms to list their foreign workers have all come to nothing. More regrettably, so have hints of big new infrastructure investments and house-building schemes. Westminster feels dead.

Comments by ministers have been disowned, the Treasury feels sidelined, diplomats believe they are ignored. When a consultant's memo to the Cabinet Office criticising Mrs May's leadership style leaked, the prime minister reportedly demanded that Deloitte, the firm in question, be “punished”. It has since withdrawn from a series of bids for government contracts, and ministers' e-mails and phone records are to be seized to prevent further leaks. Even the queen has reportedly grumbled about Mrs May's slogan-heavy furtiveness about how Britain will leave the EU.

Indeed, six months after coming to power all the prime minister can say on that subject is that “Brexit means Brexit” and that it will be “red, white and blue” (ie patriotic, rather than Caucasian, bloodied and bruised). Her fear of losing control explains why, instead of holding a simple parliamentary vote on triggering Article 50 of the EU Treaty (the process by which Britain will leave the union), she stubbornly

plunged into a legal bunfight to prevent it. As the Deloitte memo put it, she seems to have no coherent plan for Brexit, her government is “struggling” and still she is prone to “drawing in decisions and details to settle matters herself”.

Some confirmation of this came on January 3rd when Sir Ivan Rogers, Britain's ambassador to the EU, left his job ten months early. In a leaked e-mail he took aim at “muddled thinking” on Brexit (see page 41). He is not the first senior civil servant to leave early; Helen Bower, the respected chief spokeswoman at 10 Downing Street, went first. A senior minister in the upper house, Jim O'Neill, has also walked out.

All of which is a reminder that, although the Labour Party's disarray makes Mrs May look unassailable, her position is not entirely safe. She has a very small parliamentary majority and the Conservative Party has a knack for regicide. It looks quite likely that the Brexit talks will founder; Mrs May insists that she wants to maintain certain economic benefits of EU membership but end free movement of labour, a deal deemed unthinkable in Brussels. That could lead to economic chaos and expose her to a challenge from Mr Osborne, who is remaking himself as the backbench standard-bearer for liberal Toryism. Alternatively, a final deal could involve trade-offs unpalatable to her most keenly Brexiteer MPs, who would then cut up rough.

When things start to go south the defensive and needlessly belligerent tone shown in her tenure to date will serve her ill. For most of her end-of-term grilling by the liaison committee—a panel of MPs which scrutinises the government—she wore an aquiline scowl, quibbling with the questions and, when pushed, cleaving to evasive platitudes: “I gave the answer I

gave.” Mr Boycott, one feels, might approve such dogged defensiveness; but few would look to him for lessons on team building.

On coming to power it was not enough for Mrs May to fire Mr Osborne and Mr Gove: she capriciously gave each a dressing down in the process. Close observers say she is allergic to cutting deals and that in cabinet she sees eye-to-eye only with ministers who, like Philip Hammond, her chancellor, and Damian Green, her welfare secretary (and the husband of her Oxford tutorial partner), she has known for decades. Her sporadic attempts to lighten up are hit-and-miss: her frequent public mockery of Mr Johnson is making an enemy of him—and feels weird coming from the woman who gave him his powerful job in the first place.

### Many a conflict, many a doubt

There may be lessons as to Mrs May's possible longevity and success from her fellow children of the cloth, Mr Brown and Mrs Merkel. Mr Brown, whose brief premiership was dominated by the global financial crisis, never unified his party and was up against a strong opposition led by Mr Cameron. Mrs Merkel has faced crises, too—but for more than a decade has grown through them, outwitting or co-opting her opposition, maintaining unquestioned supremacy in her party.

Like Mrs Merkel, Mrs May has seen off rivals through canny manoeuvring; she bides her time, knowing when to speak up and when (as in the referendum campaign) to stay quiet. Like Mr Brown, she is prone to overblown rhetoric, irritability and indecisiveness. The biggest worry, though, is that she may also share his inability to adapt—the key difference between Mr Brown and Mrs Merkel.

Mrs May shows few signs of the ability to assimilate the new that has made Mrs Merkel so successful. Her vision of leadership, it seems, is focused on giving statements, installing processes, gathering up information and control—and little else. This makes it worryingly easy to imagine the Britain of 2018 or 2019 in disarray: her party in revolt, her ministers and partners alienated, her government sclerotic, Brexit talks breaking down, the economy tanking and Number 10 in bunker mode.

For there is more to leadership than Mrs May's procedures. There is also what Peter Hennessy, a contemporary historian, calls “the emotional geography” of power. This means adapting to events and institutions, building networks and—yes—being judiciously informal sometimes: a dose of instinct, a snap decision, a deal cut, a risk taken on a wing and a prayer. It means sharing information, accepting dissent, seeking alternative opinions, staking out a position and persuading people of it. It is this emotional landscape that Britain's geographer prime minister must master, if she can. ■



Very well, alone



## Demography in Japan

# A negative-sum game

TAMA

**The ageing of Japan's population is changing its cities. The first of two stories looks at the impact on suburbia**

MIKO TERADA moved to Tama in 1976, at about the same time as everyone else there. Back then, the fast-growing city in Tokyo's suburban fringe was busy with young married couples and children. These days, however, the strip of shops where Ms Terada runs a café is deathly quiet, her clientele elderly. The people of Tama and their apartments are all growing old and decrepit at the same time, she says.

In the mid-1990s Japan had a smaller proportion of over-65s than Britain or Germany. Thanks to an ultra-low birth rate, admirable longevity and a stingy immigration policy, it is now by far the oldest country in the OECD. And senescence is spreading to new areas. Many rural Japanese villages have been old for years, because young people have left them for cities. Now the suburbs are greying, too.

Between 2010 and 2040 the number of people aged 65 or over in metropolitan Tokyo, of which Tama is part, is expected to rise from 2.7m to 4.1m, at which point one-third of Tokyo residents will be old. In Tama, ageing will be even swifter. The number of children has already dropped sharply: its city hall occupies a former school. Statisticians think the share of people over 65 in Tama will rise from 21% to 38% in the three decades to 2040. The number of over-75s will more than double.

The city's inhabitants have already been spooked by an increasing number of

confused old people wandering around. By 2025, officials in Tama predict, almost one in four elderly residents will be bedridden and one in seven will suffer from dementia. And the city is hardly ideal for old people. It is built on steep hills, and the five-storey apartment blocks where many of the residents live do not have lifts.

For Tama, though, the most worrying effects of ageing are fiscal. Two-thirds of the city's budget goes on social welfare, which old people require lots of. They do not contribute much to the city's coffers in return. Although Japan's central government redistributes money between municipalities, much of what local governments spend comes from local residency taxes, which fall only lightly on pensioners. In short, says Shigeo Ito, the head of community health in Tama, it pays for a place to avoid growing too old.

### Tama's enticements

So, as well as providing more in-home care and laying on aerobics classes to keep people fit enough to climb all those stairs, Tama is once again trying to lure young families. With a developer, Brillia, it has already razed 23 five-storey apartment blocks and put up seven towers in their place. The number of flats in the redeveloped area has almost doubled, and many are larger than before. That has attracted new residents: although the poky 40-

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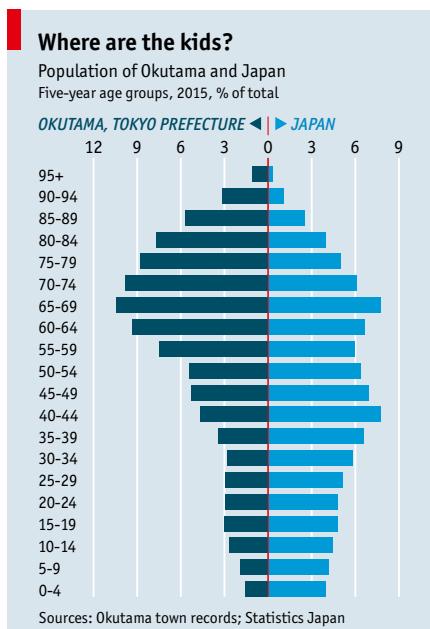
square-metre apartments in the old blocks were sufficient for the post-war generation, modern Japanese families demand more space. Tama's authorities intend to transform other districts in a similar way.

This is smart policy, but there is a problem with it. The number of 20- to 29-year-olds in Japan has crashed from 18.3m to 12.8m since 2000, according to the World Bank. By 2040 there might be only 10.5m of them. Cities like Tama are therefore playing not a zero-sum game but a negative-sum game, frantically chasing an ever-diminishing number of young adults and children. And some of their rivals have extremely sharp elbows.

Follow the Tama river upstream, into the mountains, and you eventually reach a tiny town called Okutama. What Tama is trying to avoid has already happened there. Okutama's population peaked in the 1950s, as construction workers flocked to the town to build a large reservoir that supplies water to Tokyo in emergencies. It has grown smaller and older ever since.

Today 47% of people in the Okutama administrative area—the town and surrounding villages—are 65 or older, and 26% are at least 75. Children have become so scarce that the large primary school is only about one-quarter full. Residents in their 70s outnumber children under ten by more than five to one (see chart, next page).

And Okutama's residents are as stubborn as they are long-lived. Some of its outlying villages have become so minuscule that providing them with services is difficult, says Hiroki Morita, head of the planning and finance department. It would be better for their residents, and certainly better for the local government, if they consolidated into larger villages. But old people refuse to leave their shrunken hamlets even during heavy snowstorms, and are ➤



► unlikely to move permanently just to make a bureaucrat's life easier. The internet and home delivery help them cling on, points out Mr Morita.

Okutama has tried to promote agriculture: wasabi, a spicy vegetable that is ground up and eaten with sushi, grows well there. It hopes to appeal to families by offering free vaccinations, free school lunches and free transport. None of that has staved off ageing and decline. So now it is touting free housing. Mr Morita estimates that the town has about 450 empty homes. He wants the owners to give their homes to the town government, which they might do in order to avoid property taxes. The government will then rent the homes to young couples, the more fecund the better. If they stay for 15 years their rent will be refunded.

Although its setting, amid steep hills, is spectacular, Okutama is not a pretty town. Its houses are neither old enough to be considered beautiful nor modern enough to be comfortable. Some feature post-war wheezes like plastic siding. Still, the prospect of free accommodation some two hours' journey from central Tokyo might tempt some young families. And in the meantime, Okutama has another plan.

A building once occupied by a junior high school, which closed for lack of pupils, is becoming a language college. Jellyfish, an education firm with tentacles in several countries, will use it to teach Japanese to young graduates from East and South-East Asia. It hopes to enroll 120 students, plus staff, which ought to make a notable difference in a district where there are now fewer than 350 people in their 20s. Some of those students might even decide they like the place, and settle down. Whisper it, but this sounds a little like a more liberal immigration policy. ■

## Japan's elderly workers Silver lining

TOKYO

### As Japan ages, so too does its workforce

LIKE many firms in Aichi prefecture, Japan's manufacturing heartland, Nishijimax, a maker of machine tools for the car industry, is struggling to find workers. Its solution in a country with a drum-tight labour market is one that is increasingly common in Japan: raising the age of retirement. More than 30 of the company's 140 employees are over 60; the oldest is 82. Putting qualified people out to pasture early is a waste, says Hiroshi Nishijima, a manager; "If they want to work, they should."

Since peaking at over 67m in the late 1990s, Japan's workforce has shrunk by about 2m. The government says it could collapse to 42m by mid-century as the population ages and shrinks. The number of foreigners inched up in 2015 to a record high of 2.2m, but that is far from enough to fill the labour gap. Instead of opening its doors wider to immigrants, Japan is trying to make more use of its own people who are capable of working.

Large companies in Japan mostly set a mandatory retirement age of 60—mainly as a way of reducing payroll costs in a system that rewards seniority. But other businesses are less stringent. About 12.6m Japanese aged 60 or older now opt to keep working, up from 8.7m in 2000. Two-thirds of Japan's over-65s say they want to stay gainfully employed, according to a government survey. The age of actual retirement for men in Japan is now close to 70, says the OECD, a rich-country think-tank. In most countries people typically stop working before the age at which they qualify for a state pension. Japan, where the state pension kicks in at 61 (it is due to rise to 65 by 2025), is a rare exception.

The greying of Japan's workforce is clearly visible. Elderly people are increasingly seen driving taxis, serving in supermarkets and even guarding banks. Bosses are getting older, too. Mikio Sasaki, the chairman of Mitsubishi Corporation, a trading company, is 79. Masamoto Yashiro, the chairman and CEO of Shinsei Bank, is 87. Tsuneo Watanabe, editor-in-chief of the world's biggest-circulation newspaper, the *Yomiuri Shimbun*, is a sprightly 90.

It is inevitable that people will stay in the workforce longer, says Ken Ogata, the president of Koreisha, an agency that provides temporary jobs exclusively to people over 60. He notes that the country has little appetite for importing workers, so it will have to make more use of pensioners, women and robots. Many of those who

find work through Koreisha were once employees of Tokyo Gas, Japan's largest supplier of natural gas to homes. They do the same kind of work now—reading meters and explaining the use of appliances to homeowners. "They have so much experience and knowledge that can be put to good use," says Mr Ogata.

They can also be cheaper. Companies often hire back retirees on non-permanent contracts offering poorer terms than their previous ones. Takashimaya, a department-store chain, has introduced a performance-based system for such employees aged 60-65 (at no extra cost to the company, it says).

Japan's labour crunch has created a chronic shortage of nursing care for elderly people who are no longer fit enough to work. McKinsey, a consultancy, says Japan should encourage able-bodied elderly people to help. If 10% of them were to take up such work, the country would have an additional 700,000 carers by 2025, it reckons. One way of encouraging this would be to give priority to those who have worked as carers when allocating places in nursing homes, says McKinsey. It does not help, however, that the state pension system discourages some elderly people from working by cutting their benefits if they earn more than a certain amount.

At Nishijimax, managers clearly want elderly workers to stay. The company's work routine is tailored to their needs. So, too, are the canteen's offerings—right down to the reduced-salt miso soup. ■

### Alcohol in Indonesia

## Dry talk

SEMARANG

### Debating a ban on booze

ONE of Indonesia's newest brands of beer, Prost, traces its ancestry back to 1948 when Chandra Djojonegoro, a businessman, started selling a "health tonic", known as Anggur Orang Tua, from the back of a bright-blue lorry at night markets in the coastal city of Semarang. A troupe of dancing dwarves would pull in the punters, while Djojonegoro peddled shots of what was, in essence, a fortified herbal wine to fishermen. It kept them warm during the chilly nights in the Java Sea.

The tonic is still sold in bottles with distinctive labels depicting an old Chinese man with a thick white beard. The company that makes it now produces a vast range of consumer goods, and Prost beer is the latest addition to its range. It is made in a \$50m brewery that opened in August 2015, filled with shiny stainless-steel ma-

▶ chinery from Germany. Thomas Dosy, chief executive of the subsidiary that produces Prost, says that given Orang Tua's history in the booze business it was natural for the company to move into Indonesia's \$1bn-a-year beer market.

It will not be straightforward. Conservative Muslim groups have become more assertive. Only months before the brewery opened, the government slapped a ban on the sale of beer at the small shops where most people buy their groceries. It led to a 13% slump in sales, according to Euromonitor, a research firm. The government minister who issued the decree has since been sacked, but his ban remains in place. And Muslim parties in parliament are still not satisfied. They are pushing legislation that would ban the production, distribution and consumption of all alcoholic beverages. Drinkers could face two years in jail.

The law is unlikely to pass. Muslim parties control less than one-third of the legislature's seats. The government is proposing a far more limited law aimed at curbing the production of toxic home-brews, known as *oplosan*, which are responsible for nearly all alcohol-related deaths in Indonesia. Turning Indonesia dry would be seen by many people as an affront to the cultural diversity of the sprawling archipelago, which has large Buddhist, Christian and Hindu minorities, as well as many Muslims who are partial to a cool one.

Brewers argue that alcohol is not an import from the decadent West, as the puritans often claim, but has been produced and consumed in Indonesia for at least 700 years. "It is part of the culture of Indonesia," says Michael Chin, chief executive of Multi Bintang, the country's biggest brewer. Indonesians consume less than one litre of alcohol per head a year, belying Muslim groups' claims that booze is creating a health crisis. Still, even without a national prohibition, Islamists will push for local bans—such as the one in force in Aceh since 2005 and adopted elsewhere.

Beyond booze, the state-backed council of clerics, the Indonesian Ulema Council (MUI), has in recent years passed edicts condemning everything from homosexual partnerships to the wearing of Santa hats. Although these have no legal force under Indonesia's secular constitution, vigilantes have sometimes used the edicts to target revellers as well as religious and sexual minorities. Partly at the MUI's urging, parliament has passed sweeping anti-pornography laws, which some Indonesians see as a threat to artistic and cultural liberties. Muslim groups are petitioning the courts to interpret the law in a way that would criminalise extramarital sex. They are also making more use of laws against blasphemy—notably in the trial against the governor of Jakarta, Basuki Tjahaja Purnama, a Christian of Chinese descent.

Still, for a country with the world's larg-

est Muslim population, Indonesia is remarkably permissive. Night spots in Jakarta, the capital, and tourist magnets such as the island of Bali have their raunchy sides. In Semarang, Mr Dosy predicts steady growth in domestic sales of 8-9% per year, buoyed by a growing number of middle-class tipplers. Most Indonesians, proud of their tradition of tolerance, will be hoping that he is right. ■

### New Zealand's national parks

## Lord of the ker-chings

QUEENSTOWN

**A proposal to tax users of national parks has aroused fierce argument**

**N**EW ZEALAND'S chief conservation officer, Lou Sanson, caused a stir in October by suggesting that it might be time to start charging tourists for using the country's wilderness trails. New Zealanders are keen fans of their national parks. Many would be outraged at having to pay. But many also worry about a huge influx of foreigners who have been seeking the same delights.

In 2016 New Zealand hosted 3.5m tourists from overseas; by 2022 more than 4.5m are expected every year—about the same as the country's resident population. Tourism has overtaken dairy produce as the biggest export, helped by a surge in the number of visitors from China. The national parks, which make up about one-third of the territory, are a huge draw. About half of the foreign tourists visit one. They are keen to experience the natural beauty promised by the country's "100% Pure New Zealand" advertising campaign (and shown off in the film adaptations of "The Lord of the Rings" and "The Hobbit",

which were shot in New Zealand's breathtaking wilderness).

But for every happy Chinese couple snuggling up for a selfie next to a tuatara there is a grumpy New Zealander who remembers the way things used to be—when you could walk the tracks without running into crowds at every clearing. Many locals now wonder why their taxes, as they see it, are paying for someone else's holiday. Mr Sanson would seem to agree. Entry fees could be used to upgrade facilities such as cabins, car parks and trails. A varying levy could also help reduce numbers at some of the popular locations by making it cheaper to use lesser-known, but no less beautiful, trails farther afield.

Some are not so sure it would work. Hugh Logan, a former chief of conservation for the government who now runs a mountaineering club, worries it would cost too much to employ staff to take money from hikers at entrances. It would also be difficult to prevent tourists from sneaking around the toll booths.

Some argue that it would be easier to charge visitors a "conservation tax" when they enter the country. The Green Party, the third-largest in parliament, says that adding around NZ\$18 (\$12.50) to existing border taxes would still make the total amount levied less than visitors to arch-rival Australia have to pay. But some travel companies oppose the idea. They note that tourists already contribute around NZ\$1.1bn through the country's 15% sales tax. Better, such firms say, to use foreign tourists' contribution to this tax for the maintenance of the parks.

Among the fiercest critics of a charge are those who point out that unfettered access to wilderness areas is an important principle for New Zealanders. It is enshrined in a National Parks Act which inspires almost constitution-like devotion among the country's nature-lovers. Mr Sanson has a rocky path ahead. ■



Welcome to Orcland

# Banyan | Selling Malaysians down the river

An authoritarian prime minister looks more secure than ever. Looks can deceive



**A** ROUND of applause, ladies and gentlemen. Any typical leader of a typical democracy, when found with nearly \$700m of ill-explained money from an unnamed foreign donor in his accounts, would experience a swift and fatal fall. Yet, nearly two years after news first broke that Najib Razak's bank balance had been thus plumped up, his high-wire act continues.

You could even argue that the Malaysian prime minister, who denies any wrongdoing, is at the top of his game. Mr Najib appears to command the unstinting loyalty of the party, the United Malays National Organisation (UMNO), which leads the coalition that has ruled the country since independence in 1957. He has undermined a fractious opposition, not least by peeling an Islamist party away from it. And as investigations proceed in several other countries into the alleged bilking of colossal sums from 1MDB, an indebted state investment-fund whose advisory board Mr Najib once chaired, the prime minister himself remains untouched. Staying in power helps stave off any risk he might face of international prosecution. A general election is due by late August 2018, but perhaps Mr Najib will call a snap poll in the next few months to give himself several more years' rule.

The question is how, despite the mysteries surrounding 1MDB and his personal accounts, the prime minister appears to be consolidating his power. Patronage is a big part of it. Though his wife has a lusty appetite for Hermès Birkin bags, and the wedding of his daughter to a nephew of the Kazakhstani president was an occasion of such bling that the Malaysian media were discouraged from publishing photographs, Mr Najib may be essentially right when he says the cash in his accounts was not for personal gain. An UMNO leader needs money to buy loyalty from powerful politicians. It is also handy for spreading largesse among ordinary Malays—including helping devout Muslims make the *hajj*.

Threats are as important as money. Anwar Ibrahim, the charismatic leader of the informal opposition coalition which won the popular vote in an election in 2013 (though not, thanks to gerrymandering, a majority of seats), has been in prison since 2015 on trumped-up charges of sodomy. In November the leader of an anti-corruption rally in Kuala Lumpur was arrested and held under tough new security laws. Newspapers and bloggers have been hounded. The number of activists and politicians charged

with sedition has shot up. As for 1MDB, the only conviction in Malaysia related to it has been of a whistle-blowing legislator who highlighted alleged wrongdoing by the fund's managers.

Now perhaps Mr Najib feels that the chief risks from 1MDB are behind him. Bear in mind that among the most assiduous investigations to date have been those by America's Department of Justice, which claims \$3.5bn is missing from the fund. Yet the next American president, Donald Trump, speaks admiringly of Mr Najib, a golfing buddy. It might be hard for the department to pursue a full-throttle investigation if Mr Trump expressed displeasure.

At any rate, the prime minister is at work covering his domestic bases, including wooing the Islamist party, the Pan-Malaysian Islamic Party (PAS). Some analysts mock the PAS leader, Abdul Hadi Awang, as having ayatollah-like aspirations: the party has long urged for *sharia* punishments to apply much more widely to the Malay Muslims who make up nearly two-thirds of the population. Such a proposal is not only morally but also constitutionally iffy. Undaunted, Mr Najib took the extraordinary step last year of backing Mr Hadi's private member's bill, which aims to increase the power of Islamic courts. With little discussion in cabinet or with the other 12 coalition members, the government submitted it to Parliament.

Mr Najib's strategy is clear. Although his image has not hitherto been one of ostentatious piety, he is rebranding himself as a Muslim devout. And the message to Malays is also clear: either you are with him, or, as Jayum Anak Jawan of Ohio University puts it in New Mandala, a website on South-East Asia, "your Malay-ness or Muslim-ness are brought into question."

If that seems a masterstroke, looks may deceive. Mr Najib's people insist that the issue is no business of the (non-Muslim) ethnic Chinese, who make up a quarter of the population, or with ethnic Indians, who make up a tenth. Yet these largely urban and prosperous groups worry that Mr Najib is playing a potentially explosive game of racial politics, targeted at them. That could galvanise the opposition.

## Friendless in high places

As it is, Mr Najib is counting on the squabbling opposition not to get its act together—in particular, on its failing to acknowledge the futility of Mr Anwar leading the opposition from jail. Yet there is ample scope for surprises. A growing number of opposition sympathisers say that a heavyweight with political experience is needed to take on UMNO. The obvious candidate is Muhyiddin Yassin, a former UMNO deputy prime minister who fell out with Mr Najib over 1MDB. Last year he and Mahathir Mohamad, who ran the country for 22 years, founded an ethnic-Malay party opposed to Mr Najib. The opposition would need to swallow a lot of pride and some principles to ask Mr Muhyiddin to be its leader. But he shares some of its reformist agenda, and it would transform the opposition's chances of victory.

Lastly, Mr Najib is running not only against the opposition, but against the economy. Since April the currency has fallen by nearly a quarter, reflecting the weak price of oil, a crucial export, and concern about cronyism under Mr Najib (Malaysia ranks second, after Russia, in *The Economist's* crony-capitalism index). China's help in bailing out 1MDB may have bought Mr Najib time, but budgets are strapped as economic growth starts to slow. If he can't keep the money flowing, his seemingly loyal allies would abandon him in a jiffy. So if anything keeps the prime minister awake at night, it may well be a future without friends. ■



**The party congress**

## Selection year

BEIJING

**For 20 years China's political transitions have been predictable. Not in 2017**

EVERY four years the United States holds an election that can change national policy and unseat many decision-makers. Every five years China holds a selection process that can do the same thing. Communist Party officials tout it as evidence of a well-ordered rhythm in their country's politics. This year it may turn out as unpredictable as America's election in 2016.

The people up for re-selection are the 350-odd members of the party's Central Committee, the political elite, along with its decision-taking subsets: the Politburo, the Politburo's Standing Committee (a sort of inner cabinet) and the army's ruling council. The choice of new leaders will be made at a party congress—the 19th since the founding one in 1921—which is expected to be held in Beijing in October or November, and at a meeting of the newly selected Central Committee which will be held directly afterwards.

Party congresses, which are attended by more than 2,000 hand-picked delegates, and the Central Committee meetings that follow them, are little more than rubber-stamp affairs. But they are of huge symbolic importance to Chinese leaders. They matter for three reasons. First, they endorse a sweeping reshuffle of the leadership that is decided in advance during secretive horse-trading among the elite. The coming congress will be Mr Xi's first opportunity to pack the Central Committee with his own allies; the outgoing one was

picked in 2012, when he took over, not by him but by the people then running the country, including his two predecessors. After previous congresses held five years into a leader's normally ten-year term—that is, those convened in 2007 and 1997—it became clear who that leader's successor was likely to be. If the coming meetings are like those earlier ones—a big if—they will give a strong clue to Mr Xi's choice of successor and start the transition from one generation of leaders to another.

Second, congresses can amend the party's constitution. China's leaders like the document to give credit to their favourite ideological themes (and Mr Xi is particularly keen on ideology). When Jiang Zemin stepped down as party chief in 2002 his buzzwords were duly incorporated; so too were those of his successor, Hu Jintao, five years later. Mr Xi's contribution to party-thought—such as on the need to purge it of corruption while strengthening its grip—is likely to gain similar recognition.

Third, congresses are the setting for a kind of state-of-the-union speech by the party leader, reflecting an elite consensus hammered out during the circulation of numerous drafts. In the coming months, Mr Xi will be devoting most of his political energy to ensuring that his will prevails in all three of these aspects. His authority in the coming years will hugely depend on the degree to which he succeeds.

Preparations for the gatherings are un-

**Also in this section**

**22 China promotes its own Shakespeare**

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der way. They involve a massive operation for the selection of congress delegates. On paper, this is a bottom-up exercise. Party committees down to village level are choosing people who will then choose other representatives who, by mid-summer, will make the final pick. Thousands of party members are also scrutinising the party's charter, looking for bits that might need changing.

It may sound like a vast exercise in democratic consultation, but Mr Xi is leaving little to chance. Provincial party bosses are required to make sure that all goes to (his) plan. Over the past year, Mr Xi has appointed several new provincial leaders, all allies, who will doubtless comply.

### Hands up who likes Xi

Those chosen to attend the congress will follow orders, too, especially when it comes to casting their votes for members of the new Central Committee. And the newly selected committee will stick even closer to script. The processes that lead to its selection of the party's and army's most senior leaders are obscure—a bit like the picking of cardinals in the Vatican. But an account in the official media of what happened in 2007 suggests that at some point in the summer, Mr Xi will convene a secret meeting of the current Central Committee and other grandees for a straw poll to rank about 200 potential members of the new Politburo (which now has 25 members). This is called “democratic recommendation”, although those taking part will be mindful of who Mr Xi's favourites are.

Candidates for the Politburo must fulfil certain criteria, such as holding ministerial rank. For the coming reshuffle, Mr Xi has added a new stipulation: faithful implementation of his policies. For all his power, Mr Xi has struggled with widespread passive resistance to his economic reforms. To ➤

► ram home the importance of obedience, Mr Xi recently held what he called a “democratic life session” at which Politburo members read out Mao-era-style self-criticisms as well as professions of loyalty to Mr Xi as the “core” leader (as the party decided last October to call him).

By August, when Mr Xi and his colleagues hold an annual retreat at a beach resort near Beijing, the initial lists of leaders will be ready. Probably in October, the Central Committee will hold its last meeting before the congress to approve its documents. The “19th Big” will start soon after, and will last for about a week. The first meeting of the new Central Committee will take place the next day, followed immediately by the unveiling before the press of Mr Xi’s new lineup (no questions allowed, if officials stick to precedent).

The process is cumbersome and elaborate, but over the past 20 years it has produced remarkably stable transfers of power for a party previously prone to turbulent ones. This has been helped by the introduction of unwritten rules: a limit of two terms for the post of general secretary, and compulsory retirement for Politburo members if they are 68 or over at the time of a congress. Mr Xi, however, is widely believed to be impatient with these restrictions. He has ignored the party’s hallowed notion of “collective leadership”, by accruing more power to himself than his post-Mao predecessors did.

If precedent is adhered to, five of the seven members of the Politburo’s Standing Committee, six of its other members and four of the 11 members of the party’s Central Military Commission (as the army council is known) will all start drawing their pensions. In addition, roughly half the 200-odd full members of the Central Committee (its other members, known as alternates, do not have voting rights) will retire, or will have been arrested during Mr Xi’s anti-corruption campaign. This would make the political turnover at this year’s gatherings the biggest for decades, akin to changing half the members of the House of Representatives and three-quarters of the cabinet.

Until late in 2016 there was little to suggest any deviation from the informal rules. But in October Deng Maosheng, a director of the party’s Central Policy Research Office, dropped a bombshell by calling the party’s system of retirement ages “folklore”—a custom, not a regulation.

The deliberate raising of doubts about retirement ages has triggered a round of rumour and concern in Beijing that Mr Xi may be considering going further. The main focus is his own role. Mr Xi is in the middle of his assumed-to-be ten-year term. By institutional tradition, any party leader must have served at least five years in the Standing Committee before getting the top job. So if Mr Xi is to abide by the ten-year

rule, his successor will be someone who joins the Standing Committee right after the coming congress.

But there is widespread speculation that Mr Xi might seek to stay on in some capacity when his term ends in 2022. He might, for instance, retire as state president (for which post there is a clear two-term limit) but continue as party general-secretary. He faces a trade-off. The more he breaks with precedent, the longer he will retain power—but the more personalised and therefore more unstable the political system itself may become. Trying to square that circle will be Mr Xi’s biggest challenge in the politicking of the year ahead. ■

## Literature

# There is flattery in friendship

SHANGHAI

**Officials are using Shakespeare to promote a bard of China’s own**

LIKE many countries, China had a busy schedule of Shakespeare-themed celebrations in 2016, 400 years after his death. There were plays, lectures and even plans announced for the rebuilding of his hometown, Stratford-upon-Avon, at Sanweng-upon-Min in Jiangxi province. But as many organisers saw it, Shakespeare was just an excuse. Their main aim was to use the English bard to promote one of their own: Tang Xianzu. Whatever the West can do, their message was, China can do at least as well.

Tang is well known in China, though even in his home country he does not enjoy anything like the literary status of his English counterpart—he wrote far fewer works (four plays, compared with Shake-



The balcony scene of the East

speare’s 37), and is not as quotable. But no matter. The timing was perfect. Tang died in 1616, the same year as Shashihiya, as Shakespeare is called in Chinese. President Xi Jinping described Tang as the “Shakespeare of the East” during a state visit to Britain in 2015. The Ministry of Culture later organised a Tang-themed exhibition, comparing his life and works to those of Shakespeare. It has shown this in more than 20 countries, from Mexico to France.

The two playwrights would not have heard of each other: contacts between China and Europe were rare at the time. But that has not deterred China’s cultural commissars from trying to weave a common narrative. A Chinese opera company created “Coriolanus and Du Liniang”, in which Shakespeare’s Roman general encounters an aristocratic lady from Tang’s best-known play, “The Peony Pavilion”. The musical debuted in London, then travelled to Paris and Frankfurt. Last month Xinhua, an official news agency, released an animated music-video, “When Shakespeare meets Tang Xianzu”. Its lines, set bizarrely to a rap tune, include: “You tell love with English letters, I use Chinese ink to depict Eastern romance.”

The anniversary of Shakespeare’s death is now over, but officially inspired adulation of Tang carries on (a musical about him premiered in September in Fuzhou, his birthplace—see picture). Chinese media say that a recent hit song, “The New Peony Pavilion”, is likely to be performed at the end of this month on state television’s annual gala which is broadcast on the eve of the lunar new year. It is often described as the world’s most-watched television programme. Officials want to cultivate pride in Chinese literature, and boost foreign awareness of it. It is part of what they like to call China’s “soft power”.

Shakespeare’s works only began to take root in China after Britain defeated the Qing empire in the first Opium War of 1839-42. They were slow to spread. After the dynasty’s collapse in the early 20th century, Chinese reformers viewed the lack of a complete translation of his works as humiliating. Mao was less keen on him. During his rule, Shakespeare’s works were banned as “capitalist poisonous weeds”. Since then, however, his popularity has surged in tandem with the country’s growing engagement with the West.

Cong Cong, co-director of a recently opened Shakespeare Centre at Nanjing University, worries that without a push by the government, Tang might slip back into relative obscurity. But Ms Cong says the “Shakespeare of the East” label does Tang a disservice by implying that Shakespeare is the gold standard for literature. Tang worked in a very different cultural environment. That makes it difficult to compare the two directly, she says. Officials, however, will surely keep trying. ■

**Inequality****Fat tails**

WASHINGTON, DC

**America's government spends a lot on middle earners and little on the poor**

**A**PZUZZLE exists where America's economics meet its politics. Income inequality is higher than in other rich countries, and the recent election was interpreted by many as the revenge of the left-behind, who found their champion in Donald Trump. Yet the candidate who made income inequality a campaign theme, wanted higher taxes on the rich and promised more financial regulation lost. Since the election, Mr Trump has nominated a cabinet with a combined net worth of over \$6bn, by one estimate. He has invited the bosses of big corporations to advise him on economic policy. And he has filled key White House posts with Goldman Sachs alumni. The riches of top

earners do not seem to bother voters nearly as much as many on the left would like them to.

In fact, some argue that a focus on inequality actually harmed Democrats' chances. Most of the rise in inequality happened over a decade ago (see chart 1). Polls usually suggest that Americans care less about inequality than they do about economic opportunity. And voters have reason to worry about stagnation in the middle-classes. Median weekly earnings, adjusted for inflation, were the same in 2014 as they were in 2000. Health-insurance premiums have soared. A recent paper by Raj Chetty of Stanford University and colleagues documents the "fading American dream". In 1970 more than nine in ten 30-year-olds earned more, in inflation-adjusted terms, than their parents did at the same age. In 2014 only half did.

Democrats, the logic goes, focus too much on helping the poor and taxing the rich, ignoring justified feelings of abandonment in the middle. But there is another half to the political argument: the potent charge that government redistribution also picks the pockets of the hard-working middle, offering welfare to the feckless poor. This suspicion of redistribution explains how Mr Trump could run simultaneously as populist insurgent and as champion of huge tax-cuts for the highest earners.

The idea that government has exploited

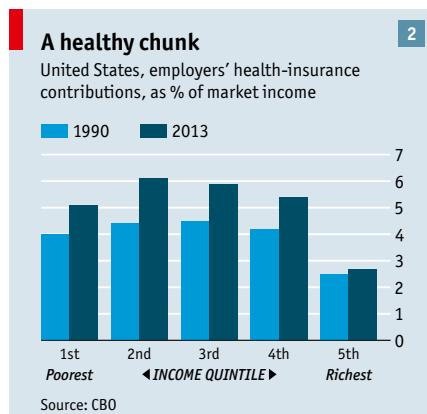
**Also in this section****24 Congressional ethics****25 Recruiting police officers****25 Stand-your-ground laws, measured****26 Charleston's new museum****26 Markets for tickets****27 Lexington: Learning to love Trumpism**

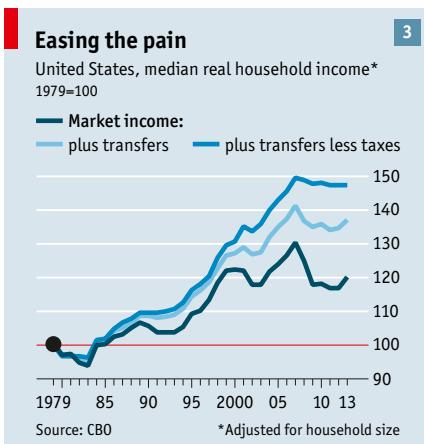
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the middle may seem to explain a lot politically, but it is not true. Much federal policy benefits middle earners more than the poor. One example is the tax deduction for mortgage-interest payments. This handout currently costs slightly more than the earned income tax-credit (EITC), the flagship anti-poverty programme that tops up poor workers' earnings. Yet it benefits only those who can afford to own their home (the bigger the mortgage, the more generous the deduction). Another example is the tax exemption for employer-provided health insurance. Unlike the mortgage-interest deduction, this does help many poor workers. But it benefits the middle more, and this disparity has become sharper in recent decades as insurance has become more expensive (see chart 2).

Handouts to the relatively well-off do not end with tax exemptions. Ignoring public pensions, America's biggest federal redistribution programme is Medicare, which offers free health insurance to over-65s of any income. Much Medicare spending, which totalled \$589bn (around 3% of GDP) in 2016, benefits the middle ►





► class, notes Gabriel Zucman of the University of California, Berkeley. With Thomas Piketty and Emmanuel Saez, two other economists, Mr Zucman recently produced new estimates which harness GDP data to improve the familiar figures from surveys and tax returns. They find that the incomes of those in the 50th to 90th income percentiles have grown by 40% since 1980, more than previously thought, thanks to growing tax exemptions. The poorer half of Americans pay roughly as much in taxes as they receive in cash redistribution, in spite of the EITC.

Before the financial crisis, government redistribution kept median incomes rising even as wages stagnated (see chart 3). Since then it has kept incomes flat as wages have fallen. By 2013 median household income before taxes was 1.6% lower than it was in 1999. But after taking off taxes and adding in government transfers, it was fully 13.7% higher. More recent data suggest that even pre-tax incomes are now growing again: they were up by 5.2% in 2015.

The economic safety net for the poorest, however, remains perilously thin by international standards. A typical jobless married couple with two children can expect a welfare income, including the value of food stamps, worth 23% of median pay. The average in the OECD, a club of mostly rich countries, is 40%. Partly as a result, relative poverty is higher than every other member of the club bar Israel. This looks even worse as the lower-paid have borne the brunt of rising inequality. Messrs Piketty, Saez and Zucman find that the trend since 1980 can be summarised as a shift of 8% of national income from the bottom half of earners to the top 1%, with no effect on those in between.

That all still leaves those whose earnings place them between the middle and the poor. Median household income in 2015 was nearly \$57,000. Exit polls suggest that Mr Trump lost among voters with incomes beneath \$50,000, as a Republican presidential candidate would be expected to. But he did much better with such voters than Mitt Romney did in 2012. The positive

swing might be thought of as a revolt of the lower middle. However, it was largest among those with incomes beneath \$30,000. Most of these voters are probably in the poorest fifth of households, though some may previously have held more lucrative jobs. The Pew Research Centre estimates that the middle class, defined as those with incomes between two-thirds and twice the median, shrank from 55% of the population in 2000 to 51% by 2014.

### Reaganite or kryptonite?

Inequality will rise if Mr Trump succeeds in slashing taxes for the highest earners, as it did after Ronald Reagan's tax cuts in the 1980s. Then, the labour market was about to bifurcate into winners and losers from globalisation and technological change. Today, rising inequality in wealth, rather than in wages, might be a bigger concern. Mr Zucman and his co-authors find that a boom in investment income at the top has

driven inequality since 2000. A recent compendium published by the Russell Sage Foundation warns of growing differences in wealth even among those who are not rich. Mr Trump's plan to reduce taxes on capital returns and abolish them on inheritance could exacerbate these trends, much as the Reagan income-tax cuts coincided with growing disparity in wages.

The effect of Mr Trump's economic policies on median incomes will depend on whether they encourage firms to invest, boosting workers' productivity. Historical evidence is not encouraging: median earnings barely grew in the 1980s. But if wages continue their recent recovery, Mr Trump is sure to claim the credit. And, unlike his party, Mr Trump has shown little appetite to curb spending on the middle class. A very rich elite, high poverty and plentiful government spending on the middle could make Mr Trump look like a continuity candidate after all. ■

### Congressional ethics

## Old bog, new tricks

WASHINGTON, DC

### How to lose votes and irritate people

AS THEIR first major initiative of the new year, Republican congressmen announced a scheme so crassly self-interested as to suggest they had learned nothing from the old one. Denizens of a reviled institution, and a party railroaded by Donald Trump's populist insurgency, they planned to gut the Office of Congressional Ethics (OCE), an independent investigative body designed to root out corruption. Less than 24 hours later, after a hail of condemnation, they turned tail; even so their bungling was damning.

The OCE was founded by the Democrats in 2008 after a run of scandals—including a big one concerning the Republican lobbyist Jack Abramoff—highlighted the impunity with which some lawmakers were abusing their office in exchange for campaign contributions. The office is empowered and equipped to investigate allegations of impropriety. It may then report its findings to the House Ethics Committee and, even if that body decides to take no further action, publicise them. Anti-corruption campaigners consider it a bulwark against official corruption. Many congressmen consider it unjust and wasteful.

Several who have been subject to the office's inquiries were involved in the effort, at a closed-door meeting of Republican congressmen, to nubble it. They included Blake Farenthold of Texas, who was investigated and exonerated by the office over an allegation of sexual harassment. The plan was to put the OCE under

congressional control and limit the scope of its investigations and its ability to publicise its work. Paul Ryan, the Republican Speaker of the House of Representatives, warned against this; the plan was nonetheless approved, by a vote of 119 Republican congressmen to 74.

Mr Trump, no doubt aware of how badly this was playing, offered a measured criticism of the congressmen's initiative. In a tweet, he called the OCE "unfair" but suggested his Republican colleagues had bigger things to be getting on with. A deluge of negative comments received at their district offices made that point more forcefully. So did Senator Lindsey Graham of South Carolina, who called the attempted takedown of the OCE "the dumbest frickin thing I've ever heard". On January 3rd, the opening day of the new Congress, the plotters hastily agreed to leave the OCE alone after all.

This delivered an easy triumph to Mr Trump, whose tweet was credited by many headline writers with having persuaded the congressmen to change course, albeit without much evidence. It also showed those lawmakers to lack self-awareness to an amazing degree. If the OCE is not working well, they should start a debate—in and with the public—about how better to investigate and prevent their abuses. To avoid an unnecessary partisan fight, they also plainly need Democratic support. This is basic politics. Republican congressmen should really learn how to do it.

## Recruiting police officers

# The force is weak

LOS ANGELES

### Police departments struggle to stay fully staffed

**S**TAR WARS can be used to sell almost anything, from Lego to a career in policing. Fort Worth's police department released a recruitment video on its Facebook page in December featuring an officer at target practice with a stormtrooper. The white-clad soldiers are notoriously poor shots, and the video shows the galactic GI missing every attempt he makes until he creeps so far forward that his goggles are very nearly touching his target. When the exasperated officer asks "who referred you to us?" Darth Vader peeks out from the back of the room, shaking his helmeted head in disgust. The scrolling text at the end of the video, which has garnered 17m views thus far, urges: "Join our Force! If you have what it takes to be a Fort Worth Police Officer and are a better aim than a Stormtrooper." The advert underscores a serious problem affecting police forces nationwide. Economic and social changes have made it harder for police departments to keep their forces fully staffed, and lead to increasingly desperate recruitment.

The Los Angeles Police Department was short of nearly 100 officers as of mid-December—only 1% of its total workforce, but still enough to be felt on the ground, says Captain Alan Hamilton, who runs recruitment for the department. Philadelphia had 350 vacancies, largely due to a spate of retirements. Last spring, Dallas cancelled two academy classes for lack of applicants; its preliminary applications dropped by over 30% between 2010 and 2015. In 2012, the ratio of police officers to population hit its lowest level since 1997, according to Uniform Crime Reporting Programme data published by the FBI.

The dynamics underpinning the shortages vary by department, but there are national trends making it harder for police forces to attract applicants. The first is a strong economy. Nelson Lim, a researcher at the RAND Corporation, a think-tank, says this is nothing new. When plenty of jobs are available, people are usually less motivated to enter dangerous professions. Police forces as well as the armed forces tend to field less interest in boom times.

The second is the perception of increased danger associated with policing: 135 officers were killed in the line of duty between January 1st 2016 and December 28th 2016—a 10% increase from 2015 but fewer than the 192 killed in 2007. Shooting deaths increased from 41 to 64. Several of them were high profile and gruesome,



No college required

such as the assassination of five Dallas police officers in July 2016. "When you look around the nation and you see the acts of violence directed at police officers—it makes people reluctant to join. Many people join the profession when they're 22 or 23 when parents still have a heavy influence," says Scott Walton, deputy chief in

Dallas, though sympathy can also boost recruitment. Dallas has seen an uptick in applications since its officers were attacked.

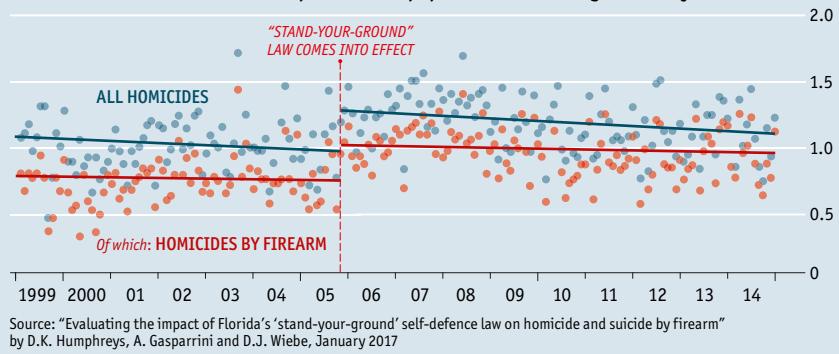
The last is the image of policing. The deaths of several unarmed black men at the hands of police officers and the ensuing backlash seem to have made police work less appealing. "We have a situation where law enforcement is being scrutinised more heavily," says Mr Hamilton of the LAPD. According to Gallup, a polling organisation, trust in law enforcement generally has remained fairly stable since it began surveying the topic in 1993. But according to data collected by Harris, another polling group, the share of both whites and blacks who believe that African Americans are discriminated against by the police has risen markedly between 1969 and 2014.

Baltimore Police Department's officer shortage led it to Puerto Rico in search of fresh faces. The department also mulled relaxing its stance on past marijuana use. Chicago has cut its minimum age requirement for its police academy from 25 to 21. Several departments have lowered educational requirements for recruits. If President-elect Trump follows through on his promises to beef up military and infrastructure spending, the plight of police departments might worsen, worries Mr Lim. The armed and police forces tend to compete for applicants. If more jobs become available in industry and construction, putting on a badge might become even less appealing to young workers. ■

## Gun laws

With the stroke of his pen in 2005, Jeb Bush, then governor of Florida, ignited enthusiasm for "stand-your-ground" laws. Citizens who "reasonably believed" their lives to be threatened were given the right to "meet force with force, including deadly force"—even in public places and, critically, without the duty to try and retreat first. More than 20 states have passed similar laws since then. Critics warned that, rather than protecting self-defence rights as intended, the bill would result in unnecessary deaths. Research published in the *Journal of the American Medical Association* appears to vindicate those fears. Soon after the law took effect in Florida, there was a sudden and sustained 24% jump in the monthly homicide rate. The rate of homicides involving firearms increased by 32%. The authors found that in states without a stand-your-ground law over the same time period those rates remained flat, suggesting that a nationwide crime wave was not to blame for the abrupt increase.

### Florida, United States, homicides per 100,000 population, victims aged 20-34 years



## Charleston's new museum

# Cobblestones and bones

CHARLESTON

## Filling in the gaps in America's history

JUST inside the gates of the Unitarian Church in Charleston sits a slab of salvaged bricks. Affixed to the front is a metal bird looking backwards—a West African symbol, a plaque explains, which means “learning from the past in order to move forward”. An inscription dedicates the monument to “the enslaved workers who made these bricks and helped build our church.” The church is off most tourists’ trails, so many miss the memorial. But an overdue museum aims to spread its frank message more widely.

Like much of the South, for a long time the city glossed or downplayed the abomination that made it rich and left it beautiful. Visitors to its grand townhouses, or to the sumptuous plantation mansions nearby, might be shown suspiciously well-appointed “servants’ quarters”. The conflict known as the “war between the states” was not, repeat not, fought over slavery. There is more honesty these days; the trade in human beings is documented in a small exhibition in an old slave mart. But such acknowledgments are not commensurate with the role the institution once played in Charleston, and Charleston in it. Rose-tinting continues. As Michael Boulware Moore, boss of the planned International African American Museum (IAAM), says, for many the plantations are less “places of horrific inhumanity” than picturesque backdrops for weddings.

The IAAM’s progenitor was Joseph Riley, Charleston’s mayor for four decades until last year. He announced the idea in 2000, aiming to remedy an amnesia he describes as “a societal defect in America”. (In the 1970s his outreach to the black community earned him the sobriquet L’il Black Joe: “an honour”, he now says.) Serendipitously, he recalls, the city was able to acquire “one of the most sacred sites of African-American history in the Western hemisphere”, the location of Gadsden’s Wharf, where perhaps 40% of the slaves imported to America first set foot on the mainland. Overall Charleston’s wharfs accounted for around half of those arrivals. As Mr Riley says, nowhere else in the country was as important to slavery, and “no place has more of a duty” to remember it. He is helping to raise the \$20m needed for the project to meet its target of \$75m.

When the museum opens in 2019—the 400th anniversary of the first slave ship to land in the colonies—its “greatest artefact”, says Mr Moore, “will be the ground.” The

## Markets for tickets

# Battling bots

NEW YORK

## Why you still can't get a ticket for "Hamilton"

“HAMILTON”, the hip-hop Broadway musical about one of America’s founding fathers, has broken all sorts of box-office records. Demand is high because it is exceptionally good. But this is not the only reason tickets are so scarce. Every time the show’s producers release a new block to sell, they immediately get snapped up by “ticket bots”, high-speed ticket-buying software. The bots cut the virtual queue, manipulating and paralysing sites like Ticketmaster before real people can get a look-see. Jeffrey Seller, “Hamilton’s” producer, has called bots “computerised cheaters”.

Despite Mr Seller working with Ticketmaster—which runs software in an effort to stop bots—to get tickets into the hands of real fans, too many tickets end up on secondary market websites for substantially inflated prices. According to Ticketmaster, about 60% of the hottest tickets are bought by bots. A single broker, using a bot, purchased 1,012 to a 2014 U2 concert in under a minute, despite the venue limiting sales to four tickets per customer. By the end of the day, that same broker had purchased 15,000 tickets. Even tickets for free events, like Pope Francis’s visit to New York in 2015, were gobbled up by bots and sold for thousands of dollars on secondary sites.

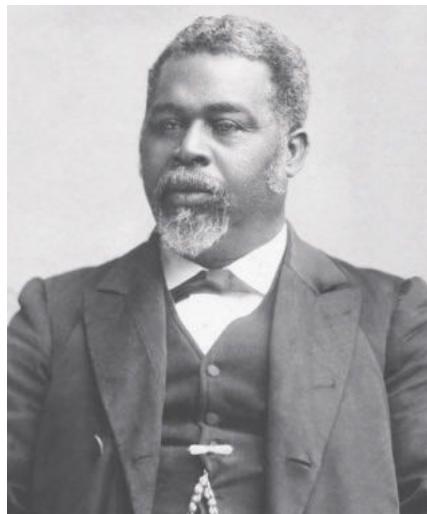
Last month President Obama signed legislation which aims to eliminate bots and intends to slap hackers with hefty fines. Under the new law, the Better Online Ticket Sales Act, the federal government can also intervene and file suit on behalf of people shut out of buying tickets because of bots. The law has support from across the industry, including Stubhub, a secondary marketplace. Stubhub does not sell anything directly, but takes a transaction fee. Jeremy Liegl, a lawyer at Ticketfly, which sells and promotes music events, said during a congressional hearing that bots harm everyone in the music industry except for the bots’ operators. The ticket markups end up in the pockets of the bot operator, not the promoter, not the venue and not the performers.

But the secondary market, worth as much as \$8bn worldwide, may be too valuable for virtual scalpers to give up. Federal law enforcement may be unable to hunt down bot-operators based outside America. And the scale of the racket is daunting. Last year bots made 5bn attempts to buy tickets on Ticketmaster, at a rate of roughly 10,000 a minute. A cold-hearted economist would propose a simple solution: make the tickets much more expensive in the first place.

building will duly be raised on pedestals, the waterfront windows affording views of the Cooper River and out towards Fort Sumter, where the civil war began in 1861. That setting is one of the features Mr Moore says will differentiate it from the new Afri-

can-American museum in Washington (the two share an exhibit designer). So, he hopes, will its emphasis on genealogical research, a bid to fill some of the gaps scoured by enslavement, plus its interest in Africa itself. Some locals, he says, fear that, in a rapidly gentrifying environment, the IAAM might “pimp black history”. On the contrary, says Mr Riley, it will tell the “unvarnished, harsh story” of the country’s “original sin”, including the roughly 700 people who froze to death in a warehouse near the wharf in the winter of 1807-08.

Yet along with the horror, promises Mr Moore, the museum will commemorate the skills and accomplishments of slaves and their descendants, reassuring black youngsters that “there are heroes who look just like them”. One such is his own great-great-grandfather, Robert Smalls (pictured), who in 1862 won his freedom by commandeering a Confederate steamship and delivering it to the federal fleet. Later he was elected to Congress and bought his former master’s house. A century and a half after his escapade, two markers were erected in Charleston in his honour. One was promptly vandalised. ■



Smalls by name, big in daring

# Lexington | Learning to love Trumpism

**Conservatives are working hard to reconcile their beliefs with the next president's agenda**



A TRUE politician is someone who, upon spying a torch-wielding mob marching on his legislature, declares: "Oh good, a parade—I must lead it." A striking number of conservatives are taking that approach ahead of Donald Trump's inauguration on January 20th. The president-elect's followers include many who distrust both main parties and, if handed a pitchfork, might skewer half the Republicans in Congress. Undaunted, party bigwigs and intellectuals have begun making the case that, for all its rough edges, "Trumpism" is a recognisably conservative way of viewing the world, with the potential to rescue swathes of America from feelings of abandonment and despair, securing majorities for Republicans for years to come.

Republican leaders who clashed with Mr Trump during the election campaign now urge colleagues to see his victory as a lesson in humility. After the new Congress was sworn in on January 3rd Paul Ryan, the Speaker of the House of Representatives, told members that for too long leaders in Washington had treated complaints about closed factories with "condescension". Now Americans had let out a "great roar", Mr Ryan continued: they have given Republicans control of Congress and the White House not as an act of generosity but as a demand for "results".

Embracing the results sought by Trumpism will not be easy for convinced free-marketeers such as Mr Ryan. On the day that Congress returned to work, Ford announced that it is cancelling plans for a \$1.6bn plant in Mexico and will create 700 jobs in Michigan building electric vehicles. This follows months of public browbeating by Mr Trump, including threats of punitive tariffs on firms making things abroad—though Ford's chief executive cast the decision to invest in America as a vote of confidence in "pro-growth" policies outlined by the president-elect. Ford joins Carrier, Lockheed Martin and Boeing as companies that have changed investment or pricing decisions after Trumpian arm-twisting (hailing Carrier's climb-down, eased by tax breaks from the state of Indiana, Mr Trump declared that the free market had failed American workers "every time"). As Mitt Romney's vice-presidential running-mate in 2012, Mr Ryan scorned the idea of governments picking "winners and losers". Today the Speaker talks up the prospects of tax reforms and deregulation giving all companies good cause to stay in America.

Other conservative grandees wonder if a dose of economic nationalism is the price of solidifying the coalition that carried Mr Trump to power, including blue-collar voters in the Midwest who abandoned the Democrats in droves. They praise Mr Trump as a patriot-pragmatist in the spirit of Lincoln or Theodore Roosevelt. They are slower to note more recent models for Trumpism, starting with populist-nationalist movements sweeping Europe. Parallels with Nicolas Sarkozy, France's centre-right president from 2007-12 and a hyperactive corporatist, are startling. Mr Sarkozy denounced French carmakers for producing cars in eastern Europe ("not justifiable", he growled), and rushed to a steelworks to promise workers he would save their jobs (a pledge he could not keep).

Hugh Hewitt, a conservative talk-radio host, this month will publish "The Fourth Way", a book-length guide to how Trumpism might advance bits of the Reagan agenda, by promoting conservative judges, stronger armed forces (Mr Hewitt likes Mr Trump's talk of a 350-ship navy) and free enterprise (above all rolling back "the vast and growing regulatory state"). To that he would add a "repatriation window" for corporate profits held abroad, and a new, voter-pleasing wave of infrastructure projects, including reopened shipyards, modernised airports, local sports facilities and other visible signs of Trumpian largesse. Billions would be disbursed by temporary, county-level commissions appointed by Congress and the White House ("the patronage!" sighs Mr Hewitt) and as classic pork-barrel spending by members of Congress. To break the partisan stalemate over immigration Mr Hewitt would have Mr Trump lay out detailed plans for a double-row border fence along the southern border, which when half- or three-quarters built would trigger a legalisation programme for most of the 11m immigrants in America without the right papers. Get all this right, Mr Hewitt says, and Mr Trump can realign national politics. Get it wrong and Mr Trump could face "catastrophic" midterm elections in 2018, a primary challenger in 2020 or, if embroiled in scandals, impeachment.

## Seeking Mr Trump's inner Reagan

In the spring Newt Gingrich, a former Speaker and adviser to Mr Trump, will publish "Understanding Trump." He calls the president-elect the third attempt, after Reagan's election in 1980 and his own Contract with America in 1994, to break free from the big-government mindset of Franklin Roosevelt's New Deal. To square that claim with Mr Trump's free-spending, distinctly statist campaign promises, Mr Gingrich portrays the businessman as a disruptive innovator, using social media and a genius for publicity to win a presidential election on the cheap. That thriftiness, also displayed in Mr Trump's business life, tells Mr Gingrich that President Trump will run a lean federal bureaucracy, root out waste and generally "kick over the table". Pondering Mr Trump's desire for better relations with Russia, Mr Gingrich has called its president, Vladimir Putin, "a thug" but at the same time scolded Republicans who treat Russia as if it were still the Soviet Union, rather than a competitor that needs dealing with "as it is".

Some conservative enthusiasm for Trumpism reflects a sincere desire to grapple with voter angst. Some is born of opportunism and fear that the next president will set his voters on Republicans who defy him. Yet Mr Trump will need allies in Congress, too, if he is to rack up achievements to impress supporters. Trumpism, born as a populist revolt, must become a programme for government. That's harder than leading a parade. ■



### Brazil's prisons

## Horror in the jungle

SÃO PAULO

### A massacre in Manaus shows that competition among gangs is increasing

**T**HE rampage lasted 17 hours. By the end of it, 56 inmates of the Anísio Jobim prison complex in Manaus, a city set amid the Amazon rainforest, were dead. Many had been decapitated; severed arms and legs were stacked by the entrance to the jail, known to most as Compaj, a contraction of its full name. Luís Carlos Valois, a judge who negotiated an end to the violence on January 2nd, called the hellish scene "Dantesque". It was Brazil's bloodiest prison riot in a quarter-century.

Only the death toll makes the carnage at Compaj stand out. Brazil's prisons erupt often. Last year 18 inmates died in clashes between gangs at prisons in the northern states of Roraima and Rondônia. In Pernambuco, a north-eastern state whose prisons are overstuffed even by Brazilian standards, violent deaths are a frequent occurrence. In January 2016, 93 prisoners broke out of two of the state's jails.

Prisons are both hellholes and headquarters for Brazil's most powerful criminal gangs. The country's prison population of 622,000, the world's fourth-largest, is crammed into jails built to hold 372,000 inmates. Compaj houses 2,200, nearly four times its capacity. Guards often do little more than patrol the perimeters, leaving gangs free to manage far-flung criminal operations via mobile phones.

The riot at Compaj suggests that prison violence—and the behaviour of the gangs behind it—is entering a new phase. Officials in the state of Amazonas say mem-

bers of Família do Norte (Family of the North, or FDN), which controls drug trafficking in the Amazon region, organised the Compaj massacre. Having gained control over much of the prison, the gang sought to wipe out opposition from Primeiro Comando da Capital (First Command of the Capital, or PCC), a larger rival based in São Paulo, a south-eastern state.

The assault on the PCC seems to be a reaction to its growing strength. Formed in 1993 by inmates in São Paulo after police massacred more than 100 prisoners at the notorious Carandiru jail, it has branched out into drug running, extortion and prostitution, often with the tacit consent of prison authorities. The PCC killed the last big rival drug trafficker in Paraguay in 2016. That gave it dominance over smuggling along the borders with Paraguay and Bolivia, and thus over the supply of cocaine and marijuana to the south-east, Brazil's richest region. It used that advantage to become the country's biggest and most profitable organised-crime group. Exploiting its growing control of the main entry points for drugs, the PCC moved beyond its home region and now has a nationwide presence. The battle at Compaj is "principally a reaction to the growing power of the PCC across Brazil in the distribution of drugs", says Bruno Paes Manso, a criminologist at the University of São Paulo.

At first, the PCC co-operated with the dominant forces in other states. In Rio de Janeiro it formed a narcotics-distribution

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alliance with the Comando Vermelho (Red Command, or cv). But the paulistas used their growing might to force their partner into a subordinate position, which provoked a rupture. The PCC has since teamed up with the cv's main rival, the Amigos dos Amigos (Friends of Friends). Prosecutors say the arrangement has allowed the São Paulo group to take control of Rocinha, a favela in Rio de Janeiro, thought to be the city's most profitable drug market.

The cv has responded by forming alliances with other crime groups threatened by the PCC's expansion. Among them are the FDN, Brazil's third-biggest gang, which controls drug-smuggling routes in the Amazon. The clashes in Roraima and Rondônia were a harbinger of the Compaj massacre. Most of the dead were members of the FDN and the cv, targeted by the PCC in revenge for attacks mounted by the FDN the year before.

### Payback time

Officials now wonder where and when the PCC will retaliate. The retribution will come from calculation, not rage, says Guaracy Mingardi, a criminologist. But come it will. The PCC "cannot remain quiet, as they will lose prestige, and prestige in the long term represents money".

There is little prospect that governments will do much to end the cycle of violence. Alexandre de Moraes, Brazil's justice minister, said the ringleaders of the Compaj massacre will be transferred to federal prisons. The federal government promised at the end of 2016 to spend an extra 1.2bn reais (\$370m) quickly to build and modernise state prisons. But that will not be enough to improve conditions that a previous justice minister described as "medieval". The cash-strapped federal government will have a hard time finding more. Historically, it has preferred to let state governments, which house nearly all of Bra- ►

zil's prisoners, bear the burden of managing and paying for the system.

They, in turn, have neither the money nor the ideas needed to improve conditions. Politicians and judges are more eager to lock up criminals, especially if they are poor and black, than they are to reduce overcrowding. About two-fifths of Brazil's prisoners are awaiting trial rather than serving sentences; university graduates, priests and others are entitled to wait in comfier conditions.

Governments also fear that a crackdown on violence in prisons will cause trouble outside them. An attempt by São Paulo's government in 2006 to curb the prison-based operations of the PCC set off a campaign of violence by the gang's confederates across the state. Hundreds died over ten days in attacks on policemen and the reprisals they provoked. Politicians prefer to keep the violence within prison walls. ■

## Bolivia

# For Evo, for ever

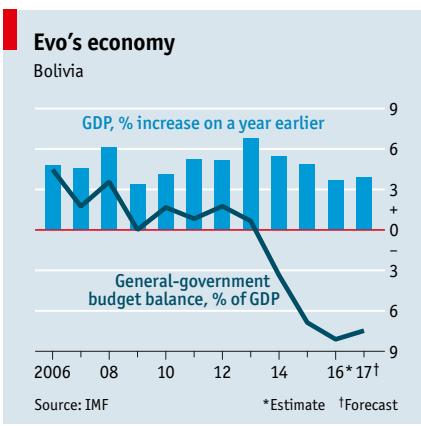
LA PAZ

## Evo Morales's supporters are looking for ways around term limits

**A**S 2016 drew to a close, a resignation letter from Bolivia's president, Evo Morales, lit up social media. It was a hoax, perpetrated on *día de los inocentes* ("day of the innocents"), the Latin American version of April Fools' Day, which falls on December 28th. The unamused communications minister, Marianela Paco, denounced it as an "attack on the people's right to reliable and truthful news".

In fact, Mr Morales's allies are scheming to keep him in office indefinitely, even though, in a referendum last February, Bolivians voted to deny him the right to run for a fourth term in 2019. On December 17th his party, the Movement to Socialism (MAS), named him as its presidential candidate for the next election. "If the people decide it, Evo will continue," Mr Morales promised his supporters.

The clamour to keep him is not a sign of recent success. Bolivia is suffering from a severe drought, whose effects are made worse by the government's failure to plan and invest. Economic growth, which sustained Mr Morales's popularity for most of his 11 years in office, has lost momentum. Scandals, strikes and clashes between protesters and police have turned some Bolivians against the government. Yet Mr Morales, Bolivia's first president of indigenous origin, dwarfs his rivals. Nearly half of voters still approve of his performance. No one in the MAS has the stature to succeed him. The opposition is fragmented.



Bolivia's woes may cut Mr Morales down to size. Despite the onset of the rainy season in December, many districts are still rationing water. The state-owned water company that supplies La Paz, the seat of government, and El Alto, a populous city perched on a cliff above it, ran out of water in November. The water level in the Incachaca reservoir, which serves parts of La Paz, was far below normal in early January. Residents of the city queue for hours to get deliveries by lorry. Farmers and ranchers are reporting large and growing losses.

This is contributing to the slowdown of the economy, which depends largely on gas exports. Their price is linked to the price of oil, which has halved since 2014. In 2017 Bolivia is expected to earn \$2.1bn from gas sales, just a third of what it made when prices were high.

As a result, GDP will grow 3.9% in 2017, a bit more than this year but far below the peak of 6.8% in 2013, forecasts the IMF (see chart). Bolivia's overvalued currency is hurting producers of goods besides raw materials, warned the IMF last month. Alarmingly, the current-account and budget deficits were around 8% of GDP in 2016.

By the profligate standards of Latin America's left-wing leaders, Mr Morales has been a fairly responsible economic manager. He invested Bolivia's gas windfall in roads, bridges, hospitals and schools. Until 2014 he kept a lid on budget deficits. But the oil-price slump and wacky weather are exposing the government's failures. High taxes on the production of oil and gas and the absence of an independent regulator have discouraged investors from prospecting for new reserves, says Hugo del Granado, a former energy official. Just two foreign energy companies, Russia's Gazprom and Venezuela's PDVSA, have come to Bolivia in the past decade. Debt-ridden PDVSA has only a token presence; Gazprom spent years battling bureaucracy and ended up scaling back its ambitions. Rather than invest on its own, it formed a partnership with France's Total, which already had operations in Bolivia.

The government's infrastructure-spending binge did not extend to water. It

nationalised utilities, put party hacks in charge and failed to invest in them. La Paz's water reserves reached dangerously low levels even before the drought took hold.

Such setbacks have damaged the government's prestige. In October it had to cancel a popular bonus of an extra month's wages paid to all workers in the formal sector, but only in years when GDP growth is more than 4.5%. Mr Morales's relations with trade unions and social movements, which once gave him unstinting support, have been hurt by disputes over infrastructure projects and benefits for disabled people. A conflict over regulation of mining by co-operatives led to the deaths of four miners and the murder of a vice-minister. The Central Obrera Boliviana, the main trade-union federation, has fallen out with the government. The MAS lost control of El Alto, Mr Morales's political stronghold, in regional elections in 2015.

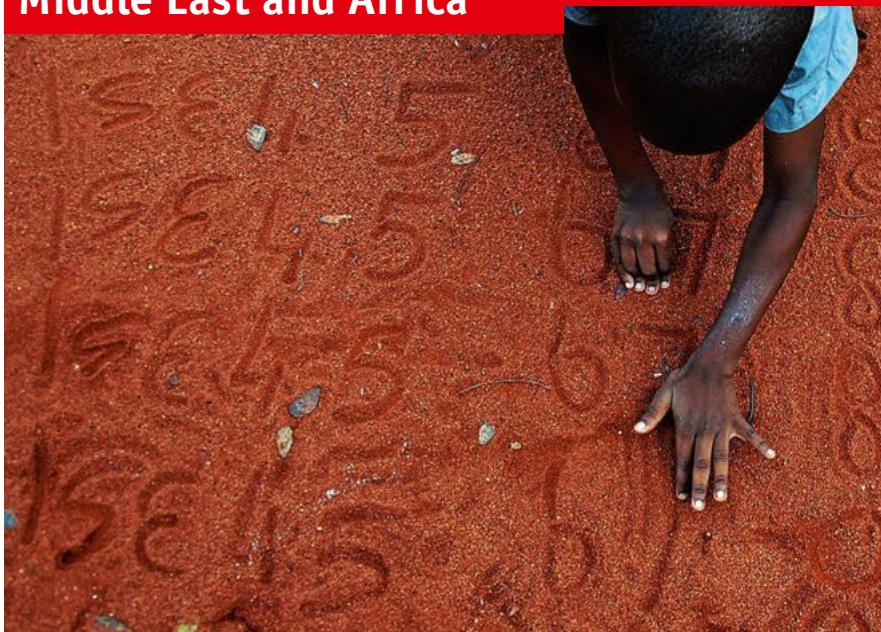
None of that deters his allies from plotting to keep him in power. Many look to the example of the late Hugo Chávez, Venezuela's left-wing leader, who lost a referendum to end term limits in 2007 only to hold another one 14 months later, which he won. Under Bolivia's constitution, a petition signed by a fifth of the electorate could trigger a re-run of the referendum to lift the term limit facing Mr Morales.

Another option, suggested by the vice-president, Álvaro García, is that Mr Morales resign for real, turning the hoax into reality. If this were coupled with a reform of the constitution, Mr Morales could argue that his current mandate, served under an outdated constitution, should not count towards one of the two terms he is allowed. He used this manoeuvre once before, in 2014, to run for re-election.

The president says that what he really wants is to return to his career as a grower of coca, a traditional stimulant that is also the raw material for cocaine. In fact, he was more an organiser of farmers than a cultivator himself. Only *inocentes* believe it is his ambition to become one. ■



Why stop in 2025?



### South Africa's schools

## Bottom of the class

CAPE TOWN

### Why South Africa has one of the world's worst education systems

AFTER half an hour of pencil-chewing Lizeka Rantsan's class lines up at her desk to hand in its maths tests. The teacher at Oranjekloof primary school in Cape Town thanks the 11- and 12-year-olds and flicks through the papers. Ms Rantsan sighs, unimpressed. Pulling one sheet of errant scribbles from the pile she asks: "How are we supposed to help these children?"

It is a question that South Africa is failing to answer. In a league table of education systems drawn up in 2015 by the OECD club of mainly rich countries, South Africa ranks 75th out of 76. In November the latest Trends in International Mathematics and Science Study (TIMSS), a quadrennial test sat by 580,000 pupils in 57 countries, had South Africa at or near the bottom of its various rankings (see chart), though its scores had improved since 2011. Its children are behind those in poorer parts of the continent. A shocking 27% of pupils who have attended school for six years cannot read, compared with 4% in Tanzania and 19% in Zimbabwe. After five years of school about half cannot work out that 24 divided by three is eight. Only 37% of children starting school go on to pass the matriculation exam; just 4% earn a degree.

South Africa has the most unequal school system in the world, says Nic Spaull of the University of Stellenbosch. The gap in test scores between the top 20% of schools and the rest is wider than in almost every other country. Of 200 black pupils

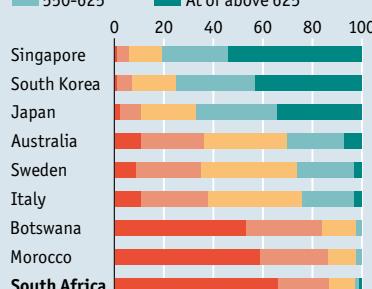
who start school just one can expect to do well enough to study engineering. Ten white kids can expect the same result.

Many of the problems have their roots in apartheid. The Bantu Education Act of 1953 set out to ensure that whites received a better education than blacks, who were, according to Hendrik Verwoerd, the future prime minister then in charge of education, to be educated only enough to be "hewers of wood and drawers of water". Black pupils received about a fifth of the funding of white peers. They were taught almost no maths or science. Most independent church-run schools that provided a good education in black areas were shut.

### Far behind

Selected TIMSS maths scores\*, 2015, % of pupils

Below 400	400-475	475-550
550-625	At or above 625	



Source: Trends in International Mathematics and Science Study

\*500=Average

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After Nelson Mandela became president in 1994 his government expanded access to schooling. It also replaced a school system segregated by race with one divided by wealth. Schools in poorer areas receive more state funding. But schools in richer areas can charge fees on top.

In theory these schools must admit pupils even if their parents cannot afford the fees. In practice they are fortresses of privilege. There are still about 500 schools built from mud, mainly in the Eastern Cape. The Western Cape has some of the largest campuses in the southern hemisphere, with cricket pitches as smooth as croquet lawns.

And yet money is not the reason for the malaise. Few countries spend as much to so little effect. In South Africa public spending on education is 6.4% of GDP; the average share in EU countries is 4.8%. More important than money are a lack of accountability and the abysmal quality of most teachers. Central to both failures is the South African Democratic Teachers Union (SADTU), which is allied to the ruling African National Congress (ANC).

The role of SADTU was laid bare in a report published in May 2016 by a team led by John Volmink, an academic. It found "widespread" corruption and abuse. This included teachers paying union officials for plum jobs, and female teachers being told they would be given jobs only in exchange for sex. The government has done little in response. Perhaps this is unsurprising: all six of the senior civil servants running education are SADTU members.

The union's influence within government belies its claim that officials are to blame for woeful schools. Last year it successfully lobbied for the cancellation of standardised tests. It has ensured that inspectors must give schools a year's notice before showing up (less than 24 hours is the norm in England). And although par-

► ent-led school governing bodies are meant to hold teachers to account, they are more often controlled by the union, or in some cases by gangs.

But even if there were better oversight most teachers would struggle to shape up. In one study in 2007 maths teachers of 11- and 12-year-olds sat tests similar to those taken by their class; questions included simple calculations of fractions and ratios. A scandalous 79% of teachers scored below the level expected of the pupils. The average 14-year-old in Singapore and South Korea performs much better.

It does not have to be this way. Spark School Bramley in Johannesburg is a low-cost private school, spending roughly as much per pupil as the average state school.

And it is everything state schools are not. Its 360 pupils begin learning at 7.30am and end around 3pm-4pm; most state schools close at 1.30pm. At the start of the day pupils gather for mindfulness exercises, maths questions, pledges to work hard—and a blood-pumping rendition of Katy Perry's "Firework". "We have an emotional curriculum as well as an academic one," says Bailey Thomson, a Spark director.

Pupils attend maths lessons based on Singapore's curriculum; literacy classes draw on how England teaches phonics. Crucially, teachers are not members of SADTU. But they receive 250 hours of professional development per year, about as much as the average state-school teacher gets in a decade.

Early results show that its pupils are on average a year ahead of their peers. Spark runs eight schools and plans to have 20 by 2019. Other operators, such as Future Nation, co-founded by Sizwe Nxasana, a former banker, are also expanding. "We are never going to have a larger footprint than [the] government but we can influence it," hopes Stacey Brewer, Spark's founder.

Another promising scheme is the "collaboration schools" pilot in the Western Cape, based on academies in England and charter schools in America. The five collaboration schools are funded by the state but run by independent operators. In what Helen Zille, the premier of the Western Cape, calls "a seminal moment", the parents of Oranjekloof pupils petitioned to keep the school in the collaboration programme when unions tried to oppose it. Ms Zille wants to open a "critical mass" of collaboration schools to inject competition into the public system.

Spark and the collaboration schools suggest that South African education need not be doomed. But together they account for a tiny fraction of the country's more than 25,000 schools. Widespread improvement will require loosening the grip of SADTU. In local polls in August the ruling party saw its worst results since the end of apartheid. This may force it to review vested interests. More likely it will continue to fail children. "The desire to learn has been eroded," says Angus Duffett, the head of Silikamva High, a collaboration school. "That is the deeper sickness." ■

## Astronomers v sheep farmers in South Africa

# Stars and baas

THE KAROO

### A telescope in the desert meets NIMBYism

**T**HREE is a haunting beauty to the Karoo, a vast swath of semi-desert that seems empty save for the stars overhead and sheep grazing below. Economic opportunities here are few. Scrubby, sprawling farms support sheep, ostrich, springbok and little else. (To be fair, Karoo lamb is delicious.)

But the Karoo's clear skies also draw some of the world's best scientists. A radio telescope project called the Square Kilometre Array (SKA) is under construction, with the latest cluster of 64 giant antennae due to be completed late next year. South Africa won the right to host half of the \$2bn international project in 2012. When finished it will be the biggest radio telescope in the world and should

allow scientists to peer into the origins of the universe.

Still, some sheep farmers are grumbling. Because of the sensitivity of the telescope, the surrounding area must be kept free from radio interference caused by everything from mobile phones to microwave ovens and some car engines. The SKA is buying up more farms than originally expected to ensure radio silence over an area of some 130,000 hectares. There will be no mobile phone signals allowed, except in the few towns in the area. Residents will instead be given an alternative radio communication system. Save the Karoo, an advocacy group, isn't swayed by the prospect of groundbreaking astronomical discoveries. Its members fear the restrictions will make the Karoo "a cut-off and backward region", and warn that abattoirs and windmill repairmen serving farms near the SKA site could face financial ruin. "I couldn't give a damn about a black hole sitting somewhere out in space," says Eric Torr, an organiser with the group. "It does not put food on the table."

Sky-high expectations in this down-at-heel area are also a problem. An SKA official grumbles that the locals expect the telescope to solve all their woes. Some jobs have been created, but few locals have the skills to decipher the secrets of distant galaxies. Until recently the high school in Carnarvon, a nearby town, didn't even have a maths and science teacher. The SKA organisation hired one, and is also offering bursaries to college students. Perhaps if the next generation's horizons are raised, they will be able to take advantage of the radio telescopes in their own backyard.



Where lambs once frolicked

## Decriminalising Zimbabwe's sex trade

# Less stigma, more competition

HARARE

### Why some prostitutes wish their job was still banned

IT IS midnight at a shopping centre in Hopley, a poor suburb east of Harare. Masceline, an orphaned 15-year-old, stands in the darkness. Her aim is to find a client. But she also wants to avoid getting beaten up by older prostitutes who resent the competition she represents.

Zimbabwe's Constitutional Court ruled in 2015 that the police could not arrest women for prostitution. At first, sex workers cheered. No more would they be dragged to police stations and shaken down for bribes to avoid six-month jail terms. It was a relief, too, for the many other women whom the cops used to arrest just for walking alone at night or drinking in a pub.

Yet there was a catch. Tambudzai Mikorasi, a 40-year-old sex worker, says she may have celebrated too early. Now that the old- ►



Supply and demeaned

► est profession has been decriminalised, a flood of young women and girls are joining it and driving down prices. (Jobs of any kind are scarce thanks to Robert Mugabe's disastrous management of the economy.)

Some veterans have responded by hiring thugs to protect their turf. In return, the men can have sex whenever they want. "We have no option," says Ms Mikorasi, her muscles flexing as she pulls down her miniskirt. "It has never been this bad. These little girls are pushing us out of business." Malaika Chatyoka, a 37-year-old, complains that the fee she can charge has slumped from \$10 for 30 minutes to as little as \$2 on some nights. The price for a full night is down to \$10, one fifth of what she used to charge.

Police raids used to scare away competitors. "Only the brave remained on the streets. Now it's free-for-all," says 25-year-old Sazini Ngwenya from Bulawayo. She adds that without the police paying attention there has been an increase in robberies and rape.

Faced with a slumping economy Zimbabweans are so desperate that, for many, even cut-price sex work seems like the least-bad option. "With no education, faced with the responsibility to fend for their siblings and/or their own children, many girls and young women are being forced to sell sex for survival," laments Talent Jumo, a director of the Katswe Sisterhood, a charity. With no sign of an economic recovery, many more girls could be forced onto the streets, she says.

For Masceline, the need to put food on the table for her family means she will continue renting out her body. "Everything I face here is better than going hungry or watching my baby sister drop out of school," she says hurriedly, as a potential client approaches. ■

### Iraq's long war

## A goody and Abadi

BAGHDAD

### Behind the battle for Mosul lies a struggle for power in Baghdad

THEY said it would be over by Christmas. Now Haider al-Abadi, Iraq's prime minister, is suggesting that the battle for Mosul could last until Easter. For almost a month his forces had stalled on what was supposed to be the easier eastern bank of Iraq's second city. And the costs have been gruelling. A fifth of Iraq's elite force has reportedly fallen in the assault. With the support of more American special forces, Mr Abadi has launched a second phase, taking the city's industrial zone. Progress is being made. But what Iraqi soldiers clear by day, Islamic State (is) fighters often regain by night, thanks to a warren of tunnels under the front lines.

Not only are is fighters holding the line against Iraqi soldiers and their American backers after ten weeks of fighting in Mosul, but they are also fending off Turkish troops 515km (320 miles) to the west, around the town of al-Bab in northern Syria. They have also recaptured Palmyra from the Syrian regime.

Across Iraq the insurgency has a new lease of life. The sickening rhythm of suicide bombs in Shia suburbs of Baghdad and southern Iraq is quickening again. In Anbar and Salahuddin, provinces long since reclaimed by the government, is is also flexing its muscles. On January 2nd it won control of a police station in Samarra for several hours and it cut briefly the Baghdad to Mosul road. It is putting out lights in Diyala. "It is not an organisation that is close to collapse," says an analyst in touch with people in Mosul.

The prolonged campaign carries political costs for Mr Abadi, who had sought to turn himself from a bumbling office-hold-

er into a victorious commander by donning military fatigues. Should there be further mishaps, Mr Abadi's rivals in Baghdad will be waiting to pounce. Among them is his predecessor, Nouri al-Maliki, and his cohorts in Iraq's assortment of predominantly Shia militias, which are collectively known as the *Hashd al-Shaabi*, or popular mobilisation forces (PMF). As the government-led advance on Mosul slows, they are calling for the deployment of Iranian-backed brigades. So short of men are Iraq's army and police that even some American commanders now welcome the use of these auxiliaries.

To date the Iraqi government's assault (with air support from the American-led coalition) has managed to minimise civilian casualties in Mosul. But if Shia militias are unleashed another bout of sectarian killings might ensue. It could push the city's remaining 900,000 Sunnis towards is. Moreover an enhanced role for the militias would weaken the state by boosting the PMF. Its brigades already display factional flags, run several secret prisons and raise money by extorting bribes at gunpoint at checkpoints.

Mr Maliki, for his part, seems to be intent on building a sectarian *pasdaran*, or revolutionary guard, much like the one that wields real power in neighbouring Iran. As prime minister from 2006 to 2014 Mr Maliki built up networks that still give him influence. From the judiciary to the civil service to parliament, many in Iraq's upper echelons owe him their positions. One of his last acts as prime minister was to form the PMF. Having tried for months to chip away at Mr Abadi's authority by impeaching his senior ministers, Mr Maliki has recently switched tack in favour of bolstering the PMF. On November 26th MPs voted to create an autonomous force comprising 110,000 PMF militiamen paid by the government and overseen by parliament.

In response Mr Abadi is using the new PMF law to woo the Sunni militias that Mr Maliki had ostracised when he was prime minister. He has brought thousands of Sunni officers and soldiers from Saddam Hussein's former army onto the government payroll under the command of a former governor of Mosul, Atheel al-Nujaifi. Charges of terrorism against Khamis al-Khanjar, a Sunni politician financed by the Gulf, have been quietly dropped. And with Mr Abadi's blessing, Ammar al-Hakim, who heads the largest Shia parliamentary



► bloc, has gone to Amman and Beirut to negotiate terms for a national reconciliation, including an amnesty, with Sunni exiles who had long since despaired of a deal with Baghdad's Shia masters.

The hope is that if they are promised a future inside Iraq, former Baathists and other Sunni Islamists might join forces to rid Iraq of is. "Some Shia are starting to realise that if they can't absorb Sunnis and Kurds, what remains of Iraq risks becoming another wilaya [province] of Iran," says a diplomat in Baghdad.

Mr Abadi's main failure has been political: he has not broken the hold that sectarian parties, including his own, have on Iraq's coffers. Political parties in his cabinet continue to take handsome cuts from government contracts and collect the pay of ghost workers in defunct factories. Rather than tackling political corruption, he has squandered the backing of protesters and Iraq's leading ayatollahs by slashing the pay of civil servants and raising taxes.

Yet for all his setbacks, Mr Abadi has regained most of the territory that Mr Maliki had lost. He has secured renewed American military support and overseen a four-fold increase in America's troop deployment over the past year. With American help, the panic-stricken army that fled Mosul in June 2014 has been rearmed and now sports an air force and a division of special-forces soldiers who are proving capable fighters. His men are also operating alongside Kurdish fighters for the first time in a decade.

Socially, too, Baghdad is regaining a semblance of normality. The concrete barricades encasing public buildings like lugubrious tombstones have slowly come down, and checkpoints have thinned. Iraq's economy is now weathering a crisis caused by a slump in the oil price and a surge in war-related spending. Oil production reached record levels in 2016 and the IMF has extended a \$5.3bn loan, which promises to attract an additional \$1bn in international credit and export guarantees. The bits of the economy not related to oil, which slumped 5% in 2016 and 14% the year before, will probably expand by 5% this year, the IMF reckons. American companies that had previously fled as Iraq slipped into mayhem, such as General Electric, are now tiptoeing back.

Even in parliament unusual alliances are forming across sectarian lines. Kurds, Sunni Arabs and Shias no longer vote as united blocs. Selim Jabbouri, the Sunni parliamentary speaker who hails from the Muslim Brotherhood, speaks of establishing a cross-confessional party in the 2018 elections and canvasses in Shia as well as Sunni parts of Iraq. For all its faults, Iraq is still the Arab world's most boisterous multiparty democracy. Perhaps it may after all convince a majority of its people that they have a future together. ■



### America and Israel

## Unsettled

MAALE ADUMIM

**President Trump may not be all good news for Binyamin Netanyahu**

**W**ITH its shopping malls, sports centres and new residential blocks, Maale Adumim (pictured above) looks and feels like any other Israeli dormitory suburb. Less than ten minutes' drive eastward from Jerusalem, the town on the edge of the Judaean Desert, which is also the third-largest Jewish settlement in the West Bank, may be about to become the first test case of America's Middle East policy under Donald Trump.

Elements of Binyamin Netanyahu's right-wing coalition are agitating to annex parts of the West Bank, starting with Maale Adumim, in the belief that the Trump administration will reverse a long-standing American policy opposing Israeli settlements in territory it occupied in 1967.

The mayor, Benny Kashriel, says that he is not concerned about international politics so much as local laws: "I want my town to have the same rights as any other town in Israel." He complains that, because the West Bank (called Judea and Samaria by the Israeli government) is under military rule, Maale Adumim's residents need to apply to the army if they wish, for instance, to close a veranda: "There is no reason that the Israeli law shouldn't apply here. Netanyahu tells us he is in favour but that we have to wait for better timing." Emphasising that the time may indeed be approaching, this week Maale Adumim welcomed the former presidential candidate and governor of Arkansas, Mike Huckabee, to inaugurate a new building.

Naftali Bennett, the leader of the hard-

right Jewish Home party, says he will propose a bill to extend Israeli sovereignty to Maale Adumim, arguing that the new American administration offers "a unique window of opportunity" to redraw the map. "For the first time in 50 years we Israelis have to decide what we want—a Palestinian state in Judea and Samaria, or Israeli law replacing military law where Israeli citizens live." Mr Bennett believes that he and his colleagues must press the prime minister to persuade Mr Trump to recognise the settlements as permanent at his first meeting.

After eight years of friction with Barack Obama's administration, Mr Netanyahu has good reason to feel optimistic. He is expected to be the first foreign leader to meet the new president after his inauguration on January 20th. Although Mr Netanyahu may not get a promise to scrap the Iran nuclear deal, in every other way he will be pushing on an open door when it comes to enlisting Mr Trump's help to counter Iranian influence in the region.

Then there is the pre-election promise by Mr Trump to relocate the American embassy from Tel Aviv to Jerusalem, with all the symbolism that would involve. Mr Trump's pick of David Friedman to be America's ambassador to Israel has also sent a strong message. A bankruptcy lawyer without diplomatic experience, Mr Friedman believes that Israel is legally entitled to annex the West Bank and supports the building of new settlements there—steps that would rule out any possibility of ►

► a peace deal based on the establishment of a Palestinian state next to Israel.

The gulf between the outgoing and incoming administrations was laid bare on December 23rd. Mr Obama's decision not to veto UN Security Council Resolution 2334 (reiterating that the settlements are illegal and expressing concern that prospects for the two-state solution were being sabotaged by both sides) was a well-aimed parting shot. Mr Trump's administration will not be able to overturn a resolution that may embolden the International Criminal Court to take action over settlements; Israeli officials will have to consider the risks of building more.

Mr Netanyahu's fury must at least have been soothed by Mr Trump's response on Twitter: "Stay strong Israel, January 20th is fast approaching!" The Israeli prime minister tweeted back: "President-elect Trump, thank you for your warm friendship and your clear-cut support for Israel!"

A few hours later America's secretary of state, John Kerry, in a speech highly critical of Israel's government, explained the context of the UN abstention. He warned that right-wing ideologues within Mr Netanyahu's coalition were leading Israel inexorably towards abandoning even the pretence of interest in a two-state solution, with profound consequences for both the country's future security and its status as a democratic Jewish state. There was little in Mr Kerry's speech, which also forthrightly condemned Palestinian glorification of terrorism, that deviated from American policy towards Israel that goes back more than 40 years. But his disappointment and frustration were clear.

In practice, Mr Netanyahu may not find Mr Trump's uncritical friendship an unalloyed blessing. It has often suited him to play off hardliners, such as Mr Bennett, against Washington. It has served his purpose to keep the idea of the two-state solution alive while doing nothing to help make it a reality. Typically, he has yet to respond to the latest demands for annexing Maale Adumim. One of Mr Netanyahu's allies, the regional co-operation minister, Tzachi Hanegbi, warned this week that "it would be bad for Israel to unilaterally annex Judea and Samaria." However, many members of the ruling Likud party also favour the Maale Adumim law.

The right wing has scented an opportunity in legal problems facing Mr Netanyahu. The prime minister was questioned this week by police over fraud and graft allegations. This is one of a number of corruption probes into his financial affairs and the prime minister is suddenly vulnerable. Although he insists that there is nothing of substance in the allegations, he will not have forgotten how his predecessor, Ehud Olmert, was forced by his cabinet colleagues eight years ago to resign over allegations of bribe-taking, and was later

### Israel's divisions

## Uniform justice

TEL AVIV

### The conviction of a soldier divides Israel

**O**NE of the most contentious cases in Israel's military history reached its verdict on January 4th when three military judges found a serving soldier, Sergeant Elor Azaria, guilty of manslaughter for killing a Palestinian.

The public controversy was not over the facts. Both the prosecution and defence agreed that on March 24th 2016, in the West Bank city of Hebron, Mr Azaria had fired point-blank at Abdel-Fattah al-Sharif, a Palestinian man lying grievously wounded after he had been shot while stabbing an Israeli soldier.

Nor was it over the court's dismissal of Mr Azaria's claim to have been acting in self-defence; the judges reached a unanimous decision that he had acted "calmly, without urgency and in a calculated manner" and that, as he said on the scene to a comrade, he thought Mr al-Sharif "deserve[d] to die".

Instead the controversy relates to the fact that a large section of the Israeli



Rallying for the right to shoot prisoners

jailed. Mr Netanyahu may have to concede something to the hardliners to keep his own job.

"The Maale Adumim law is the first sign that the Netanyahu government is using its newfound power in the Trump era to make unilateral moves," says Danny Seidemann, a director of Terrestrial Jerusalem, an NGO that monitors building works in and around Jerusalem. "Annexing Maale Adumim would virtually cut the West

public seems to believe that Mr Azaria was right to have shot a wounded prisoner who no longer posed a danger. A poll last August by the Israeli Democracy Institute and Tel Aviv University indicated that 65% of Israel's Jewish majority supported his actions. A seemingly contradictory finding in the same poll put public support of the Israel Defence Forces (IDF), the same organisation that put Sergeant Azaria on trial, at 87%.

One explanation for this discrepancy is that anger is high over the sporadic campaign of stabbings by Palestinians since 2015. Another is that admiration for the army does not necessarily extend to the generals, who rushed to condemn him when video of the shooting emerged. This mixed message is coming from the politicians, too. The prime minister, Binyamin Netanyahu, called Mr Azaria's parents to express solidarity shortly after his arrest. Since the conviction he joined several ministers in calling for Mr Azaria to be pardoned by the president, Reuven Rivlin. The only senior member of the ruling Likud party to condemn the shooting unequivocally was Moshe Yaalon, then the defence minister. Shortly afterwards he was pushed out of office and replaced by Avigdor Lieberman, a hardliner.

Manslaughter convictions of IDF soldiers on duty are very rare. The last was 11 years ago when one was found guilty of killing Tom Hurndall, a British pro-Palestinian activist. Human-rights organisations say other similar shootings have gone unpunished.

Still, the generals can take comfort from the judges' firm line: the IDF's claim to be a highly moral army requires it to act against cases of blatant indiscipline. And Mr Netanyahu, though bending to populist sentiment at home, will doubtless hold out the verdict as proof to the world that his country is a democracy where the rule of law prevails, in a region where such virtues are rare.

Bank in two, making it almost impossible to establish in the future a viable Palestinian state." He doubts that Mr Netanyahu wants to go that far, which means he may have to throw his right-wingers other meat, such as more settlement-building in east Jerusalem and the West Bank. Delaying tactics and ambiguity have been the twin hallmarks of Mr Netanyahu's premiership. Both may become harder with the advent of Mr Trump. ■

# Finding a voice

EUROPEAN uncertainty among Britain's continental neighbours has caused the number of Britons at the event—including a Briton who recently applied for a German passport, partly as insurance against Brexit—to rise sharply. The situation is confused and urgent. When would postal votes be sent? Will expatriate Britons have to apply for a German passport to vote in the European elections after Brexit? "At the moment we have plenty of questions and not too many answers," observes Mr Worth, who has organised regularly popular gatherings in Hamburg and Copenhagen. The confusion comes in two varieties. The first concerns the mechanics of voting in the European elections. In the Netherlands, Britain has no centralised system. Instead, voters are, sending out ballots, then collecting them from the right local authorities in time. It shows. British embassies have publicised the wrong deadline for registration. The correct one is June 7th; postal votes have been sent abroad with too little postage; expat voter details have been mislaid by local authorities. Small wonder that, of the roughly 5m Britons living abroad, only about 200,000 are registered.

The second, more long-term source of uncertainty: what will Brexit mean for Britons on the continent? As the Leave and Remain camps traded lurid claims—comparing the EU to Hitler, for Brexit would embolden Islamic

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# 2017, as written by:



George Clooney



Sadiq Khan



Martin Sorrell



Maria Alyokhina of Pussy Riot



Justin Trudeau



& *The Economist's* journalists

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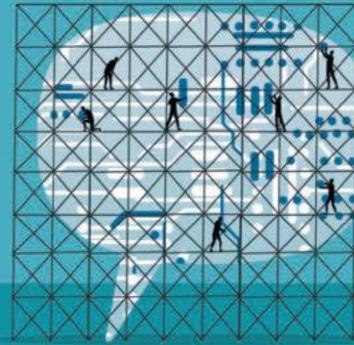
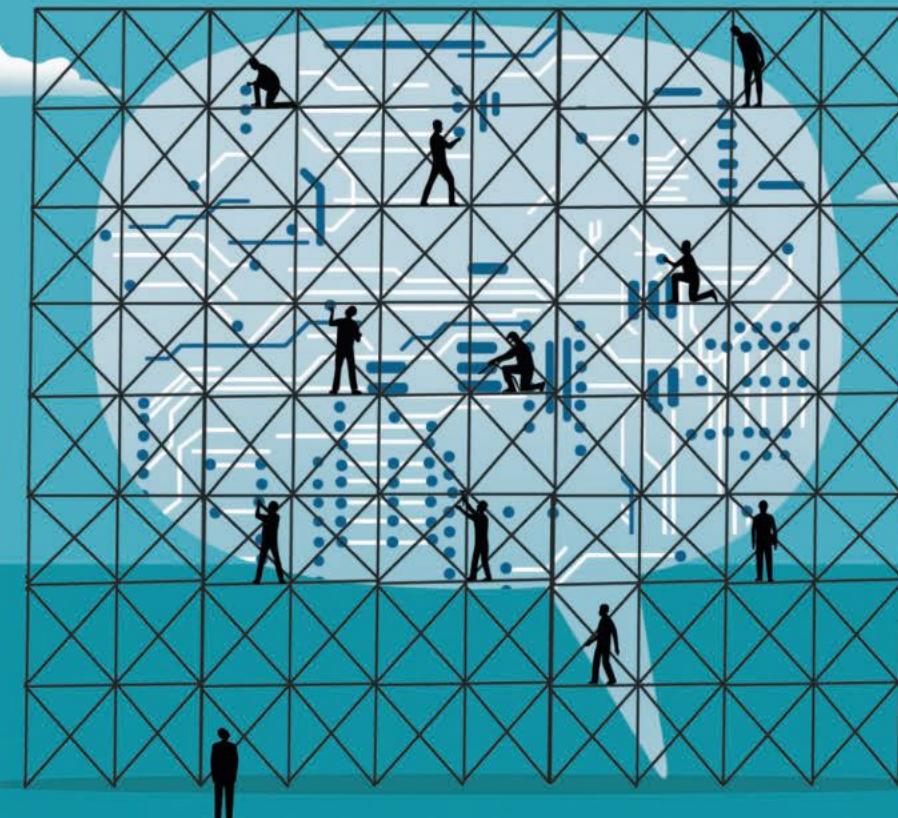


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## Finding a voice

**Computers have got much better at translation, voice recognition and speech synthesis, says Lane Greene. But they still don't understand the meaning of language**

**I**'M SORRY, Dave. I'm afraid I can't do that." With chilling calm, HAL 9000, the onboard computer in "2001: A Space Odyssey", refuses to open the doors to Dave Bowman, an astronaut who had ventured outside the ship. HAL's decision to turn on his human companion reflected a wave of fear about intelligent computers.

When the film came out in 1968, computers that could have proper conversations with humans seemed nearly as far away as manned flight to Jupiter. Since then, humankind has progressed quite a lot farther with building machines that it can talk to, and that can respond with something resembling natural speech. Even so, communication remains difficult. If "2001" had been made to reflect the state of today's language technology, the conversation might have gone something like this: "Open the pod bay doors, Hal." "I'm sorry, Dave. I didn't understand the question." "Open the pod bay doors, Hal." "I have a list of eBay results about pod doors, Dave."

Creative and truly conversational computers able

to handle the unexpected are still far off. Artificial-intelligence (AI) researchers can only laugh when asked about the prospect of an intelligent HAL, Terminator or Rosie (the sassy robot housekeeper in "The Jetsons"). Yet although language technologies are nowhere near ready to replace human beings, except in a few highly routine tasks, they are at last about to become good enough to be taken seriously. They can help people spend more time doing interesting things that only humans can do. After six decades of work, much of it with disappointing outcomes, the past few years have produced results much closer to what early pioneers had hoped for.

Speech recognition has made remarkable advances. Machine translation, too, has gone from terrible to usable for getting the gist of a text, and may soon be good enough to require only modest editing by humans. Computerised personal assistants, such as Apple's Siri, Amazon's Alexa, Google Now and Microsoft's Cortana, can now take a wide variety of questions, structured in many different ways, and return accurate and useful answers in a natural-sound-►

### ALSO IN THIS TQ

**SPEECH RECOGNITION**  
I hear you

**SYNTHETIC SPEECH**  
Hasta la vista, robot voice

**MACHINE TRANSLATION**  
Beyond Babel

**MEANING AND MACHINE INTELLIGENCE**  
What are you talking about?

**BRAIN SCAN**  
Terry Winograd

**LOOKING AHEAD**  
For my next trick

▶ing voice. Alexa can even respond to a request to “tell me a joke”, but only by calling upon a database of corny quips. Computers lack a sense of humour.

When Apple introduced Siri in 2011 it was frustrating to use, so many people gave up. Only around a third of smartphone owners use their personal assistants regularly, even though 95% have tried them at some point, according to Creative Strategies, a consultancy. Many of those discouraged users may not realise how much they have improved.

In 1966 John Pierce was working at Bell Labs, the research arm of America’s telephone monopoly. Having overseen the team that had built the first transistor and the first communications satellite, he enjoyed a sterling reputation, so he was asked to take charge of a report on the state of automatic language processing for the National Academy of Sciences. In the period leading up to this, scholars had been promising automatic translation between languages within a few years.

But the report was scathing. Reviewing almost a decade of work on machine translation and automatic speech recognition, it concluded that the time had come to spend money “hard-headedly toward important, realistic and relatively short-range goals”—another way of saying that language-technology research had overpromised and underdelivered. In 1969 Pierce wrote that both the funders and eager researchers had often fooled themselves, and that “no simple, clear, sure knowledge is gained.” After that, America’s government largely closed the money tap, and research on language technology went into hibernation for two decades.

The story of how it emerged from that hibernation is both salutary and surprisingly workaday, says Mark Liberman. As professor of linguistics at the University of Pennsylvania and head of the Linguistic Data Consortium, a huge trove of texts and recordings of human language, he knows a thing or two about the history of language technology. In the bad old days researchers kept their methods in the dark and described their results in ways that were hard to evaluate. But beginning in the 1980s, Charles Wayne, then at America’s Defence Advanced Research Projects Agency, encouraged them to try another approach: the “common task”.

### Step by step

Researchers would agree on a common set of practices, whether they were trying to teach computers speech recognition, speaker identification, sentiment analysis of texts, grammatical breakdown, language identification, handwriting recognition or anything else. They would set out the metrics they were aiming to improve on, share the data sets used to train their software and allow their results to be tested by neutral outsiders. That made the process far more transparent. Funding started up again and language technologies began to improve, though very slowly.

## Many early approaches to language technology got stuck in a conceptual cul-de-sac

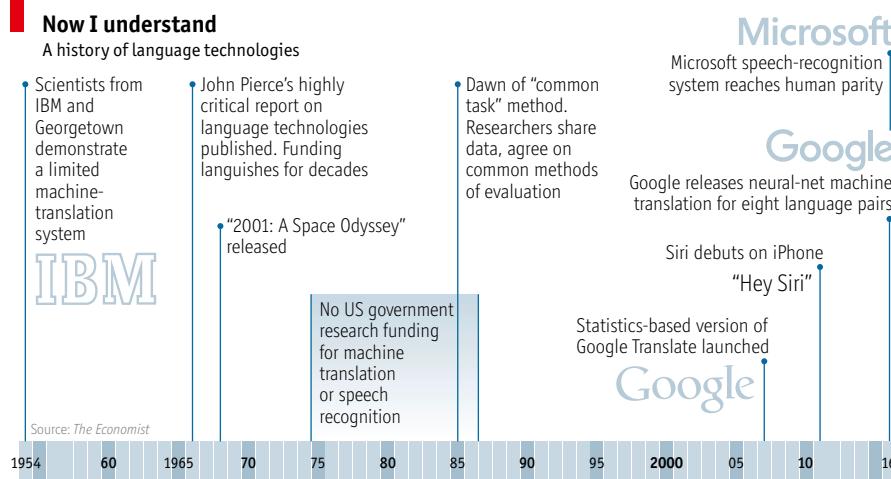
Many early approaches to language technology—and particularly translation—got stuck in a conceptual cul-de-sac: the rules-based approach. In translation, this meant trying to write rules to analyse the text of a sentence in the language of origin, breaking it down into a sort of abstract “interlanguage” and rebuilding it according to the rules of the target language. These approaches showed early promise. But language is riddled with ambiguities and exceptions, so such systems were hugely complicated and easily broke down when tested on sentences beyond the simple set they had been designed for.

Nearly all language technologies began to get a lot better with the application of statistical methods, often called a “brute force” approach. This relies on software scouring vast amounts of data, looking for patterns and learning from precedent. For example, in parsing language (breaking it down into its grammatical components), the software learns from large bodies of text that have already been parsed by humans. It uses what it has learned to make its best guess about a previously unseen text. In machine translation, the software scans millions of words already translated by humans, again looking for patterns. In speech recognition, the software learns from a body of recordings and the transcriptions made by humans.

Thanks to the growing power of processors, falling prices for data storage and, most crucially, the explosion in available data, this approach eventually bore fruit. Mathematical techniques that had been known for decades came into their own, and big companies with access to enormous amounts of data were poised to benefit. People who had been put off by the hilariously inappropriate translations offered by online tools like BabelFish began to have more faith in Google Translate. Apple persuaded millions of iPhone users to talk not only on their phones but to them.

The final advance, which began only about five years ago, came with the advent of deep learning through digital neural networks (DNNs). These are often touted as having qualities similar to those of the human brain: “neurons” are connected in software, and connections can become stronger or weaker in the process of learning. But Nils Lenke, head of research for Nuance, a language-technology company, explains matter-of-factly that “DNNs are just another kind of mathematical model,” the basis of which had been well understood for decades. What changed was the hardware being used.

Almost by chance, DNN researchers discovered that the graphical processing units (GPUs) used to render graphics fluidly in applications like video games were also brilliant at handling neural networks. In computer graphics, basic small shapes move according to fairly simple rules, but there are lots of shapes and many rules, requiring vast numbers of simple calculations. The same GPUs are used to fine-tune the weights assigned to “neurons” in DNNs as they scour data to learn. The technique has already produced big leaps in quality for all kinds of deep learning, including deciphering handwriting, recognising faces and classifying images. Now they are helping to improve all manner of language technologies, often bringing enhancements of up to 30%. That has shifted language technology from usable at a pinch to really rather good. But so far no one has quite worked out what will move it on from merely good to reliably great. ■



## Speech recognition

# I hear you

### Computers have made huge strides in recognising human speech

**W**HEN a person speaks, air is forced out through the lungs, making the vocal chords vibrate, which sends out characteristic wave patterns through the air. The features of the sounds depend on the arrangement of the vocal organs, especially the tongue and the lips, and the characteristic nature of the sounds comes from peaks of energy in certain frequencies. The vowels have frequencies called "formants", two of which are usually enough to differentiate one vowel from another. For example, the vowel in the English word "fleece" has its first two formants at around 300Hz and 3,000Hz. Consonants have their own characteristic features.

In principle, it should be easy to turn this stream of sound into transcribed speech. As in other language technologies, machines that recognise speech are trained on data gathered earlier. In this instance, the training data are sound recordings transcribed to text by humans, so that the software has both a sound and a text input. All it has to do is match the two. It gets better and better at working out how to transcribe a given chunk of sound in the same way as humans did in the training data. The traditional matching approach was a statistical technique called a hidden Markov model (HMM), making guesses based on what was done before. More recently speech recognition has also gained from deep learning.

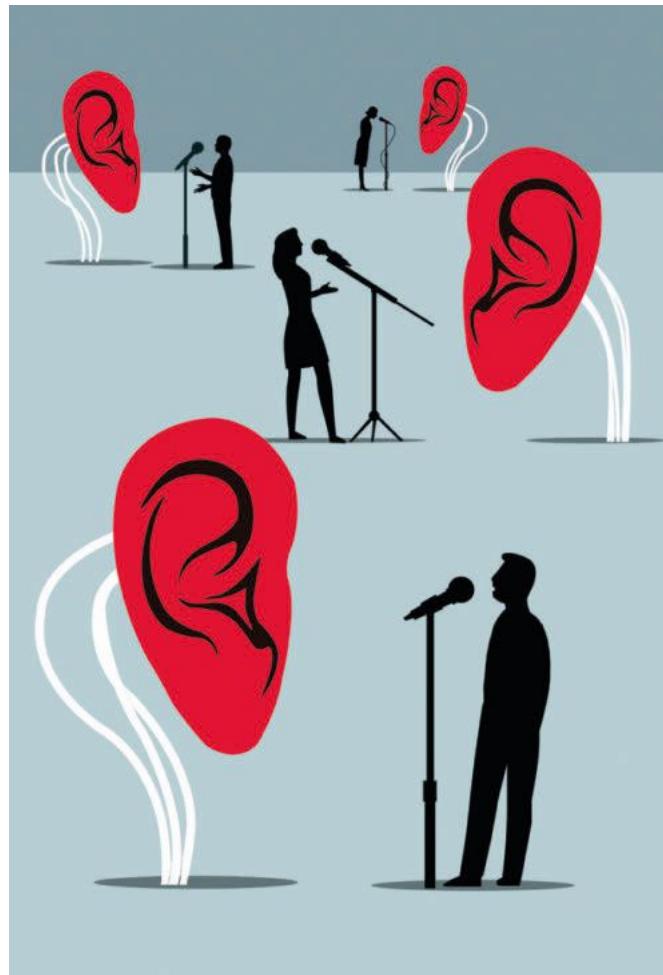
English has about 44 "phonemes", the units that make up the sound system of a language. P and b are different phonemes, because they distinguish words like pat and bat. But in English p with a puff of air, as in "party", and p without a puff of air, as in "spin", are not different phonemes, though they are in other languages. If a computer hears the phonemes s, p, i and n back to back, it should be able to recognise the word "spin".

But the nature of live speech makes this difficult for machines. Sounds are not pronounced individually, one phoneme after the other; they mostly come in a constant stream, and finding the boundaries is not easy. Phonemes also differ according to the context. (Compare the l sound at the beginning of "light" with that at the end of "full".) Speakers differ in timbre and pitch of voice, and in accent. Conversation is far less clear than careful dictation. People stop and restart much more often than they realise.

All the same, technology has gradually mitigated many of these problems, so error rates in speech-recognition software have fallen steadily over the years—and then sharply with the introduction of deep learning. Microphones have got better and cheaper. With ubiquitous wireless internet, speech recordings can easily be beamed to computers in the cloud for analysis, and even smartphones now often have computers powerful enough to carry out this task.

#### Bear arms or bare arms?

Perhaps the most important feature of a speech-recognition system is its set of expectations about what someone is likely to say, or its "language model". Like other training data, the language models are based on large amounts of real human speech, transcribed into text. When a speech-recognition system "hears" a stream of sound, it makes a number of guesses about what has been said, then calculates the odds that it has found the right one, based on the kinds of words, phrases and clauses it has seen earlier in the training text.



At the level of phonemes, each language has strings that are permitted (in English, a word may begin with str-, for example) or banned (an English word cannot start with tsr-). The same goes for words. Some strings of words are more common than others. For example, "the" is far more likely to be followed by a noun or an adjective than by a verb or an adverb. In making guesses about homophones, the computer will have remembered that in its training data the phrase "the right to bear arms" came up much more often than "the right to bare arms", and will thus have made the right guess.

Training on a specific speaker greatly cuts down on the software's guesswork. Just a few minutes of reading training text into software like Dragon Dictate, made by Nuance, produces a big jump in accuracy. For those willing to train the software for longer, the improvement continues to something close to 99% accuracy (meaning that of each hundred words of text, not more than one is wrongly added, omitted or changed). A good microphone and a quiet room help.

Advance knowledge of what kinds of things the speaker might be talking about also increases accuracy. Words like "phlebitis" and "gastrointestinal" are not common in general discourse, and uncommon words are ranked lower in the probability tables the software uses to guess what it has heard. But these words are common in medicine, so creating software trained to look out for such words considerably improves the result. This can be done by feeding the system a large number of documents written by the speaker whose voice is to be recognised; common words and phrases can be extracted to improve the system's guesses.

As with all other areas of language technology, deep learning has sharply brought down error rates. In October Microsoft an-►

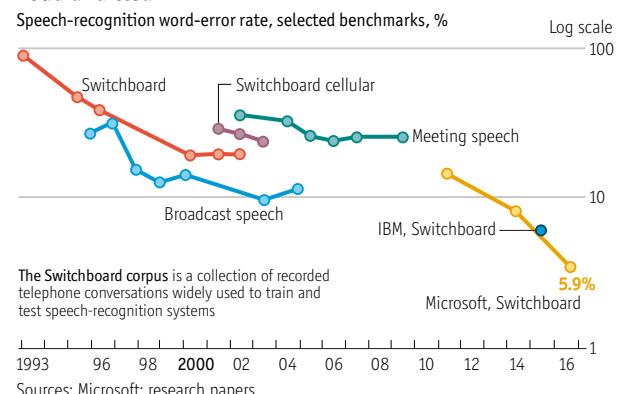
nounced that its latest speech-recognition system had achieved parity with human transcribers in recognising the speech in the Switchboard Corpus, a collection of thousands of recorded conversations in which participants are talking with a stranger about a randomly chosen subject.

Error rates on the Switchboard Corpus are a widely used benchmark, so claims of quality improvements can be easily compared. Fifteen years ago quality had stalled, with word-error rates of 20-30%. Microsoft's latest system, which has six neural networks running in parallel, has reached 5.9% (see chart), the same as a human transcriber's. Xuedong Huang, Microsoft's chief speech scientist, says that he expected it to take two or three years to reach parity with humans. It got there in less than one.

The improvements in the lab are now being applied to products in the real world. More and more cars are being fitted with voice-activated controls of various kinds; the vocabulary involved is limited (there are only so many things you might want to say to your car), which ensures high accuracy. Microphones—or often arrays of microphones with narrow fields of pick-up—are getting better at identifying the relevant speaker among a group.

Some problems remain. Children and elderly speakers, as well as people moving around in a room, are harder to understand. Background noise remains a big concern; if it is different from that in the training data, the software finds it harder to generalise from what it has learned. So Microsoft, for example, offers businesses a product called CRIS that lets users customise speech-recognition

### Loud and clear



systems for the background noise, special vocabulary and other idiosyncrasies they will encounter in that particular environment. That could be useful anywhere from a noisy factory floor to a care home for the elderly.

But for a computer to know what a human has said is only a beginning. Proper interaction between the two, of the kind that comes up in almost every science-fiction story, calls for machines that can speak back (see box below). ■

## Hasta la vista, robot voice

### Machines are starting to sound more like humans

"I'll be back." "Hasta la vista, baby." Arnold Schwarzenegger's Teutonic drone in the "Terminator" films is world-famous. But in this instance film-makers looking into the future were overly pessimistic. Some applications do still feature a monotonous "robot voice", but that is changing fast.

Creating speech is roughly the inverse of understanding it. Again, it requires a basic model of the structure of speech. What are the sounds in a language, and how do they combine? What words does it have, and how do they combine in sentences? These are well-understood questions, and most systems can now generate sound waves that are a fair approximation of human speech, at least in short bursts.

Heteronyms require special care. How should a computer pronounce a word like "lead", which can be a present-tense verb or a noun for a heavy metal, pronounced quite differently? Once again a language model can make accurate guesses: "Lead us not into temptation" can be parsed for its syntax, and once the software has worked out that the first word is almost certainly a verb, it can cause it to be pronounced to rhyme with "reed", not "red".

Traditionally, text-to-speech models

have been "concatenative", consisting of very short segments recorded by a human and then strung together as in the acoustic model described above. More recently, "parametric" models have been generating raw audio without the need to record a human voice, which makes these systems more flexible but less natural-sounding.

DeepMind, an artificial-intelligence company bought by Google in 2014, has announced a new way of synthesising speech, again using deep neural networks. The network is trained on recordings of people talking, and on the texts that match what they say. Given a text to reproduce as speech, it churns out a far more fluent and natural-sounding voice than the best concatenative and parametric approaches.

The last step in generating speech is giving it prosody—generally, the modulation of speed, pitch and volume to convey an extra (and critical) channel of meaning. In English, "a German teacher", with the stress on "teacher", can teach anything but must be German. But "a German teacher" with the emphasis on "German" is usually a teacher of German (and need not be German). Words like prepositions and conjunctions are not usually stressed. Getting machines to put

the stresses in the correct places is about 50% solved, says Mark Liberman of the University of Pennsylvania.

Many applications do not require perfect prosody. A satellite-navigation system giving instructions on where to turn uses just a small number of sentence patterns, and prosody is not important. The same goes for most single-sentence responses given by a virtual assistant on a smartphone.

But prosody matters when someone is telling a story. Pitch, speed and volume can be used to pass quickly over things that are already known, or to build interest and tension for new information. Myriad tiny clues communicate the speaker's attitude to his subject. The phrase "a German teacher", with stress on the word "German", may, in the context of a story, not be a teacher of German, but a teacher being explicitly contrasted with a teacher who happens to be French or British.

Text-to-speech engines are not much good at using context to provide such accentuation, and where they do, it rarely extends beyond a single sentence. When Alexa, the assistant in Amazon's Echo device, reads a news story, her prosody is jarringly un-humanlike. Talking computers have yet to learn how to make humans want to listen.

## Machine translation

# Beyond Babel

## Computer translations have got strikingly better, but still need human input

In "STAR TREK" it was a hand-held Universal Translator; in "The Hitchhiker's Guide to the Galaxy" it was the Babel Fish popped conveniently into the ear. In science fiction, the meeting of distant civilisations generally requires some kind of device to allow them to talk. High-quality automated translation seems even more magical than other kinds of language technology because many humans struggle to speak more than one language, let alone translate from one to another.

The idea has been around since the 1950s, and computerised translation is still known by the quaint moniker "machine translation" (MT). It goes back to the early days of the cold war, when American scientists were trying to get computers to translate from Russian. They were inspired by the code-breaking successes of the second world war, which had led to the development of computers in the first place. To them, a scramble of Cyrillic letters on a page of Russian text was just a coded version of English, and turning it into English was just a question of breaking the code.

Scientists at IBM and Georgetown University were among those who thought that the problem would be cracked quickly. Having programmed just six rules and a vocabulary of 250 words into a computer, they gave a demonstration in New York on January 7th 1954 and proudly produced 60 automated translations, including that of "Mi pyeryedayem mislyi posryedstvom ryechiy," which came out correctly as "We transmit thoughts by means of speech." Leon Dostert of Georgetown, the lead scientist, breezily predicted that fully realised MT would be "an accomplished fact" in three to five years.

Instead, after more than a decade of work, the report in 1966 by a committee chaired by John Pierce, mentioned in the introduction to this report, recorded bitter disappointment with the results and urged researchers to focus on narrow, achievable goals such as automated dictionaries. Government-sponsored work on MT went into near-hibernation for two decades. What little was done was carried out by private companies. The most notable of them was Systran, which provided rough translations, mostly to America's armed forces.

### La plume de mon ordinateur

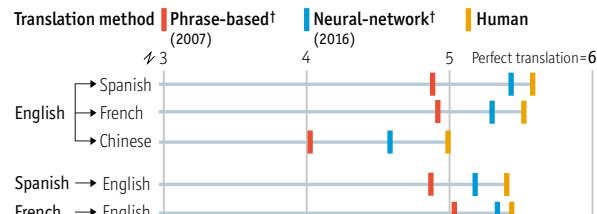
The scientists got bogged down by their rules-based approach. Having done relatively well with their six-rule system, they came to believe that if they programmed in more rules, the system would become more sophisticated and subtle. Instead, it became more likely to produce nonsense. Adding extra rules, in the modern parlance of software developers, did not "scale".

Besides the difficulty of programming grammar's many rules and exceptions, some early observers noted a conceptual problem. The meaning of a word often depends not just on its dictionary definition and the grammatical context but the meaning of the rest of the sentence. Yehoshua Bar-Hillel, an Israeli MT pioneer, realised that "the pen is in the box" and "the box is in the pen" would require different translations for "pen": any pen big enough to hold a box would have to be an animal enclosure, not a writing instrument.

How could machines be taught enough rules to make this kind of distinction? They would have to be provided with some knowledge of the real world, a task far beyond the machines or their programmers at the time. Two decades later, IBM stumbled on an ap-

## Speak easy

Human scorers' rating\* of Google Translate and human translation



Pour l'ancienne secrétaire d'Etat, il s'agit de faire oublier un mois de cafouillages et de convaincre l'auditoire que M. Trump n'a pas l'étoffe d'un président

Source: Google \*0=完全 nonsense translation, 6=perfect translation †Machine translation

proach that would revive optimism about MT. Its Candide system was the first serious attempt to use statistical probabilities rather than rules devised by humans for translation. Statistical, "phrase-based" machine translation, like speech recognition, needed training data to learn from. Candide used Canada's Hansard, which publishes that country's parliamentary debates in French and English, providing a huge amount of data for that time. The phrase-based approach would ensure that the translation of a word would take the surrounding words properly into account.

But quality did not take a leap until Google, which had set itself the goal of indexing the entire internet, decided to use those data to train its translation engines; in 2007 it switched from a rules-based engine (provided by Systran) to its own statistics-based system. To build it, Google trawled about a trillion web pages, looking for any text that seemed to be a translation of another—for example, pages designed identically but with different words, and perhaps a hint such as the address of one page ending in /en and the other ending in /fr. According to Macduff Hughes, chief engineer on Google Translate, a simple approach using vast amounts of data seemed more promising than a clever one with fewer data.

Training on parallel texts (which linguists call corpora, the plural of corpus) creates a "translation model" that generates not one but a series of possible translations in the target language. The next step is running these possibilities through a monolingual language model in the target language. This is, in effect, a set of expectations about what a well-formed and typical sentence in the target language is likely to be. Single-language models are not too hard to build. (Parallel human-translated corpora are hard to come by; large amounts of monolingual training data are not.) As with the translation model, the language model uses a brute-force statistical approach to learn from the training data, then ranks the outputs from the translation model in order of plausibility.

Statistical machine translation rekindled optimism in the field. Internet users quickly discovered that Google Translate was far better than the rules-based online engines they had used before, such as BabelFish. Such systems still make mistakes—sometimes minor, sometimes hilarious, sometimes so serious or so many as to make nonsense of the result. And language pairs like Chinese-English, which are unrelated and structurally quite different, make accurate translation harder than pairs of related languages ►

▶ like English and German. But more often than not, Google Translate and its free online competitors, such as Microsoft's Bing Translator, offer a usable approximation.

Such systems are set to get better, again with the help of deep learning from digital neural networks. The Association for Computational Linguistics has been holding workshops on MT every summer since 2006. One of the events is a competition between MT engines turned loose on a collection of news text. In August 2016, in Berlin, neural-net-based MT systems were the top performers (out of 102), a first.

Now Google has released its own neural-net-based engine for eight language pairs, closing much of the quality gap between its old system and a human translator. This is especially true for closely related languages (like the big European ones) with lots of available training data. The results are still distinctly imperfect, but far smoother and more accurate than before. Translations between English and (say) Chinese and Korean are not as good yet, but the neural system has brought a clear improvement here too.

### The Coca-Cola factor

Neural-network-based translation actually uses two networks. One is an encoder. Each word of an input sentence is converted into a multidimensional vector (a series of numerical values), and the encoding of each new word takes into account what has happened earlier in the sentence. Marcello Federico of Italy's Fondazione Bruno Kessler, a private research organisation, uses an intriguing analogy to compare neural-net translation with the phrase-based kind. The latter, he says, is like describing Coca-Cola in terms of sugar, water, caffeine and other ingredients. By contrast, the former encodes features such as liquidness, darkness, sweetness and fizziness.

Once the source sentence is encoded, a decoder network generates a word-for-word translation, once again taking account of the immediately preceding word. This can cause problems when the meaning of words such as pronouns depends on words mentioned much earlier in a long sentence. This problem is mitigated by an "attention model", which helps maintain focus on other words in the sentence outside the immediate context.

Neural-network translation requires heavy-duty computing power, both for the original training of the system and in use. The heart of such a system can be the GPUs that made the deep-learning revolution possible, or specialised hardware like Google's Tensor Processing Units (TPUs). Smaller translation companies and researchers usually rent this kind of processing power in the cloud. But the data sets used in neural-network training do not need to be as extensive as those for phrase-based systems, which should give smaller outfits a chance to compete with giants like Google.

Fully automated, high-quality machine translation is still a long way off. For now, several problems remain. All current machine translations proceed sentence by sentence. If the translation of such a sentence depends on the meaning of earlier ones, automated systems will make mistakes. Long sentences, despite tricks like the attention model, can be hard to translate. And neural-net-based systems in particular struggle with rare words.

Training data, too, are scarce for many language pairs. They are plentiful between European languages, since the European Union's institutions churn out vast amounts of material translated by humans between the EU's 24 official languages. But for smaller languages such resources are thin on the ground. For example, there are few Greek-Urdu parallel texts available on which to train a translation engine. So a system that claims to offer such translation is in fact usually running it through a bridging language, nearly always English. That involves two translations rather than one, multiplying the chance of errors.

Even if machine translation is not yet perfect, technology can already help humans translate much more quickly and accurately. "Translation memories", software that stores already translated words and segments, first came into use as early as the 1980s. For someone who frequently translates the same kind of material (such as instruction manuals), they serve up the bits that have already been translated, saving lots of duplication and time.

A similar trick is to train MT engines on text dealing with a narrow real-world domain, such as medicine or the law. As software techniques are refined and computers get faster, training becomes easier and quicker. Free software such as Moses, developed with the support of the EU and used by some of its in-house translators, can be trained by anyone with parallel corpora to hand. A specialist in medical translation, for instance, can train the system on medical translations only, which makes them far more accurate.

At the other end of linguistic sophistication, an MT engine can be optimised for the shorter and simpler language people use in speech to spew out rough but near-instantaneous speech-to-speech translations. This is what Microsoft's Skype Translator does. Its quality is improved by being trained on speech (things like film subtitles and common spoken phrases) rather than the kind of parallel text produced by the European Parliament.

Translation management has also benefited from innovation, with clever software allowing companies quickly to combine the best of MT, translation memory, customisation by the individual translator and so on. Translation-management software aims to cut out the agencies that have been acting as middlemen between clients and an army of freelance translators. Jack Welde, the founder of Smartling, an industry favourite, says that in future translation customers will choose how much human intervention is needed for a translation. A quick automated one will do for low-►



► stakes content with a short life, but the most important content will still require a fully hand-crafted and edited version. Noting that MT has both determined boosters and committed detractors, Mr Welde says he is neither: "If you take a dogmatic stance, you're not optimised for the needs of the customer."

Translation software will go on getting better. Not only will engineers keep tweaking their statistical models and neural networks, but users themselves will make improvements to their own systems. For example, a small but much-admired startup, Lilt, uses phrase-based MT as the basis for a translation, but an easy-to-use interface allows the translator to correct and improve the MT system's output. Every time this is done, the corrections are fed back into the translation engine, which learns and improves in real time. Users can build several different memories—a medical one, a financial one and so on—which will help with future translations in that specialist field.

TAUS, an industry group, recently issued a report on the state of the translation industry saying that "in the past few years the translation industry has burst with new tools, platforms and solutions." Earlier this year Jaap van der Meer, TAUS's founder and director, wrote a provocative blogpost entitled "The Future Does Not Need Translators", arguing that the quality of MT will keep improving, and that for many applications less-than-perfect translation will be good enough.

The "translator" of the future is likely to be more like a quality-control expert, deciding which texts need the most attention to detail and editing the output of MT software. That may be necessary because computers, no matter how sophisticated they have become, cannot yet truly grasp what a text means. ■

## Computer translation is still known as "machine translation"

cold today?" The assistants know a few things about users, such as where they live and who their family are, so they can be personal, too: "How's my commute looking?" "Text my wife I'll be home in 15 minutes."

And they get better with time. Apple's Siri receives 2bn requests per week, which (after being anonymised) are used for further teaching. For example, Apple says Siri knows every possible way that users ask about a sports score. She also has a delightful answer for children who ask about Father Christmas. Microsoft learned from some of its previous natural-language platforms that about 10% of human interactions were "chitchat", from "tell me a joke" to "who's your daddy?", and used such chat to teach its digital assistant, Cortana.

The writing team for Cortana includes two playwrights, a poet, a screenwriter and a novelist. Google hired writers from Pixar, an animated-film studio, and *The Onion*, a satirical newspaper, to make its new Google Assistant funnier. No wonder people often thank their digital helpers for a job well done. The assistants' replies range from "My pleasure, as always" to "You don't need to thank me."

### Good at grammar

How do natural-language platforms know what people want? They not only recognise the words a person uses, but break down speech for both grammar and meaning. Grammar parsing is relatively advanced; it is the domain of the well-established field of "natural-language processing". But meaning comes under the heading of "natural-language understanding", which is far harder.

First, parsing. Most people are not very good at analysing the syntax of sentences, but computers have become quite adept at it, even though most sentences are ambiguous in ways humans are rarely aware of. Take a sign on a public fountain that says, "This is not drinking water." Humans understand it to mean that the water ("this") is not a certain kind of water ("drinking water"). But a computer might just as easily parse it to say that "this" (the fountain) is not at present doing something ("drinking water").

As sentences get longer, the number of grammatically possible but nonsensical options multiplies exponentially. How can a machine parser know which is the right one? It helps for it to know that some combinations of words are more common than others: the phrase "drinking water" is widely used, so parsers trained on large volumes of English will rate those two words as likely to be joined in a noun phrase. And some structures are more common than others: "noun verb noun noun" may be much more common than "noun noun verb noun". A machine parser can compute the overall probability of all combinations and pick the likeliest.

A "lexicalised" parser might do even better. Take the Groucho Marx joke, "One morning I shot an elephant in my pyjamas. How he got in my pyjamas, I'll never know." The first sentence is ambiguous (which makes the joke)—grammatically both "I" and "an elephant" can attach to the prepositional phrase "in my pyjamas". But a lexicalised parser would recognise that "I [verb phrase] in my pyjamas" is far more common than "elephant in my pyjamas", and so assign that parse a higher probability.

But meaning is harder to pin down than syntax. "The boy kicked the ball" and "The ball was kicked by the boy" have the same meaning but a different structure. "Time flies like an arrow" can mean either that time flies in the way that an arrow flies, or that insects called "time flies" are fond of an arrow.

"Who plays Thor in 'Thor'?" Your correspondent could not remember the beefy Australian who played the eponymous Norse god in the Marvel superhero film. But when he asked his iPhone, Siri came up with an unexpected reply: "I don't see any movies matching 'Thor' playing in Thor, IA, US, today." Thor, Iowa, with a population of 184, was thousands of miles away, and "Thor", the film, has been out of cinemas for years. Siri parsed the question perfectly properly, but the reply was absurd, violating the rules of what linguists call pragmatics: the shared knowledge and under-►

### Meaning and machine intelligence

## What are you talking about?

**Machines still cannot conduct proper conversations with humans because they do not understand the world**

**I**N "BLACK MIRROR", a British science-fiction satire series set in a dystopian near future, a young woman loses her boyfriend in a car accident. A friend offers to help her deal with her grief. The dead man was a keen social-media user, and his archived accounts can be used to recreate his personality. Before long she is messaging with a facsimile, then speaking to one. As the system learns to mimic him ever better, he becomes increasingly real.

This is not quite as bizarre as it sounds. Computers today can already produce an eerie echo of human language if fed with the appropriate material. What they cannot yet do is have true conversations. Truly robust interaction between man and machine would require a broad understanding of the world. In the absence of that, computers are not able to talk about a wide range of topics, follow long conversations or handle surprises.

Machines trained to do a narrow range of tasks, though, can perform surprisingly well. The most obvious examples are the digital assistants created by the technology giants. Users can ask them questions in a variety of natural ways: "What's the temperature in London?" "How's the weather outside?" "Is it going to be

► standing that people use to make sense of the often messy human language they hear. “Can you reach the salt?” is not a request for information but for salt. Natural-language systems have to be manually programmed to handle such requests as humans expect them, and not literally.

### Multiple choice

Shared information is also built up over the course of a conversation, which is why digital assistants can struggle with twists and turns in conversations. Tell an assistant, “I’d like to go to an Italian restaurant with my wife,” and it might suggest a restaurant. But then ask, “is it close to her office?”, and the assistant must grasp the meanings of “it” (the restaurant) and “her” (the wife), which it will find surprisingly tricky. Nuance, the language-technology firm, which provides natural-language platforms to many other companies, is working on a “concierge” that can handle this type of challenge, but it is still a prototype.

Such a concierge must also offer only restaurants that are open. Linking requests to common sense (knowing that no one wants to be sent to a closed restaurant), as well as a knowledge of the real world (knowing which restaurants are closed), is one of the most difficult challenges for language technologies.

Common sense, an old observation goes, is uncommon enough in humans. Programming it into computers is harder still.

Fernando Pereira of Google points out why. Automated speech recognition and machine translation have something in common: there are huge stores of data (recordings and transcripts for speech recognition, parallel corpora for translation) that can be used to train machines. But there are no training data for common sense.

Knowledge of the real world is another matter. AI has helped data-rich companies such as America’s West-Coast tech giants organise much of the world’s information into interactive databases such as Google’s Knowledge Graph. Some of the content of that appears in a box to the right of a Google page of search results for a famous figure or thing. It knows that Jacob Bernoulli studied at the University of Basel (as did other people, linked to Bernoulli through this node in the Graph) and wrote “On the Law of Large Numbers” (which it knows is a book).

Organising information this way is not difficult for a company with lots of data and good AI capabilities, but linking information to language is hard. Google touts its assistant’s ability to answer questions like “Who was president when the Rangers won the World Series?” But Mr Pereira concedes that this was the result of explicit training. Another such complex query—“What was the population of London when Samuel Johnson wrote his dictionary?”—would flummox the assistant, even though the Graph knows about things like the historical population of London and the date of Johnson’s dictionary. IBM’s Watson system, which in

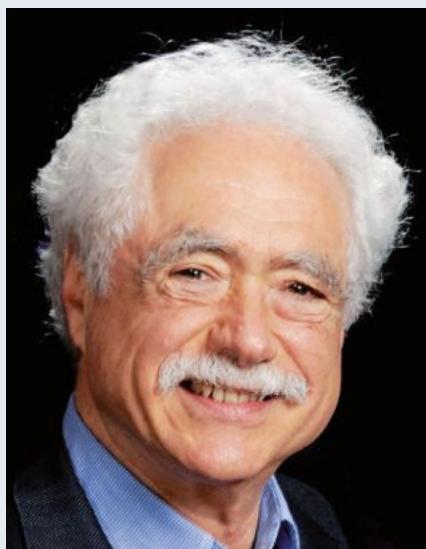
## Brain scan | Terry Winograd

### The Winograd Schema tests computers’ “understanding” of the real world

THE Turing Test was conceived as a way to judge whether true artificial intelligence has been achieved. If a computer can fool humans into thinking it is human, there is no reason, say its fans, to say the machine is not truly intelligent.

Few giants in computing stand with Turing in fame, but one has given his name to a similar challenge: Terry Winograd, a computer scientist at Stanford. In his doctoral dissertation Mr Winograd posed a riddle for computers: “The city councilmen refused the demonstrators a permit because they feared violence. Who feared violence?”

It is a perfect illustration of a well-recognised point: many things that are easy for humans are crushingly difficult for computers. Mr Winograd went into AI research in the 1960s and 1970s and developed an early natural-language program called SHRDLU that could take commands and answer questions about a group of shapes it could manipulate: “Find a block which is taller than the one you are holding and put it into the box.” This work brought a jolt of optimism to the AI crowd, but Mr Winograd later fell out with them, devoting himself not to making machines intelligent but to making them better at helping human beings. (These camps are sharply divided by philosophy and academic pride.) He taught Larry Page at Stanford, and after



Mr Page went on to co-found Google, Mr Winograd became a guest researcher at the company, helping to build Gmail.

In 2011 Hector Levesque of the University of Toronto became annoyed by systems that “passed” the Turing Test by joking and avoiding direct answers. He later asked to borrow Mr Winograd’s name and the format of his dissertation’s puzzle to pose a more genuine test of machine “understanding”: the Winograd Schema. The answers to its battery of

questions were obvious to humans but would require computers to have some reasoning ability and some knowledge of the real world. The first official Winograd Schema Challenge was held this year, with a \$25,000 prize offered by Nuance, the language-software company, for a program that could answer more than 90% of the questions correctly. The best of them got just 58% right.

Though officially retired, Mr Winograd continues writing and researching. One of his students is working on an application for Google Glass, a computer with a display mounted on eyeglasses. The app would help people with autism by reading the facial expressions of conversation partners and giving the wearer information about their emotional state. It would allow him to integrate linguistic and non-linguistic information in a way that people with autism find difficult, as do computers.

Asked to trick some of the latest digital assistants, like Siri and Alexa, he asks them things like “Where can I find a nightclub my Methodist uncle would like?”, which requires knowledge about both nightclubs (which such systems have) and Methodist uncles (which they don’t). When he tried “Where did I leave my glasses?”, one of them came up with a link to a book of that name. None offered the obvious answer: “How would I know?”

► 2011 beat two human champions at the quiz show "Jeopardy!", succeeded mainly by calculating huge numbers of potential answers based on key words by probability, not by a human-like understanding of the question.

Making real-world information computable is challenging, but it has inspired some creative approaches. Cortical.io, a Vienna-based startup, took hundreds of Wikipedia articles, cut them into thousands of small snippets of information and ran an "unsupervised" machine-learning algorithm over it that required the computer not to look for anything in particular but to find patterns. These patterns were then represented as a visual "semantic fingerprint" on a grid of 128x128 pixels. Clumps of pixels in similar places represented semantic similarity. This method can be used to disambiguate words with multiple meanings: the fingerprint of "organ" shares features with both "liver" and "piano" (because the word occurs with both in different parts of the training data). This might allow a natural-language system to distinguish between pianos and church organs on one hand, and livers and other internal organs on the other.

Proper conversation between humans and machines can be seen as a series of linked challenges: speech recognition, speech synthesis, syntactic analysis, semantic analysis, pragmatic understanding, dialogue, common sense and real-world knowledge. Because all the technologies have to work together, the chain as a whole is only as strong as its weakest link, and the first few of these are far better developed than the last few.

The hardest part is linking them together. Scientists do not know how the human brain draws on so many different kinds of knowledge at the same time. Programming a machine to replicate that feat is very much a work in progress. ■



## What machines cannot yet do is have true conversations

lack of anything challenging to do would be harmful to people.

Fortunately, the tasks that talking machines can take off humans' to-do lists are the sort that many would happily give up. Machines are increasingly able to handle difficult but well-defined jobs. Soon all that their users will have to do is pipe up and ask them, using a naturally phrased voice command. Once upon a time, just one tinkerer in a given family knew how to work the computer or the video recorder. Then graphical interfaces (icons and a mouse) and touchscreens made such technology accessible to everyone. Frank Chen of Andreessen Horowitz, a venture-capital firm, sees natural-language interfaces between humans and machines as just another step in making information and services available to all. Silicon Valley, he says, is enjoying a golden age of AI technologies. Just as in the early 1990s companies were piling online and building websites without quite knowing why, now everyone is going for natural language. Yet, he adds, "we're in 1994 for voice."

1995 will soon come. This does not mean that people will communicate with their computers exclusively by talking to them. Websites did not make the telephone obsolete, and mobile devices did not make desktop computers obsolete. In the same way, people will continue to have a choice between voice and text when interacting with their machines.

Not all will choose voice. For example, in Japan yammering into a phone is not done in public, whether the interlocutor is a human or a digital assistant, so usage of Siri is low during business hours but high in the evening and at the weekend. For others, voice-enabled technology is an obvious boon. It allows dyslexic people to write without typing, and the very elderly may find it easier to talk than to type on a tiny keyboard. The very young, some of whom today learn to type before they can write, may soon learn to talk to machines before they can type.

Those with injuries or disabilities that make it hard for them to write will also benefit. Microsoft is justifiably proud of a new device that will allow people with amyotrophic lateral sclerosis (ALS), which immobilises nearly all of the body but leaves the mind working, to speak by using their eyes to pick letters on a screen. The critical part is predictive text, which improves as it gets used to a particular individual. An experienced user will be able to "speak" at around 15 words per minute.

People may even turn to machines for company. Microsoft's Xiaoice, a chatbot launched in China, learns to come up with the responses that will keep a conversation going longest. Nobody would think it was human, but it does make users open up in surprising ways. Jibo, a new "social robot", is intended to tell children stories, help far-flung relatives stay in touch and the like.

Another group that may benefit from technology is smaller language communities. Networked computers can encourage a winner-take-all effect: if there is a lot of good software and content in English and Chinese, smaller languages become less valuable online. If they are really tiny, their very survival may be at stake. But Ross Perlin of the Endangered Languages Alliance notes that new software allows researchers to document small languages more quickly than ever. With enough data comes the possibility of developing resources—from speech recognition to interfaces with software—for smaller and smaller languages. The Silicon Valley giants already localise their services in dozens of languages; neural networks and other software allow new versions to be generated faster and more efficiently than ever.

There are two big downsides to the rise in natural-language technologies: the implications for privacy, and the disruption it will bring to many jobs.

Increasingly, devices are always listening. Digital assistants like Alexa, Cortana, Siri and Google Assistant are programmed to wait for a prompt, such as "Hey, Siri" or "OK, Google", to activate them. But allowing always-on microphones into people's pockets and homes amounts to a further erosion of traditional expectations of privacy. The same might be said for all the ways in which language ►

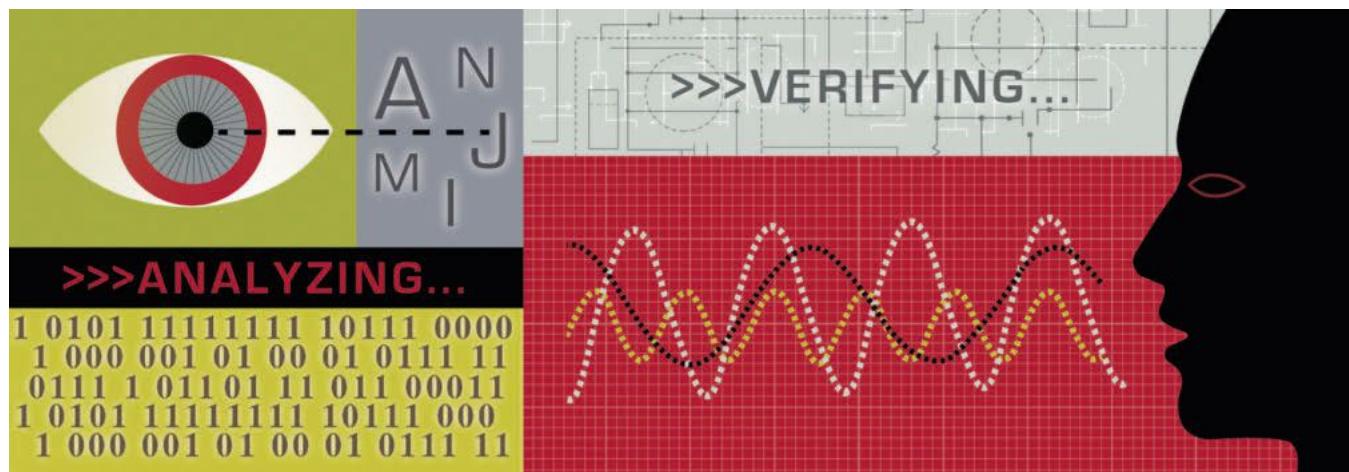
### Looking ahead

## For my next trick

### Talking machines are the new must-haves

**I**N "WALL-E", an animated children's film set in the future, all humankind lives on a spaceship after the Earth's environment has been trashed. The humans are whisked around in intelligent hovering chairs; machines take care of their every need, so they are all morbidly obese. Even the ship's captain is not really in charge; the actual pilot is an intelligent and malevolent talking robot, Auto, and like so many talking machines in science fiction, he eventually makes a grab for power.

Speech is quintessentially human, so it is hard to imagine machines that can truly speak conversationally as humans do without also imagining them to be superintelligent. And if they are superintelligent, with none of humans' flaws, it is hard to imagine them not wanting to take over, not only for their good but for that of humanity. Even in a fairly benevolent future like "WALL-E's", where the machines are doing all the work, it is easy to see that the



▶ software improves by training on a single user's voice, vocabulary, written documents and habits.

All the big companies' location-based services—even the accelerometers in phones that detect small movements—are making ever-improving guesses about users' wants and needs. The moment when a digital assistant surprises a user with "The chemist is nearby—do you want to buy more haemorrhoid cream, Steve?" could be when many may choose to reassess the trade-off between amazing new services and old-fashioned privacy. The tech companies can help by giving users more choice; the latest iPhone will not be activated when it is laid face down on a table. But hackers will inevitably find ways to get at some of these data.

#### Hey, Siri, find me a job

The other big concern is for jobs. To the extent that they are routine, they face being automated away. A good example is customer support. When people contact a company for help, the initial encounter is usually highly scripted. A company employee will verify a customer's identity and follow a decision-tree. Language technology is now mature enough to take on many of these tasks.

For a long transition period humans will still be needed, but the work they do will become less routine. Nuance, which sells lots of automated online and phone-based help systems, is bullish on voice biometrics (customers identifying themselves by saying "my voice is my password"). Using around 200 parameters for identifying a speaker, it is probably more secure than a fingerprint, says Brett Beranek, a senior manager at the company. It will also eliminate the tedium, for both customers and support workers, of going through multi-step identification procedures with PINs, passwords and security questions. When Barclays, a British bank, offered it to frequent users of customer-support services, 84% signed up within five months.

Digital assistants on personal smartphones can get away with mistakes, but for some business applications the tolerance for error is close to zero, notes Nikita Ivanov. His company, Datalingvo, a Silicon Valley startup, answers questions phrased in natural language about a company's business data. If a user wants to know which online ads resulted in the most sales in California last month, the software automatically translates his typed question into a database query. But behind the scenes a human working for Datalingvo vets the query to make sure it is correct. This is because the stakes are high: the technology is bound to make mistakes in its early days, and users could make decisions based on bad data.

This process can work the other way round, too: rather than natural-language input producing data, data can produce language. Arria, a company based in London, makes software into which a spreadsheet full of data can be dragged and dropped, to be turned automatically into a written description of the contents, complete with trends. Matt Gould, the company's chief strategy

officer, likes to think that this will free chief financial officers from having to write up the same old routine analyses for the board, giving them time to develop more creative approaches.

Carl Benedikt Frey, an economist at Oxford University, has researched the likely effect of artificial intelligence on the labour market and concluded that the jobs most likely to remain immune include those requiring creativity and skill at complex social interactions. But not every human has those traits. Call centres may need fewer people as more routine work is handled by automated systems, but the trickier inquiries will still go to humans.

Much of this seems familiar. When Google search first became available, it turned up documents in seconds that would have taken a human operator hours, days or years to find. This removed much of the drudgery from being a researcher, librarian or journalist. More recently, young lawyers and paralegals have taken to using e-discovery. These innovations have not destroyed the professions concerned but merely reshaped them.

Machines that relieve drudgery and allow people to do more interesting jobs are a fine thing. In net terms they may even create extra jobs. But any big adjustment is most painful for those least able to adapt. Upheavals brought about by social changes—like the emancipation of women or the globalisation of labour markets—are already hard for some people to bear. When those changes are wrought by machines, they become even harder, and all the more so when those machines seem to behave more and more like humans. People already treat inanimate objects as if they were alive: who has never shouted at a computer in frustration? The more that machines talk, and the more that they seem to understand people, the more their users will be tempted to attribute human traits to them.

That raises questions about what it means to be human. Language is widely seen as humankind's most distinguishing trait. AI researchers insist that their machines do not think like people, but if they can listen and talk like humans, what does that make them? As humans teach ever more capable machines to use language, the once-obvious line between them will blur. ■

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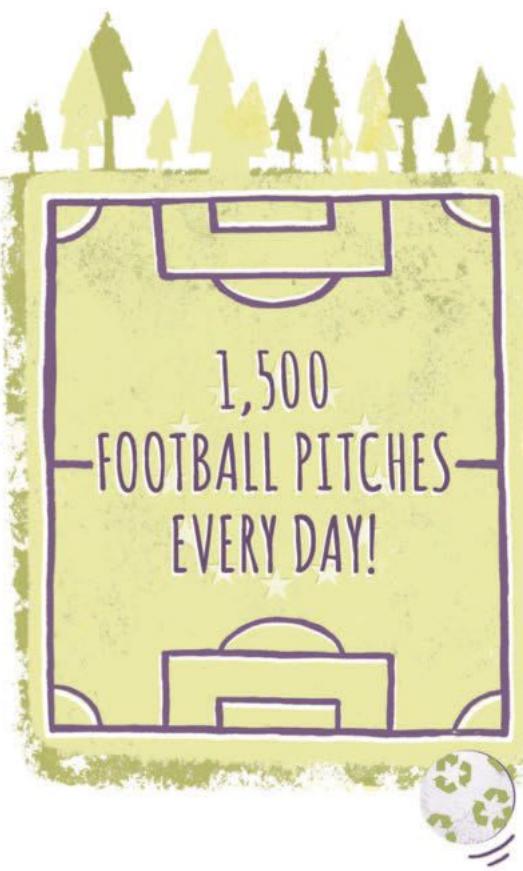
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## Terror in Turkey

## From celebration to carnage

ISTANBUL

### An Islamic State attack on a nightclub widens the secular-religious divide

**A**FTER a year of terrorist attacks and a violent coup attempt, Istanbul residents are getting used to the sound of explosions. When blasts rang out near the city's best-known nightclub just after 1am on January 1st, some thought they were new-year pyrotechnics. Yet the skies above them were empty. A massacre was unfolding below. By the time it was over at least 39 people, mostly foreigners, were dead, and dozens more wounded. Autopsies suggested that many had been shot at close range. Some saved themselves by leaping into the Bosphorus. As *The Economist* went to press the attacker, a suspected follower of Islamic State (is), had not been caught.

IS has carried out at least eight big attacks in Turkey, including the deadliest in the country's history, a suicide-bombing that killed more than 100 people in October 2015. The nightclub attack is the first it has undisputedly claimed. In an online statement the group praised the shooting as an attack on an "apostate" celebration and revenge for a Turkish offensive against it in Syria. Turkey's army cleared IS from strongholds overlooking the border in early September, and fighting continues near al-Bab, a town north-east of Aleppo.

Under pressure in Syria, IS has struck back by destabilising Turkey. The group's earliest attacks in 2015 helped to reignite a war between Kurdish militants and Turkey's armed forces. A second wave scared away tourists and fanned resentment of

the 2.8m Syrian refugees living in Turkey. The latest, which hit a venue where celebrities dance and drink alongside foreigners and the monied elite, threatens to inflame tensions between Islamists and secular Turks, many of whom blame the pro-Islamist government for the spread of extremism. "Islamic State reads Turkish society very well and it knows to strike at the key pressure points," says Hilmi Demir, an expert on Muslim sects and radicalisation.

Those pressure points are multiplying. Instead of healing his divided country after the coup in July, Turkey's president, Recep Tayyip Erdogan, cracked down on his opponents, including Kurdish activists, leftists and secularists. Official discourse is increasingly conservative. In December the country's religious-affairs directorate, the Diyanet, joined Islamist groups in proclaiming that new-year festivities were "alien" to Turkish values. Meanwhile, a group of young ultranationalists staged a protest at which they pretended to hold Santa Claus—that unwelcome Western intruder—at gunpoint.

### Losing the plot

Many Turkish conservatives refuse to admit that innocents, including Muslims, are being murdered by a group acting in the name of Islam. They prefer conspiracy theories. A pro-government newspaper claimed the attack on New Year's Day was the work of a "mastermind", shorthand for

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an alliance of Western powers. An MP from the governing party blamed—who else?—the CIA.

The shooting also raised questions of accountability. More than 400 lives have been lost in big terrorist attacks since the summer of 2015, yet not one minister has resigned. Just over a week before the nightclub attack, Russia's ambassador was fatally shot by an off-duty Turkish policeman. The government says it foiled 339 attacks last year. But it has also used the war on terrorism as an excuse to silence critics. In December authorities detained a *Wall Street Journal* reporter for three nights, allegedly for retweeting an image from an IS murder video. Days later they arrested an investigative reporter, Ahmet Sik, on farcical terrorism charges. Since the coup, more than 100 journalists have been locked up.

Largely because of the state's control over religious debate, support for IS among Turks is minimal. Yet the group is determined to pit Turkey's traditionally tolerant brand of Islam against an emboldened fundamentalist fringe. It wants to galvanise those Islamists who condemn secular ways of life, says Rusen Cakir, a journalist. "They want to transform Turkey into a battlefield," he says.

The New Year's Day attack could serve as a wake-up call. The ruling Justice and Development party is realising that polarisation can win elections "but that it makes the country ungovernable," says Ozgur Hırsıçıklı, head of the Ankara office of the German Marshall Fund, a think-tank. The Diyanet has declared that an attack on a nightclub is as reprehensible as an attack on a mosque. Mr Erdogan himself has warned against allowing the fault lines in Turkish society to widen, which is exactly what IS wants. Alas, Mr Erdogan's populist authoritarianism, jingoism and repression are only wedging them further apart. ■

## America's new Russia sanctions

## Feint praise

MOSCOW

## As Putin outmanoeuvres Obama, Trump applauds

IT WAS Vladimir Putin as we have come to know him: unpredictable, cynical and skilful at trumping real events with propaganda. On December 29th Barack Obama expelled 35 Russian diplomats involved in intelligence work (along with their families), ordered two Russian diplomatic compounds in America closed, and imposed fresh sanctions against Russian security agencies and a list of individuals. Mr Obama was retaliating for Russian interference in America's elections, which included hacking the computers of high-level Democratic Party officials and leaking the embarrassing contents to the press. The White House expected Russia to eject an equal number of American diplomats. Instead, Mr Putin responded asymmetrically, parrying the American action and mocking Mr Obama as a bitter loser.

Mr Putin's performance was carefully choreographed. In the first move Sergei Lavrov, the foreign minister, appeared on state television to declare that Russia would respond to America's actions in kind. The foreign ministry and other agencies, he said, had proposed to Mr Putin that 31 diplomats from the American embassy and four diplomats from the consulate in St Petersburg be declared *personae non gratae*. Mr Lavrov also recommended shutting down the American embassy's dacha in a wooded Moscow park.

In the second move, Mr Putin publicly overruled his foreign minister. While America's actions were "unfriendly" and "provocative", and merited the toughest response, Mr Putin said, he would not "resort to irresponsible 'kitchen' diplomacy" but would instead plan steps for improved relations with the incoming president, Donald Trump. Moreover, he would not punish the children of American diplomats for the tensions between the two countries. Instead, he invited them to a Christmas and New Year's Day show at the Kremlin. He then wished Mr Obama and Mr Trump a happy new year.

Russian state television, which has been pumping out anti-American propaganda for years, quickly seized on a new narrative. "The provocation has failed," announced a news anchor on Channel One. Mr Obama had found himself "in a puddle", while Mr Putin had displayed diplomatic "mastery at the world level". The invocation of Christmas and family seemed a backhanded jab at Mr Obama's pacific reputation and his public displays

## Motorway charges

## Another European crisis

KIEFERSFELDEN

## One continent, divided by lots of toll booths

EVERY winter, northern Europeans bound for ski holidays zip insouciantly through the Netherlands, Belgium and Germany on motorways that are free of charge. But near the borders of Austria or Switzerland they must pull over to buy stickers so that they can drive on the Alpine motorways—even as Austrian and Swiss cars zoom in the opposite direction onto Germany's free Autobahn. To the perceived injustices in the European Union (EU), add another: the nuisances of a quilt of road-tolls.

Bavarians are particularly cranky. If you live in Munich, say, work and play extend naturally across the border. Hence the grousing about paying on Austrian roads while Austrians "free-ride" on Bavarian ones. In 2013 the CSU, a regional party that governs Bavaria, made fixing "this unfair situation" a condition for joining the coalition of the chancellor, Angela Merkel. The CSU's Alexander Dobrindt, who became transport minister, got to work.

He knew that his biggest hurdle would be the EU, which forbids discriminating against the citizens of other member states. So he came up with two nominally separate laws. In one, everyone, German or foreign, would be charged a new road toll, like Austria's. In the other, Germans would get a cut in their vehicle tax that miraculously equals the price of the new toll. In effect, only foreigners would have paid more to use the Autobahn. That was a bit too cheeky for the European Commission, which in 2015 flashed a stop sign in front of Mr Dobrindt. But now he has struck a compromise with Brussels. The proposed toll

will be cheaper, and the tax relief for Germans better disguised.

That still has other Europeans fuming about Bavarian harassment aimed at them. Austria and the Netherlands, possibly joined by Denmark and Belgium, may sue Germany before the European Court of Justice. A Bavarian pet peeve has thus escalated to crisis diplomacy. "We in Austria are very unhappy about this," Christian Kern, the Austrian chancellor, said in December. "This is a stress test for good German-Austrian relations." Mr Dobrindt retorted: "I have little sympathy for this toll-whingeing, especially when it comes from Austria." It seems that the EU will always find new ways to puncture its own tyres.



of affection for children. The media stunt earned an unctuous tweet from Mr Trump: "Great move on delay (by V. Putin)—I always knew he was very smart!"

Mr Trump's tweet added to the mystery of his apparent infatuation with Mr Putin and fuelled anxiety about Russia's ability to undermine American democracy. Yet for pro-Western Russian liberals, the panicked attitude of some of America's mainstream media was equally discomfiting. It seemed a mirror image of Russia's own hysteria about the role of America in sowing chaos and staging colour revolutions in Russia's back yard.

"In the eyes of the West, Russia appears to be the source of most uncomfortable social changes," wrote Maxim Trudolyubov in a column in *Vedomosti*, an independent

daily. "As a Russian, it is amusing to watch this. The West now identifies all its problems with 'Russia', just as Russia identifies all its problems with 'the West'."

Americans' treatment of Russia as a bogeyman fills Mr Putin's supporters with pride. They see it as a sign of Russia's renewed great-power status. But while the Kremlin may be benefiting from fears of its influence in the short term, it is unclear how it plans to turn those fears to its longer-term advantage. Mr Putin has long depended on fear of America as a mighty enemy to reinforce his hold on power. Kicking the outgoing Mr Obama may be a poor substitute. Paradoxically, Mr Trump's dismissal of Russian influence could be more harmful to the Kremlin's narrative than fears of its interference. ■

## Spain and Catalonia

# Catalexit?

BARCELONA

## A search for a face-saving deal to avoid another unsettling referendum

**I**F YOU look up from the bustle of the winter tourists thronging the streets of Barcelona, you will see some balconies draped with the *estelada*, a blend of the Catalan and Cuban flags that has become the banner of those who want their land to become independent. There are fewer than there once were, but still enough to inspire the Catalan regional government's pledge to hold a binding referendum on independence in 2017. Since the Spanish government refuses to contemplate such a vote, a confrontation seems inevitable.

Indeed, it has already begun. Some 300 Catalan officials face court cases for flouting the law, in acts ranging from a previous unilateral effort in 2014 to organise an independence vote to petty protests, such as flying the *estelada* from town halls. Carles Puigdemont, the president of the Generalitat (the Catalan government), promises to push through "laws of disconnection" this summer, such as one setting up its own tax agency, prior to holding a referendum, probably in September. His pro-independence coalition has a majority in the Catalan parliament. On December 14th Spain's Constitutional Tribunal warned the Generalitat that the referendum would be illegal. Spain could face unprecedented defiance of its democratic constitution.

How has it come to this? Spain's constitution of 1978 gave Catalonia, one of the country's most prosperous regions, more self-government than almost any other part of Europe. The Generalitat controls not just schools and hospitals but police and prisons. It has made Catalan the main language of teaching. Under Jordi Pujol, the skilful moderate nationalist *cacique* (political boss) who headed the Generalitat from 1980 to 2003, Catalonia was content with this settlement, using its votes in the Madrid parliament to extract increments to its powers and revenues.

Two things upset matters. The first was when the Constitutional Tribunal in 2010 watered down a new autonomy statute, which recognised Catalonia's sense of nationhood and granted additional legal powers to the Generalitat. It had been approved by referendum in Catalonia and by the Spanish parliament. The second factor was the economic crisis after the bursting of Spain's property bubble in 2008.

In 2012 demonstrators against austerity began to put the blame on Madrid, rather than Artur Mas, Mr Pujol's heir. Support for independence surged from less than

25% to more than 45%. "Society moved towards more radical positions," thinks Joan Culla, a historian. Others see this as at least in part induced by the Generalitat, with its money and powerful communications machine. It allowed the nationalists to keep power, despite budget cuts and revelations that for decades they had taken rake-offs on public contracts.

Catalan society remains split. "There aren't the numbers to advance [to independence] but there's enough to make a lot of noise," says Jordi Alberich of the Cercle d'Economia, a business group.

### Best of enemies

This stand-off has been politically profitable not just for the Catalan nationalists but also for Mariano Rajoy, Spain's prime minister, and his conservative People's Party. His staunch defence of his country's territorial unity is popular in most places outside Catalonia. For years Mr Rajoy did nothing to respond to Catalan grievances, some of which are justified. Catalonia pays more into the central kitty than it gets back, but its transport systems have been neglected while Madrid has spiffy metro lines and a surfeit of motorways.

Yet weariness with the deadlock has taken hold, in both Barcelona and Madrid. Last month Mr Rajoy put his deputy, Soraya Sáenz de Santamaría, in charge of the Catalan question. She is putting feelers out to the Generalitat. Mr Puigdemont has published a list of 46 points to negotiate. It

starts with the "binding referendum".

It is not hard to divine the contours of a deal. Mr Rajoy could offer concessions on financing and infrastructure. More controversially, he could propose recognising the Catalan language or that Catalonia is a nation within Spain.

The toughest issue is the referendum. This is no moment to contemplate any sort of plebiscite with equanimity. Catalan nationalists claim to be exemplary pro-Europeans. But there are many echoes of Brexit in Catalonia. Instead of Brussels, it is Madrid the nationalists accuse of stealing Catalans' money. They argue that independence would be quick and easy. "The great growth in support for independence from 2012 was the first manifestation of populism in Spain," says Javier Cercas, a writer who lives in Barcelona.

Mr Puigdemont insists that blocking the referendum "would be bad news for democracy". He is prepared to negotiate its timing. But he adds: "We won't easily renounce it. I think we've earned the right to be heard." Some in Barcelona believe the Generalitat's leaders are searching for a dignified way to back down. Mr Puigdemont talks also of "constituent" elections to found a new state. But his party, clouded by corruption, may suffer. The Catalan variant of Spain's left-wing Podemos, which already runs Barcelona's city government and which is forming a new, broader, party, is likely to gain ground. It wants Catalonia to form part of a "plurinational" Spain, a cleverly vague formula.

"Is being part of Spain a problem in the daily life of Catalans?" asks Inés Arrimadas of Ciudadanos, an anti-nationalist party that leads the opposition in the Catalan parliament. "For us the problems of Catalonia are unemployment, poverty and corruption." The longer the deadlock lasts, the harder Mr Puigdemont may find it to persuade Catalans otherwise. ■



Let my pueblo go

# Charlemagne | Nailed it

How Luther's ideas have shaped Germany for half a millennium



**S**ET foot in Germany this year and you are likely to encounter the jowly, dour portrait of Martin Luther. With more than 1,000 events in 100 locations, the whole nation is celebrating the 500th anniversary of the monk issuing his 95 theses and (perhaps apocryphally) pinning them to the church door at Wittenberg. He set in motion a split in Christianity that would forever change not just Germany, but the world.

At home, Luther's significance is no longer primarily theological. After generations of secularisation, not to mention decades of official atheism in the formerly communist east (which includes Wittenberg), Germans are not particularly religious. But the Reformation was not just about God. It shaped the German language, mentality and way of life. For centuries the country was riven by bloody confessional strife; today Protestants and Catholics are each about 30% of the population. But after German unification in the 19th century, Lutheranism won the culture wars. "Much of what used to be typically Protestant we today perceive as typically German," says Christine Eichel, author of "*Deutschland, Lutherland*", a book about Luther's influence.

Start with aesthetics. For Luther this was, like everything else, a serious matter. He believed that Christians were guaranteed salvation through Jesus but had a duty to live in such a way as to deserve it. Ostentation was thus a disgraceful distraction from the asceticism required to examine one's own conscience. The traces of this severity live on in Germany's early 20th-century Bauhaus architecture, and even in the furniture styles at IKEA (from Lutheran Sweden). They can be seen in the modest dress, office decor and eating habits of Angela Merkel, the daughter of a Lutheran pastor, and of Joachim Gauck, Germany's president and a former pastor himself. Both may partake of the glitz of the French presidency while visiting Paris, but it would never pass in Berlin.

Luther shared his distaste for visual ornament with other Protestant reformers. But he differed in the role he saw for music. The Swiss Protestants John Calvin and Huldrych Zwingli viewed music as sensual temptation and frowned on it. But to Luther music was a divinely inspired weapon against the devil. He wanted believers to sing together—in German, in church and at home, and with instruments accompanying them. Today Germany has 130 publicly financed orchestras, more than any other country. And

concerts are still attended like sermons, sombrely and seriously.

Luther's inheritance can also be seen in the fact that Germany, the world's 17th-most populous country, has the second-largest book market after America's. After he translated the Bible into German, Luther wanted everyone, male or female, rich or poor, to read it. At first Protestants became more literate than Catholics; ultimately all Germans became bookish.

Finally, a familiar thesis links Luther to German attitudes towards money. In this view Catholics, used to confessing and being absolved after each round of sins, tend to run up debts (*Schulden*, from the same root as *Schuld*, or "guilt"), whereas Protestants see saving as a moral imperative. This argument, valid or not, has a familiar ring in southern Europe's mainly Catholic and Orthodox countries, which have spent the euro crisis enduring lectures on austerity from Wolfgang Schäuble, Germany's devoutly Lutheran finance minister.

Yet on money, too, Luther differed from other reformers. When Max Weber wrote of the Protestant work ethic in 1904, he had in mind Calvinism and its relatives, such as American Puritanism. Calvin viewed an individual's ability to get rich as a sign that God had predestined him to be saved. To Luther, Christians were already saved, so wealth was suspect. Instead of amassing it, Christians should work for their community, not themselves. Work (*Beruf*) thus became a calling (*Berufung*). Not profit but redistribution was the goal. According to Gerhard Wegner, a professor of theology, this "Lutheran socialism" finds secular expression in the welfare states of Scandinavia and Germany.

Luther's "subcutaneous" legacy keeps popping up in surprising places, says Mrs Eichel. Germans, and especially Lutherans, buy more life insurance but fewer shares than others (Luther didn't believe in making money without working for it). And everywhere they insist on conscientious observance of principle and order. They religiously separate their rubbish by the colour of glass and are world champions at recycling (65% of all waste), easily beating the second-place South Koreans.

## Holier than thou

Luther also shares blame for some negative qualities ascribed to Germans. He was deeply anti-Semitic, a prejudice his countrymen have shed at great cost (he blamed evil stares from Jews for the illness that eventually killed him). Germans' legendary obedience to authority is attributed to Luther's insistence on separating spiritual and worldly authorities (which princes in his day found useful in suppressing a peasants' revolt). And although personally fond of boisterous jokes, he was among the founding figures of Germany's rather humourless and preachy tradition of public discourse. Germans today are the first to bemoan their national habit of delivering finger-wagging lectures.

Such rigid moralism can make Germans hard to deal with, especially in Brussels, where the EU's problems demand a willingness to let misdemeanours slide. But there are worse traits than excessive morality. Besides, 500 years on, Lutheran Germany is being transformed by globalisation. Germany today has not only devout ascetics but everything from consumerist hipsters to Om-chanting yogis. A growing Muslim population is pushing the country towards a new kind of religious pluralism. Mrs Eichel herself finds German churches "too serious"; she attends one headed by an African-American gospel preacher. If the downside of Germans' Lutheran heritage is a difficulty in lightening up or accepting alternative lifestyles, they seem to be getting over it. ■



## Crime

## How low can it go?

**A decades-long fall in offending seems to be tapering off. Yet crime rates could drop even further in future**

MARY ANN COTTON was one of the great Victorian poisoners. She probably killed three of her four husbands, a lover, her mother and 11 of her 13 children. Arsenic was her weapon of choice. As the deaths mounted, the authorities became suspicious. Only when they tested the empty medicine bottles that littered her house and found evidence of arsenic was Cotton caught. She was tried and hanged in 1873. Today murder by poison is rare—dangerous substances are more tightly controlled and the accuracy of autopsies makes the crime harder to pull off. In the year to March 2015 only 11 people were killed in this way.

Poisoning is not the only offence almost to have disappeared. Since the mid-1990s Britain has seen a steady and dramatic decline in lawbreaking: the number of crimes has more than halved, according to the official Crime Survey for England and Wales. Vehicle theft has fallen by 86% and burglary by 71% since 1995. Violent crime has dropped by two-thirds and robberies by more than half. Even with the onset of the financial crisis in 2007 and the ensuing cuts to welfare and public services, including the police, Britain has grown ever safer.

The explanations range from the falling value of items once stolen, such as televisions, to clever policing and improved security. Ram-raiding, a once-common crime in which criminals crash cars or vans through the front of shops or banks in or-

der to loot them, is largely a thing of the past, says Nick Tilley, a criminologist at University College London, because of innovations such as the introduction of bollards in front of such premises and security shutters to protect shopfronts.

Other criminal enterprises have become less rewarding. Phone theft increased as smartphones took off, says Graham Farrell, a criminologist at the University of Leeds, but it has since ebbed as owners have gained the power to track and disable their stolen devices. The proportion of owners reporting their phone nicked fell by half between 2009 and 2016. Nor is it any longer worth robbing bus drivers, because card payments and cash-drop boxes mean they no longer carry much money. Data from Transport for London show a fall of 56% in bus robberies between 2013 and 2015, which coincides with a reduction in the number of cash payments for fares.

In some cases, the harm has been reduced even as the crime has persisted. Ensuring that pubs and clubs give drinkers venturing outside receptacles made of plastic or toughened glass, which breaks into blunt little cubes rather than jagged shards, has cut the number of severe injuries, particularly to the face, incurred by drunken brawlers. Before the drinks industry switched to toughened glass in 1997, 13% of violence between strangers involved the use of glasses or bottles. The year after

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the switch it dropped to 4%.

Yet the fall in crime seems to have slowed. The overall number of offences dropped by just 1% in the year to June 2016, according to the Crime Survey. Compare that with the decline of 13% over the previous two years. And a few crimes are rising again. Car theft edged up by 1%. The kinds of violent crimes that do not cause physical injury (such as stalking, harassment and death threats) climbed by 18%. Pickpocketing, which had been going up even while instances of other offences fell, continued to rise. Have Britain's crime rates reached their nadir?

The recent levelling off may be the long-expected impact of the financial crisis, suggests Tim Newburn, a criminologist at the London School of Economics. In times of hardship people steal more. Attempts to break into homes have risen by 5% over the past year. Domestic violence goes up with the anxiety of poverty and appears to be increasing. The Crime Survey stops counting offences after five incidents involving the same victim. But remove that cap and violence against women has been rising since 2008. That suggests that even if the number of women being abused at home has not risen, victims are being attacked more often.

Still, further declines in crime are possible. Pinching cars is one example of a "gateway crime"—the first rung on the ladder to more serious lawbreaking. The drastic reduction in car theft in the past couple of decades has thus meant fewer entrants into the pool of criminals. Young people make up a shrinking share of the prison population. In June 2011, men aged 18-24 accounted for 26% of those locked up. They now represent just 17%. And whereas youths are growing less likely to reoffend, among older cons recidivism is on the increase.

Older, experienced crooks lie behind ►

► the recent rises in certain crimes. Although car theft in general has been falling, sophisticated thefts of expensive cars by skilled criminals have increased. Swiping posh vehicles for resale and export is more difficult than nicking them off the street for joy-riding. Thieves are pinching car keys rather than simply breaking into vehicles, or unlocking them remotely by hacking into their security systems.

That such professionals are responsible hints at why crime rates may have further to fall. Studies in America, where crime has also been declining for a long time, suggest that men over 40 today offend at a much higher rate than men of that age did a couple of decades ago. Today's middle-aged crooks learned their trade in the 1980s when crime was relatively easy, and have carried on offending, says Mr Farrell. In time this light-fingered generation will "retire", or die. With fewer novices taking their place, crime may dip lower still. ■

#### Brexit preparations

## Rogers and out

#### The departure of Britain's man in Brussels lays bare a lack of Brexit plans

CIVIL servants mostly operate behind the scenes and off camera. Sir Ivan Rogers, Britain's permanent representative to the European Union since November 2013, fits the bill nicely. Yet his announcement on January 3rd that he was leaving early became big news because of what it showed about the government's unreadiness for Brexit negotiations.

Sir Ivan, a former Treasury and EU official, knows everything there is to know about how Brussels works. He was David Cameron's chief adviser on Europe. He got to know Theresa May when, as home secretary, she engaged in tortuous talks over Britain's opt-out from EU policies on justice and home affairs. But he has long been faulted by Eurosceptics as too gloomy over Brexit. In December he was pilloried for reporting that it could take ten years to negotiate and ratify a trade deal with the EU. Yet as Sir Ivan put it this week, free trade "does not just happen when it is not thwarted by authorities." Experience shows that such deals can indeed take years to agree.

His other purported sin came during Mr Cameron's attempted renegotiation of Britain's membership terms before the referendum. At one point the prime minister wanted to demand a unilateral emergency brake on free movement of EU citizens to Britain. Sir Ivan advised him that other EU leaders, including Germany's Angela Merkel, would reject this out of hand. So Mr

Cameron settled instead for a four-year freeze on in-work benefits for EU migrants. Brexiteers claim that, without Sir Ivan's excessive caution, Britain could have got a lot more. Yet the EU's attachment to free movement is genuine and deep—even the benefits change that Mr Cameron won took 48 hours of hard pounding to secure.

Uncertainty clouds Brexit, even after the speedy replacement of Sir Ivan by Sir Tim Barrow, previously ambassador to Russia. Sir Ivan's letter makes clear that the government has no detailed exit strategy and that its negotiating team is not even fully in place. Mrs May insists she will trigger Article 50, the legal way to leave the EU, by the end of March, earlier than Sir Ivan advised. That will set a two-year deadline for Brexit. A chunk of 2017 will be taken up by Dutch, French, German and probably Italian elections. Sir Ivan pointedly notes that serious multilateral negotiating experience is in short supply in Whitehall. In the EU institutions in Brussels, it is not.

His resignation supports the idea that Mrs May and her ministers mistrust advisers tainted by time in Europe. Lord Macpherson, a former permanent secretary to the Treasury, tweeted that, with other departures, it was a "wilful & total destruction of EU expertise". Anyone with experience of Brussels knows it is a place in which knowledge of EU customs, laws and procedures is valuable, especially after midnight. Mrs May could be repeatedly ambushed if she is bereft of advisers ready, as Sir Ivan puts it, to "challenge ill-founded arguments and muddled thinking."

Other EU countries have long been frustrated by the British, who favour a transactional approach to the project over dreams of ever closer union. But they have also come to admire the talent and dedication of British diplomats and officials. It would be gravely damaging to Mrs May if she were to lose those advantages at a time when they are needed more than ever. ■



Ivan to break free

#### International development

## A stingy new year

#### The juicy aid budget sparks jealousy

**I**N 2015 Britain gave away £12.1bn (\$18.5bn) in foreign aid, more than any country bar America. It was one of just six countries to meet the UN's target of spending 0.7% of GDP on international assistance. Yet although the leaders of all Britain's main political parties support this generosity, grumblies that the money should stay at home are growing louder.

For the past few months newspapers have been digging up examples of exorbitant aid-industry salaries and alleged mis-spending. According to the *Daily Mail*, £5.2m of British cash went to an Ethiopian pop group (defenders point out that the band was part of a project to change attitudes about women's roles). Some backbench Conservatives have called for aid to be redirected to pay for social care for elderly Britons. The UK Independence Party wants to spend it on homeless veterans instead.

The appointment of Priti Patel as head of the Department for International Development in July raised hawks' hopes, since she had previously called for the department to be abolished. So far, though, Ms Patel has done little to live up to her ferocious reputation besides talking tough to international agencies. Few aid-watchers expect big changes to government policy. The 0.7% target was enshrined in law by the Conservative-Liberal Democrat coalition in 2015; maintaining it is a Tory manifesto commitment.

Some charity bosses whisper that the fuss is not all bad. A few executives are indeed paid too much, and consultancies sometimes overcharge, they say. Pointing this out is worthwhile, especially since the industry can be too defensive about instances of genuine incompetence. Yet much of the criticism is hollow. Some newspapers complained about bureaucracy, then whinged about programmes in which cash handouts were given directly to the poor.

The government could tweak aid policy to use more of the funds to promote British commercial interests, or hand out more money bilaterally rather than through intermediaries. Neither would make aid spending more effective, says Owen Barder of the Centre for Global Development, a think-tank. Nor would they insulate the government from criticism. With public services facing cuts, the generous aid budget will come under continued fire however well it is spent.

# Bagehot | Pierogi and the British genius

**Britain is a more cohesive society than the doom-mongers claim**



THE new year finds Britain tense. Brexit looms: Theresa May will soon start the two-year countdown. There is still the tangle of divisions that contributed to last June's referendum vote. The gaps between liberal, Remain-voting places and conservative, Leave-voting ones will widen as the trade-offs of Brexit become clear. Cultural grievances concerning rapid inflows of foreigners, and of existing immigrants perceived to have integrated poorly, remain unresolved. Racist slogans have appeared on walls and hate crimes are up. Still Mrs May refuses to guarantee European Union citizens the right to stay put. "A disunited Kingdom", bellow headlines.

How to reunite it? Debates rage over Louise Casey's review into integration, published last month. Commissioned by David Cameron, the civil servant's report paints a grim picture of a land cleft by segregation, where citizens live parallel lives. It recommends that schools teach British values and that immigrants take an oath of loyalty (an idea endorsed by Sajid Javid, the communities secretary). Much of the opposition agrees, Stephen Kinnock urging his fellow Labour MPs to "move away from multiculturalism and towards assimilation". On January 5th a new Parliamentary group on integration advocated a middle way between the two approaches. Expect more in this vein as the year unfolds.

Much of it will be warranted. Segregation scars parts of Britain, some immigrant groups remain poorly integrated and minorities within them are hostile to liberal values. But the gloom lacks a sense of the bigger picture. Accompany Bagehot to Ely, a cathedral city sprouting from the prairies of eastern England, where thousands of central and eastern Europeans have moved to pick vegetables for low wages—and where many have settled. Your columnist visited on December 23rd to witness the segregation. What better litmus test than Christmas, with its many national variations?

Sure enough, the local Poles' traditions were widely evident. In a shop named "White & Red", green-grey carp glistened in ice boxes; shelves groaned with pierogi (dumplings) and bottles of bison-grass vodka; piles of sachets variously containing hay and communion wafers teetered by the till. Gosia Bates and Joanna Bialas, two locals, explained that each ingredient features in the Wigilia, or Christmas Eve, meal. This involves hay scattered on

the floor (to evoke the nativity), wafers broken before the meal and 12 dishes including carp, herring, pierogi, mushrooms, beetroot soup and poppy-seed cake. No meat or alcohol is taken, so the vodka comes out at midnight. The steady traffic of local Poles in the shop spoke to the strength of this foreign culture. "Every year my uncle sends me this from Silesia, for good financial luck," said Mrs Bates, producing a shiny carp scale from her purse.

Below the surface, however, something else is happening. Britons also shop at "White & Red", lured by the garlicky sausage and crusty bread. And Poles are picking up British habits like eating turkey and watching the queen's Christmas speech. Those who, like Mrs Bates, have British partners are leading the fusion: her Anglo-Polish son receives British chocolate from the Polish St Nicholas on December 6th; her Christmas tree is decorated towards the start of the month (the British way) but will stay up well into January (the Polish way); her son receives half of his presents on December 24th (Polish) and half on the 25th (British). She serves turkey on Christmas Day, as is typical in Britain, but also leaves a chair empty—a Polish tradition respecting strangers. When relatives visit she cooks an English breakfast, which they love (apart from the baked beans). She enjoys crackers but feels "a bit silly with a paper hat on my head". Ms Bialas plans to create a similar mix of cultures for her baby, due in 2017.

Without oaths, integration classes or other forms of state do-goodery, central European cultures in Britain are melding with local ones. Children are leading the way. Right after the Brexit vote teachers in Ely had to soothe not just upset Polish pupils but also British ones who fretted about losing their pals. Ms Bialas describes school pick-up time, when Polish and British parents tend to stick to their own, but children pour out in a multinational muddle. Ask the Polish ones which football teams they support, she says, and they often name two: one Polish and one British. Some have become so British that they now struggle in their native tongue, getting A\* grades in maths but Ds in Polish written exams. This even extends to the liturgy. Mariusz Urbanowski, a local Polish priest, says he mixes the two languages in his festive services, to cater for different generations of Anglo-Poles.

## Szczesliwego New Year!

Such is the Britain forgotten by the gloomsters. Fully 82% of its citizens socialise at least monthly with people from different ethnic or religious backgrounds; from 2003 to 2016 the proportion calling their vicinity "cohesive" rose from 80% to 89%; over half of first-generation migrants have friends of a different ethnicity (among their kids the proportion is nearer three-quarters); numbers of inter-ethnic marriages and households are rising; educational and employment gaps are shrinking. The proportion of British-Pakistani households using English as their main language rose from 15% to 45% in the 13 years to 2010.

The story of British life in 2017 is that new immigrants are enriching and combining with this mongrel culture as loyally as their predecessors once did. In pubs and churches, gyms and schools, Britishness is being made and remade not by political diktat but by an organic process of mixing and mingling. Britain contains few French-style *banlieues* or American-style ghettos. London's mayor is a liberal Muslim. Sikhs in turbans protect Buckingham Palace. Tikka masala (Indian-ish) and fish and chips (Jewish-ish) are the country's national dishes. Polish-ish pierogi will surely join them soon. In a troubled age, let this diverse country take more pride in all that. ■



## Fixing fragile nations

# Conquering chaos

JUBA AND KABUL

## Why states fail and how they can be rebuilt: lessons from Afghanistan and South Sudan

**I**N THE middle of 2016 a suicide-bomber blew up a minibus full of judicial staff in Kabul. The injured were rushed to the Emergency Hospital in the Afghan capital. One was married to a nurse there, who was on duty when he arrived. He is now paraplegic. She is “coping”, says a colleague: “She’s one tough woman.”

It is striking how many of the hospital’s patients were targeted for upholding the law. Amir Muhammad, a policeman with shrapnel wounds, says the Taliban attacked his post and killed seven of his 14 fellow officers. “They had heavier weapons than us,” he explains.

The Taliban are as shrewd as they are brutal. Afghanistan is close to becoming a failed state again. To avert that catastrophe, the government must provide adequate security and establish something resembling the rule of law. But it is tricky to set up a functioning legal system when judges and police officers keep getting murdered. Moreover, the government can hardly claim to be keeping people safe when they fear being blown up on their way to work.

Since Barack Obama drastically reduced the number of American troops in Afghanistan, the Taliban have made alarming gains. NATO forces there fell from a peak of 132,000 in 2011 to around 13,000 today. Only about 60% of Afghans live in

areas controlled by the government. Others live under Taliban control (about 10%) or in areas that are violently disputed.

Wherever they can, the Taliban replace the government’s justice with their own swifter, harsher (and, some say, less corrupt) variety. If two peasants quarrel over a piece of land, a Taliban official will hear both sides and make a ruling. Such rulings often stick, for no one doubts that the Taliban will enforce them.

The pull-out of foreign troops has made Afghanistan not only more dangerous, but poorer, too. By one estimate, the NATO mission cost almost \$1trn between 2001 and 2014—more than six times as much as Afghanistan’s GDP over that period. Many Afghans sold stuff to and built things for the foreigners. Now that boom is over. Economic growth plunged from 14% in 2012 to 0.8% in 2015.

“Day by day we are losing our business,” says Ashad Wali Safi, who runs an electronics store in Kabul. The aid agencies that used to buy printers from him are gone. Security is “very bad”. (The previous day, a suicide-bomb had killed at least 30 people in a nearby mosque.) “Even in daytime, we don’t feel safe. At night? Forget it.”

Adding to the uncertainty, no one knows what Donald Trump’s Afghan policy will be. In the past he has said both that

American troops should leave Afghanistan, and that they should “probably” stay. Afghans are nervous. “We hope this new American administration will be supportive too,” says Ashraf Ghani, the president.

Few things matter more than fixing failed states. Broadly defined, state failure provides “a general explanation for why poor countries are poor”, argue Daron Acemoglu of the Massachusetts Institute of Technology and James Robinson of the University of Chicago in “Why Nations Fail”. Life in a failed or failing state is short and harsh. Life expectancy in the bottom 16 countries on the Fragile States Index compiled by the Fund for Peace, a think-tank (see map on next page), is 85% of the global average. Measured at purchasing-power parity, income per head is a miserable 21%.

### There goes the neighbourhood

Lawless regions, such as the badlands of Pakistan and Yemen, act as havens for terrorists. And civil wars tend to spill across borders. The Rwandan genocide of 1994, for example, sparked an even deadlier conflagration in Congo.

In the most extreme form of state failure, in places like Somalia, the central government does not even control the capital city. In milder forms, as in Nigeria, the state is far from collapse but highly dysfunctional and unable to control all of its territory. Or, as in North Korea today or China under Mao Zedong, it controls all of its territory but governs in a way that makes everyone but a tiny elite much worse off.

This article will look at two main examples: an unambiguously failed state, South Sudan, and a state tottering on the brink, Afghanistan. It will argue that, as Mr Acemoglu and Mr Robinson put it, the key to ►

► understanding state failure is “institutions, institutions, institutions”. The world’s newest country, South Sudan has received billions of dollars of aid and the advice of swarms of consultants since seceding from Sudan in 2011, but has failed to build any institutions worthy of the name. Afghanistan faces a terrifying insurgency but has a president doing his best to restore order.

States are not wretched and unstable because of geography—if so, how to explain the success of landlocked Botswana? Nor is culture the main culprit: if so, South Koreans would not be more than 20 times richer than North Koreans. Some societies have “inclusive institutions that foster economic growth”; others have “extractive institutions that hamper [it]”. South Sudan is an extreme example of the latter.

### Never look back

“Everybody I know is getting out,” says Joyce Mandi, as she mixes maize porridge for her six children at a bus stop in South Sudan. Around her, young men heave bags and mattresses onto the roof of a minibus. Ms Mandi is fleeing her village and heading for Kakuma, a refugee camp in neighbouring Kenya. Her husband has gone into the bush, she says, to fight the government.

The South Sudanese, who are mostly black African and non-Muslim, fought for half a century to secede from Sudan. Arab Muslims from the north used to oppress and enslave them. Perhaps 2m southerners died in the war of secession. But few think life has got better since then.

Those now in charge are former guerrillas from the Sudan People’s Liberation Army (SPLA), a group of tribal militias united only by hatred of the north. The first president, Salva Kiir, tried to hold the SPLA’s factions together by paying them off with petrodollars (oil is almost the only thing South Sudan exports). Alex de Waal of Tufts University estimates that in 2013 the government paid salaries for 320,000 soldiers, police and militiamen—more than a tenth of all men aged 15–54. Many of these soldiers did not exist: their pay was pocketed by the warlords supposedly commanding them.

But the state’s largesse did not buy loyalty. Instead, it encouraged the men with guns to demand more. Then the money ran out, thanks to collapsing oil prices and a suicidal game of chicken, in which the government stopped production to try to squeeze better terms from Sudan (which controls the pipeline through which South Sudanese oil is exported).

As his coffers emptied, Mr Kiir started flagrantly to favour his own Dinka tribe, South Sudan’s biggest, to stay in power. His vice-president, Riek Machar, who is from the Nuer tribe, the second-biggest, was forced out of government in July 2013 and went back to war later that year. A peace deal in 2015 quickly broke down. Some 3m

South Sudanese—a quarter of the population—have fled their homes. Were it not for food aid, often dropped out of planes onto remote villages, hundreds of thousands would starve.

South Sudan failed to build institutions that transcended tribal loyalties or curbed the power of warlords. Torit, where Ms Mandi boarded that minibus to Kenya, is a good place to observe the hollowness of the country’s government. Though it is capital of one of South Sudan’s 28 states, it feels like a military outpost. Troops in “technicals”—pick-up trucks with mounted machine-guns—patrol the streets.

There are plenty of government buildings, including state ministries of education, culture and health. But none of them does much. Teachers were last paid in September, says Jacob Atari, the local education minister. Inflation of over 800% means their monthly salary of around 300 South Sudanese pounds is now worth less than \$4. Over 70% of children are out of school, says Mr Atari.

Nowhere in South Sudan does the state do what it is supposed to. Only 27% of adults can read, according to the UN. Preventable diseases such as cholera, measles and malaria are rampant. The rule of law is a distant dream.

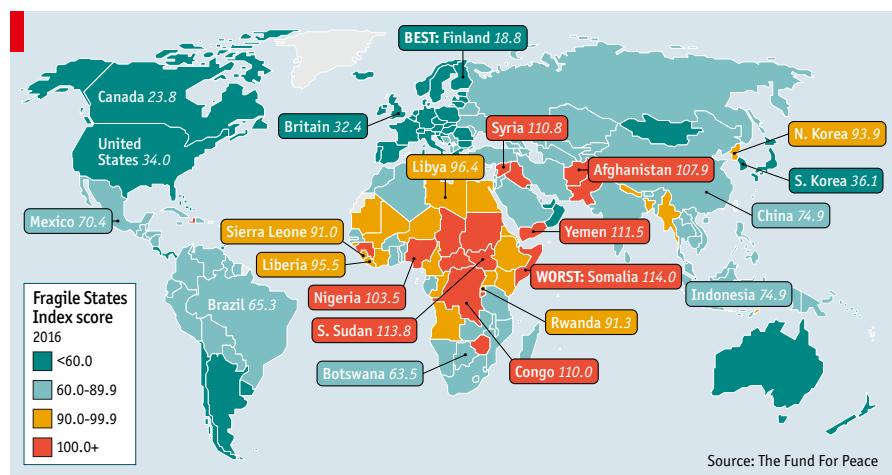
The country’s political system is in theory decentralised, but in reality the money flows through Juba, the national capital. And instead of being distributed to states, it is typically stolen or spent on weapons. Politics is a euphemism for armed battles over plunder. The warlord who wins can steal the oil and pay his troops. (Or, he can simply let them rob civilians.)

The fighting becomes tribal because warlords recruit by stirring up ethnic tension so that their kinsmen will rally to them. This creates a vicious circle. Lacking protection from other institutions, people seek it from their own tribe. Rather than demand evenhanded government, they back tribal leaders, knowing that they will steal and hoping they will share the spoils with their kin.

The splintering of South Sudan can be glimpsed in the “protection of civilians” camps maintained by the UN. One in Juba holds almost 40,000 people. At night, gunshots are common and aid workers refuse to venture inside. Most of the residents are Nuers, like Mr Machar, who have been stranded here since the civil war began. They are sure who is to blame. “Our tribe was killed by the government and so we came here,” says Kikany Kuol Wuol, a community chairman in the camp. “We cannot leave, we have nowhere to go. If our women just go outside to look for firewood they are raped.” When fighting broke out in Juba in July between Mr Machar’s forces and the government, it spread into the camp as UN peacekeepers withdrew. The problem, says Mr Kuol, is that: “This is a government only for Dinkas. The rest of us they want to starve to death.” Everyone in the camp supports Mr Machar, he says.

Mr Acemoglu and Mr Robinson are pessimistic about failed nations’ chances of turning around. Extractive institutions typically have historical roots. For example, the authors trace the failure of today’s Democratic Republic of Congo partly to the pre-colonial Kingdom of Kongo, where taxes were arbitrary (one was levied whenever the king’s beret fell off) and the elite sold their subjects to European slavers. Peasants therefore lived deep in the forest, to hide from slavers and tax-collectors. They did not adopt new technology, such as the plough, even when they heard of it. Why bother, when any surplus was subject to seizure? Modern Congolese farmers make similar complaints.

“Why Nations Fail” argues that “the politics of the vast majority of societies throughout history has led, and still leads today, to extractive institutions.” These tend to last because they give rulers the resources to pay armies, bribe judges and rig elections to stay in power. These rulers adopt bad policies not because they are ignorant of good ones but on purpose. Letting your relatives embezzle is bad for the nation but great for your family finances. ►



▶ But failed states are not doomed to stay that way. Between 2007 and 2016, according to the Fragile States Index, 91 countries grew more stable and 70 grew shakier. Among those improving were giants such as China, Indonesia, Mexico and Brazil. The worst performers were mostly smaller, such as Libya and Syria.

Even states that have collapsed completely can be rebuilt. Liberia and Sierra Leone were stalked by drug-addled child soldiers a decade and a half ago; now both are reasonably calm. The key is nearly always better leadership: think of how China changed after Mao died. Many bad rulers continue deliberately to adopt bad policies, but they can be—and often are—replaced with better ones.

### Instructions included

Afghanistan's president since 2014, Mr Ghani is a former academic and author of a book called "Fixing Failed States". His TED talk on fixing broken states has been viewed 750,000 times. Now he is trying to put his own theories into practice.

Yet he admits that rebuilding Afghanistan is more complex than he expected. The insurgents draw support from several sources: local grievances, tribal animosities, global Islamist networks, organised crime (Afghanistan is the world's largest producer of opium) and the Pakistani security services. In 2015 Mr Ghani accused Pakistan of being in an "undeclared state of hostility" towards his country. Now he goes further. "In October it was almost a declared state of hostility," he says. The Taliban enjoy havens in Pakistan's lawless areas and, analysts suspect, direct help from Pakistani spooks, some of whom would rather have Afghanistan in chaos than see India gain a foothold there. Recent suicide-bombs in Kabul appear to have contained military-grade explosives, which Afghans assume came from over the border.

Mr Ghani has a clear idea of the state's basic functions. First, it must uphold the rule of law. Second, it must secure a monopoly on the use of violence. The two are linked. As Sarah Chayes points out in "Thieves of State", when people see the state as predatory, they are more likely to support insurgents. She cites the example of an Afghan who was shaken down nine times by police on a single journey, and vowed not to warn them if he saw the Taliban planting a bomb to kill them.

Mr Ghani justly takes credit for the fact that the Taliban did not overthrow the state after Mr Obama's pull-out. "In 2015 we were in danger, because the global and regional consensus was that we would not be able to hold," he says. Now, says General John Nicholson, the commander of the NATO forces in Afghanistan, the Taliban have been fought to a stalemate. They seized a big city, Kunduz, in 2015, but were driven out and have taken no more since.



**Politics by other means in South Sudan**

NATO air power combined with American-trained Afghan special forces pack "an offensive punch", says General Nicholson. The Taliban cannot mass troops for fear of NATO bombs. However, they have "safety outside the country".

Mr Ghani is less tolerant of corruption than was his predecessor, Hamid Karzai, and appears to have cleaned up customs and government procurement a fair bit. He has improved tax collection and promoted infrastructure projects, such as rail links and power plants, in the hope that Afghanistan will become a central Asian hub. (He notes with satisfaction that the Taliban have said they will not attack such schemes.) He promotes education for women, which was banned when the Taliban ruled Afghanistan in 1996–2001. To conservative Afghans who think this would lead to illicit mixing with men, he has a convincing response. "In the remote provinces, they are asking for women doctors," he points out. How can they have female doctors if they do not allow their daughters to go to school?

Nonetheless, a survey by the Asia Foundation finds that only 29% of Afghans believe the country is moving in the right direction. This is largely because 70% fear for their safety—the highest level in over a decade. However, a slim majority (54%) say the army is getting better at providing security, while only 20% say it is getting worse.

Public perceptions of corruption have barely budged since Mr Ghani came to power, with 89% of Afghans saying it is a problem in their daily life. More encouragingly, the share of those who had dealt with police and reported sometimes having to pay bribes is falling somewhat: from 53% in 2015 to 48% in 2016.

Foreign donors warm to Mr Ghani. In

October he convinced them to pledge \$15bn over the next four years. Yet he is leery of how aid is dispensed. The flood of foreign cash that followed the American-led toppling of the Taliban government in 2001 often undermined the state or was wasted. Aid agencies paid salaries 20 times higher than the Afghan civil service, prompting the best officials to quit to work as drivers and interpreters. Mr Ghani has long argued that aid should flow through the national government, rather than support a parallel state that can pack up and go when donor fashions change. He may be getting his way: roughly half of aid now passes through the national budget, a share that is expected to rise.

Even with a leader determined to make good choices, building an honest state is hard. Mr Ghani complains of inaccurate information. "There were three databases in the Ministry of Education: one for teachers, one for salaries, one for schools...they weren't talking to each other." Faulty records make it easier for money to vanish. Digital payments should help, he says—the police thought they had received a pay rise when the first experiments with mobile payments began, because commanders could no longer skim their wages. But there is a long way to go.

"A decade ago, if you went into a minister's office, you'd see dust on the desk, no computer and the minister picking his toenails," says a Western official in Kabul. "Now you have competent ministers and lots of young professional staff who keep in touch via WhatsApp and speak English. The bad news is that Ghani is still learning how to be a politician. Karzai would get on the phone with tribal leaders and chat about their fathers' health [before talking business]. Ghani tries to book them for a ten-minute meeting, and hustles them out of the door before the tea is cold."

This is a common criticism. Mr Ghani is good at retail politics (he won the disputed election in 2014 partly because he had spent so much time sitting in villages asking ordinary Afghans what they wanted). But he is a technocrat among warlords, some of whom have been made billionaires by the drugs trade. He rules in uneasy coalition with a "chief executive" with ill-defined powers: Abdullah Abdullah, the man he beat in 2014. His vice-president is a blood-spattered warlord. The president will struggle to build a clean state when so many bigwigs prefer it dirty, critics say.

Mr Ghani dismisses the charge. "If politics becomes all tactics, where would you produce change?" he asks. He insists that he bends over backwards to be respectful of tribal leaders, "but it cannot be at the expense of building institutions." This is a crucial point. Countries whose stability depends on an individual strongman are brittle. Those that create inclusive institutions need never fail again. ■



Nestlé

## A life less sweet

VEVEY

**As rivals nibble at its business, Nestlé's new boss must find a formula for growth**

LARGE food companies have long been among the world's most solid, with reassuringly consistent returns even in hard times. None would seem steadier than Nestlé, based in the Swiss town of Vevey, on a lake near snowy peaks. For its 150th anniversary in 2016 it opened a new museum filled with corporate heirlooms: the first written notes about a new product called milk chocolate, laid out in black cursive; an old tin of Nescafé, used by soldiers as a stimulant in the second world war; and an early can of Henri Nestlé's infant formula, which in 1867 saved the life of a premature baby.

It has come a long way since then. It sold goods worth nearly \$90bn in 189 countries in 2015. Of the 30,000 cups of coffee sipped around the world each second, Nestlé estimates, one-fifth are cups of Nescafé. But the industry it presides over is in upheaval. On January 1st a new chief executive, Ulf Mark Schneider (pictured), took over. He is the first outsider to get the top job since 1922, and his background—running a health-care firm, not selling chocolate bars or frozen pizza—suggests the main source of worry for the business.

More and more consumers are snubbing packaged food's sugar, salt and unpronounceable preservatives. Meanwhile, swarms of smaller firms, emboldened by the ease of peddling goods online, are touting supposedly healthier options. From 2011 to 2015 big sellers of consumer-pack-

aged goods, mainly food and drink companies, lost three percentage points of market share in America—a lot in the industry's context—according to a study by the Boston Consulting Group, a consultancy, and IRI, a data provider.

As super-sized companies swat at such tiny attackers, another foe is gaining ground. 3G, a Brazilian private-equity firm, likes to buy big, slow-growing food and drinks companies and slash their costs. Targets have included Kraft and Heinz, two giants which 3G helped merge into one group in 2015, as well as several of the world's biggest brewers. Other food companies are scrambling to make cuts of their own, lest they become 3G's next meal. That has prompted a debate over whether such

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cuts wreck firms' growth prospects even further, or whether, in fact, they are best off accepting that robust expansion is a thing of the past and wringing out profits.

Nestlé is not immune to such pressures. In recent years it has often missed its goal of 5-6% sales growth. Excluding acquisitions, its numbers have not met investors' expectations in 11 of the past 17 quarters. In the most recent quarter, the firm registered organic sales growth of 3.2%.

Changing consumer tastes explain some of these shortfalls. So does a shifting retail landscape. Managing a giant portfolio of brands, from KitKat and Nespresso to DiGiorno pizza and Purina dog food, has become harder. Mr Schneider will have to master online ways to market and deliver its well-known brands. The firm needs to coax customers to pay more for premium products as ordinary ones get commoditised, and discounted by firms such as Germany's Lidl and Aldi.

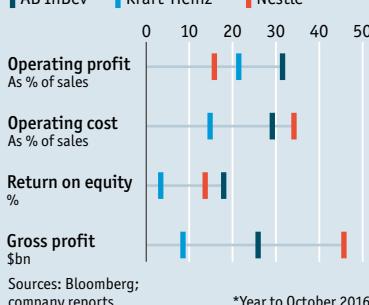
The firm can still boast impressive staying power—its global market share across its entire range of products has remained near 20% for the past decade. François-Xavier Roger, Nestlé's chief financial officer, points out that the group's sales growth in the first nine months of 2016 was among the fastest of the top ten biggest food and drink companies. Yet a detailed examination of its position by Sanford C. Bernstein, a research firm, shows that when growth from acquisitions is excluded, it lost share in all but three of its top 20 product categories between 2007 and 2015. Some of its core offerings, such as bottled water and single-serve coffee, fared the worst. (Keurig, Nestlé's arch-rival in coffee pods, slurped share in America.)

Such results are likely to attract particular censure from investors because of Nestlé's past heavy emphasis on growth and market share, which sometimes came at ➤

### The latest recipe

2015 fiscal year

AB InBev Kraft-Heinz\* Nestlé



► the expense of the firm's profits. In 2015 its operating-profit margin was 15%, better than the 13% at Danone, a French competitor, but far below the 21% at Kraft-Heinz. Shareholders in the firm are waiting to see whether Mr Schneider will shake things up. Some want him to sell off businesses that seem most at risk of long-term decline, such as frozen food, as shoppers look for fresher fare.

### Food for life?

For now, Nestlé is defiant. "We started 150 years ago having a product that actually—there's symbolism there—saved the life of a child," says Paul Bulcke, the outgoing chief executive. He and his colleagues say that investment in health and related innovation will produce strong growth at the company for years to come. Mr Schneider, who used to run Fresenius, a big German firm that offers kidney-dialysis products and other medical services, will certainly emphasise that message. Nestlé differentiates itself from 3G, with its keen focus on cuts. Mr Roger says he respects what 3G does, but that "they have a strategy which is very different from ours."

Still, few observers would call Nestlé a health company. Many of its products are perfectly healthy, including bottled water and coffee. Many are not—milk chocolate and ice cream, to name but two. And for now, the purest forms of Nestlé's focus on health contribute relatively little to its sales. A business unit called Nestlé Health Science, for example, sells nutritional products for medical needs, such as vitamin-packed drinks for the elderly and for cancer patients. It contributes less than 5% of revenue.

The firm has a research institute devoted to studying food's role in the management and prevention of disease—for example, better understanding nutrition's ability to promote brain health. It may bring growth but probably only in the long term. Nestlé has also partnered with young drugs firms, including one that is testing a treatment for ulcerative colitis.

More immediately rewarding may be its efforts to make best-selling but unhealthy foods a bit more wholesome. In November the company said it had created hollow sugar crystals that taste sweet but contain fewer calories than the usual stuff. It will begin to put the new ingredient in its chocolate in 2018.

It is also proud of changes to the millions of frozen dinners it sells every week in America. Shoppers had been avoiding the frozen-food aisle. Nestlé first tried discounts, and then in 2015 introduced new versions of its Lean Cuisine products, stripping out unpalatable ingredients and replacing them with organic ones. At Stouffer's, another frozen brand, Nestlé decided to target men with easy, protein-packed meals that are more nutritionally

valuable. It worked—its frozen-food sales in America grew faster. In November 2015 they were 6% above what they had been a year earlier. But Bernstein's Andrew Wood points out that the revival of frozen food now looks wobbly again.

Nor is Nestlé ignoring 3G's strategy entirely: it is trying to trim expenses. "We are very much in an investment position, not in a cost-cutting exercise," says Mr Roger, "but that doesn't mean that we don't want to be cost-efficient in what we do." One effort, which includes trimming waste at factories, is credited with saving about SFr1.5bn (\$1.5bn) a year. Last year Nestlé announced organisational changes, such as

consolidating procurement, which will save about SFr2bn each year from 2020.

Whatever else Mr Schneider has on the menu for Nestlé, radical changes may be somewhat limited by the fact that so many of those who built the company into what it is now are sticking around. Mr Bulcke is expected to become its chairman. The outgoing chairman, Peter Brabeck-Letmathe, a former Nestlé chief executive, may become honorary chairman. Mr Bulcke, for one, seems sure that the company should maintain its strong emphasis on the long term. He taps his hand on the table, rattling some Nespresso cups, as he insists that growth is still the key. ■

### Toshiba

## Losing count

TOKYO

### Japan's enfeebled giant faces a multi-billion-dollar write-down

THE probe in 2015 into one of Japan's largest-ever accounting scandals, at Toshiba, an electronics and nuclear-power conglomerate that has been the epitome of the country's engineering prowess, concluded that number-fiddling at the firm was "systemic". It was found to have padded profits by ¥152bn (\$1.3bn) between 2008 and 2014. Its boss, and half of the board's 16 members, resigned; regulators imposed upon it a record fine of \$60m.

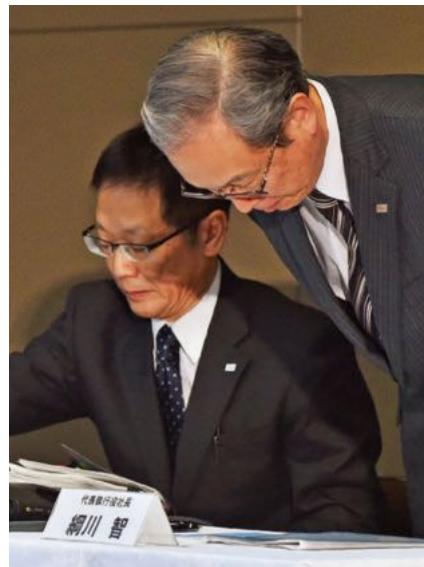
Now its deal-making nous is in doubt too. In December 2015—the very same month that it forecast hundreds of billions of yen in losses for the financial year then under way, as it struggled to recover from the scandal—Toshiba's American arm,

Westinghouse Electric, bought a nuclear-construction firm, CB&I Stone & Webster. One year on, on December 27th, Toshiba announced that cost overruns at that new unit could lead to several billions of dollars in charges against profits.

Its shares fell by 42% in a three-day stretch as investors dumped them, fearing a write-down that could wipe out its shareholders' equity, which in late September stood at \$3.1bn. Moody's and S&P, two ratings agencies, announced credit downgrades and threatened more. Toshiba's explanation for how it got the numbers so wrong on a smallish purchase is woolly. But it is clear that missing construction deadlines on nuclear-power plants can send costs skyrocketing. Its projects in America, and in China, are years behind schedule. Mycle Schneider, a nuclear expert, says that in America, as elsewhere, engineering problems are compounded by a shortage of skilled manpower. Few plants have been built there recently.

Part of the \$229m that Westinghouse paid for CB&I Stone & Webster included \$87m of goodwill (a premium over the firm's book value based on its physical assets). It is that initial estimate that is now being recalculated.

Toshiba had looked to be bouncing back from its accounting nightmare. Before the latest plunge it had made the second-biggest gains on the Nikkei 225 index in 2016, where its shares were up by 77%. In April it wrote off \$2.3bn on the goodwill value of Westinghouse, purchased for \$5.4bn in 2006—a write-down that it had long avoided. In August it announced its first profit in six quarters. It forecast a net profit of ¥145bn for the financial year of ►



Ritual contrition

**Westinghouse woes**

Toshiba, share price, yen



► 2016-17, a clear reversal from its ¥46bn loss of the previous year. Part of that was thanks to a bold turnaround plan: firing 14,000 staff, as well as selling lossmaking parts of its manufacturing empire, like tvs, and one of its star units, a medical-equipment maker, for \$6bn.

That left it free to focus on its semiconductor arm, which has been buoyed by demand from Chinese smartphone makers, and its nuclear unit, which accounts for a third of its revenue. The latest write-down could dampen future investment in both. Toshiba has limited ways left to raise cash. It has been barred from doing so on the stockmarket ever since it was put on alert after the accounting fiasco—one step short of a delisting.

Observers reckon that Toshiba has some room to manoeuvre, and that it will not ditch its nuclear business. It could raise as much as \$4bn from the sale of some part-owned subsidiaries, including Nu-Flare, a spinoff of its semiconductor unit, says Seth Fischer of Oasis Management in Hong Kong, a hedge fund, and a shareholder in Toshiba's power-station affiliate. It could even choose to sell its lucrative chip business altogether (Toshiba is the world's second-biggest maker of NAND chips after Samsung Electronics of South Korea), as well as some of its remaining consumer-electronics ones.

Toshiba's central part in a plan by the government of Shinzo Abe, the prime minister, to pep up growth by exporting nuclear-power technology to emerging countries may help. In June Westinghouse clinched a deal in India to build six new-generation AP1000 reactors, Toshiba's first order since the triple meltdown at the Fukushima Dai-ichi nuclear plant in 2011. Toshiba is also involved in that site's costly and complex clean-up. Some think that Japanese banks, known for keeping zombie firms on life support, will stand behind it, come what may. Shares in Toshiba's two main lenders, Sumitomo and Mizuho, slid last week after the profit warning. Investors expect more big bank loans or a debt-for-equity swap, which allows a bank to turn bad loans into shares.

**Donald Trump and business****Wheel spin****Ford Motors cancels a new plant in Mexico**

**I**T WAS in the spring of 2016 that Donald Trump singled out Ford Motors, calling its plans to build a plant in Mexico an "absolute disgrace" and promising it would not happen on his watch. Back then, it seemed remarkable that the candidate thought he could boss around a firm of Ford's stature. On January 3rd Ford cancelled its \$1.6bn project in the Mexican state of San Luis Potosí and said it would instead invest \$700m into an existing plant in Flat Rock, Michigan, to build electric and autonomous cars.

Ford's manoeuvre seems more wheel-spin than U-turn. Mr Trump's strong-arming of corporate America is real enough, and the carmaker will have gained much favour with the president-elect. But its decision can be explained largely in operational terms. The original plan was for the new Mexican plant to build chiefly Focus cars—small passenger vehicles for which demand has fallen, thanks to America's love affair with SUVs, crossovers and pick-up trucks and to low petrol prices. The decision to scrap the new plant looks far more like Ford reducing its exposure to the small-car game in North America than reducing its footprint in Mexico, says George Galliers at Evercore, an investment bank.

The firm will still move production of the Focus away from its plant in Wayne, Michigan to an existing plant in Hermosillo, Mexico. As for the upgrade of the Flat

Rock facility, where Ford this week trumpeted 700 new jobs to come, the firm had already announced back in December 2015 that it would invest in electrification and in 13 new electric vehicles. Linking one location for that (Flat Rock) with the Mexican plant cancellation looked like yet more accomplished spin.

Things would undoubtedly be difficult for global carmakers if Mr Trump tried to follow through on a campaign promise to slap a 35% tariff on cars exported from Mexico to America. In 2015 the country exported 2.7m vehicles, over four-fifths of which went to North America. By appearing to kowtow to the new boss-in-chief, Ford's chief executive, Mark Fields, may hope to keep this threat at bay—and to extract other favourable concessions, such as softer rules on emissions standards. "We have a president-elect who has said very clearly that one of his first priorities is to grow the economy," enthused Mr Fields. "That should be music to our ears."

Next in the line of fire is General Motors, America's biggest carmaker, which said in 2013 that it would invest \$5bn in Mexico over six years. This week Mr Trump admonished it for making its Chevy Cruze, another compact car, mostly over the border. "Make in U.S.A. or pay big border tax!" he tweeted. The company may find it hard to match Ford's skilful road-handling.



The consensus on Toshiba's latest screw-up is that a long-standing culture of poor management is to blame. Toshiba's audit committee, for example, was until 2015 headed by its former chief financial officer; such bodies should be fully independent, says Nicholas Benes of the Board Director Training Institute of Japan. It is not clear whether or not the firm has fully overhauled its culture as part of its response to

the scandal laid bare in 2015. Satoshi Tsunakawa, who was installed as the company's new boss in June 2016, said last week that he had only become aware of the problem with CB&I Stone & Webster in December. It was in 2015 that Mr Abe introduced Japan's first detailed rules on how companies should run themselves. The spectacle of Toshiba's apparently endless crisis suggests more needs to be done. ■

# Schumpeter | The fat-cow years

Banks in the rich world are getting their appetites back. Don't be too scared



**I**N THE Bible, seven years of feast were followed by seven years of famine. For banks there have been ten lean years. Subprime-loan defaults started to rise in February 2007, causing a near-collapse of the industry in America and Europe. Next came bail-outs from governments, then years of grovelling before regulators, mass firings of staff and quarter after quarter of poor results that left banks' shareholders disappointed. Now, a decade later, the moneylenders are quietly wondering if 2017 is the year in which their industry turns a corner.

Over the past six months the FTSE index of global bank shares has leapt by 24%. American banks have led the way, with the value of Bank of America rising by 67%, and that of JPMorgan Chase by 39%. In Europe BNP Paribas' market value has risen by 52%. In Japan shares in the lumbering Mitsubishi UFJ Financial Group—the rich world's biggest bank by assets—have behaved like those of a frisky internet startup; they are up by 57%. Predictions about global banks' future returns on equity have stopped falling, note analysts at UBS, a Swiss bank. Some of the biggest casualties of the financial crisis are even expanding. On December 20th Lloyds, bailed out by British taxpayers in 2009 at a cost of \$33bn, said it would buy MBNA, a credit-card firm, for \$2bn.

The excitement can be explained by three Rs: rates, regulation and returns. Consider interest rates first. The slump in rates has been terrible for banks. Between 2010 and 2015, the net interest income of the rich world's 100 biggest banks fell by \$100bn, or about half of 2010 profits. When rates across the economy rise, by contrast, banks can expand margins by charging borrowers more, while passing on only some of the benefit of higher rates to depositors. So bankers have been watching the bond market with barely concealed joy. Ten-year government yields have risen by one percentage point in America, and by 0.30-0.64 points in the big euro-zone economies and Japan over the last six months. Investors are talking about a Trump-inspired "reflation": the president-elect promises to embark on a public-spending boom. In Germany inflation is at a three-year high of 1.7%.

Banks' CEOs are also chipper because they think that regulation has peaked. In America the new administration is likely either to repeal the Dodd-Frank act, an 848-page law from 2010, or to prod regulators to enforce it less zealously. Bank-bashing fa-

tigue seems to have set in among the public. True, when firms misbehave, there is still a firestorm of outrage. John Stumpf, the boss of Wells Fargo, quit in October after his bank admitted creating fake accounts. But many people can see that power has migrated from banking to the technology elite in California. The brew of high pay, monopolistic tendencies and huge profits that attracts populist resentment is now more to be found in Silicon Valley than in Wall Street or the City of London.

Global supervisors are still cooking up new rules, known as "Basel 4" (see page 51), but are unlikely to demand a big rise in the safety buffer the industry holds in the form of capital. The strongest banks are signalling that they will lay out more in dividends and buy-backs, rather than hoard even more capital (today, the top 100 rich-world banks pay out about 40% of their profits).

A third reason for optimism in bank boardrooms is returns. Global banking's return on equity (ROE) has crept back towards a respectable 10%. The worst of the fines imposed by American regulators are over. So far, "fintech" startups that use technology to compete with rich-world banks have not won much market share; banks have used technology to boost efficiency. They have also got better at working out which of their activities create value after adjusting for risk and the capital they tie up. Barclays, once known for cutting corners, says it can calculate the ROE generated by each of its trading clients. It is ditching 7,000 of them.

Given the giddy mood, the big danger starts with a C, for complacency. Regulators believe that banks now pose less of a threat to taxpayers. American lenders have \$1.2trn of core capital, more than twice what they held in 2007. Citigroup, the most systemically important bank to be bailed out, now has three times more capital than its cumulative losses in 2008-10. European banks' capital buffers have risen by 50% since 2007, to \$1.5trn.

Yet there are still plenty of weak firms that could cause mayhem. Deutsche Bank, several Italian lenders and America's two state-run mortgage monsters, Fannie Mae and Freddie Mac, are examples. Mega-banks may simply be too big for any mortal to control. For every dollar of assets that General Electric's Jeff Immelt manages, Jamie Dimon at JPMorgan Chase looks after \$5.

## Once bitten

And banks still lack a post-crisis plan beyond cost-cutting. Despite their surging shares, most are valued at around the level they would fetch if their assets were liquidated, which hardly indicates optimism about their prospects. Before the crisis, they inflated their profits by expanding in unhealthy ways. They captured rents from state guarantees, created ever more layers of debt relative to GDP, and grew their balance-sheets by means of heavy over-borrowing. They have reversed much of this expansion over the past decade but that strategy cannot go on for ever.

In 2017 banks will need to articulate a new growth mission and show that they can expand profits without prompting public outrage or a regulatory backlash. One area of promise is the drive to raise rich-world productivity. That would boost economies broadly, and their own profits. There is plenty that banks could do: get more credit to young firms, improve payments systems so that a higher proportion of midsized firms can engage in cross-border e-commerce, and harness technology to make banking as cheap and easy to use as a smartphone app. Forward-thinking bank bosses are already emphasising such goals. If they could achieve them over the next decade, they might even realise a fourth R—redemption. ■



## Indian economics

## Many rupee returns

MUMBAI

### The impact of India's radical monetary reform is becoming clearer

MOST economists might hazard a guess that voiding the bulk of a country's currency overnight would dent its immediate growth prospects. On November 8th India took this abstruse thought experiment into the real world, scrapping two banknotes which made up 86% of all rupees in circulation. Predictably, the economy appears indeed to have been hobbled by the sudden "demonetisation". Evidence of the measure's costs is mounting, while the benefits look ever more uncertain.

At least the new year has brought a semblance of monetary normality. For seven weeks queues had snaked around banks, the main way for Indians to exchange their old notes for new ones or deposit them in their accounts. That is over, largely because the window to exchange money closed on December 30th. The number of fresh notes that can be withdrawn from ATMs or bank counters is still curtailed, but the acute cash shortage is abating, at least in big cities.

As data trickle through, so is evidence of the economic price paid for demonetisation. Consumers, companies and investors all wobbled in late 2016. Fast-moving consumer goods, usually a reliable growth sector, retrenched by 1.15% in November, according to Nielsen, a research group. Bigger-ticket items seem to have been hit harder. Year-on-year sales at Hero Motocorp, the biggest purveyor of two-wheelers, slid by more than a third in December.

A survey of purchasing managers in

manufacturing plunged from relative optimism throughout 2016 to the expectation of mild contraction. Firms' investment proposals fell from an average of 2.4trn rupees (\$35bn) a quarter to just 1.25trn rupees in the one just ended, according to Centre for Monitoring Indian Economy, a data provider. As a result, corporate-credit growth, already anaemic, has reached its lowest rate in at least 30 years (see chart).

All this amounts to "a significant but not catastrophic" impact, says Shilan Shah of Capital Economics, a consultancy. Annual GDP growth forecasts for the fiscal year ending in March have slipped by around half a percentage point, to under 7%, from an actual rate of 7.3% in the last full quarter before demonetisation. Other fac-

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tors, such as the rise in the oil price and the surge in the value of the dollar after the election of Donald Trump, are also at play.

Whether the costs of the exercise justify the benefits depends, of course, on what those benefits are. In his speech announcing the measure, Narendra Modi, the prime minister, highlighted combating corruption and untaxed wealth. Gangsters and profiteers with suitcases full of money would be left stranded. But reports suggest that nearly 15trn rupees of the 15.4trn rupees taken out of circulation are now accounted for. So either the rich weren't hoarding as much "black money" as was supposed, or they have proved adept at laundering it. The Indian press is full of tales of household staff paid months in advance in old notes, or of bankers agreeing to exchange vast sums illegally.

Fans of demonetisation point to three beneficial outcomes. First, banks, laden with fresh deposits, will lend this money out and so boost the economy. Big banks cut lending rates this week (quite possibly nudged by government, the largest shareholder of most of them). But their lending recently has not been constrained by a lack of deposits, so much as by insufficient shareholder capital to absorb potential losses, and by the over-borrowed balance-sheets of many industrial customers.

Second, Indians will move from living cash in hand into the taxed formal economy. Mr Modi has recently promoted the idea of a cashless, or "less-cash", India (not something mentioned at the outset), as one reason for demonetisation. Progress towards getting Indians to pay for things electronically is indeed being made, but from an abysmally low base.

The third upshot is the most controversial. Now that the demonetised bank notes are worthless, the government is intent on in effect appropriating the proceeds. The ➤

### Less cash, less credit

India, bank credit to the commercial sector  
% increase on a year earlier



Source: Thomson Reuters

procedure requires trampling on the credibility of the Reserve Bank of India (RBI), the central bank, which must first agree to dis honour the promise, on all banknotes, to "pay the bearer" the value. If it does so, "extinguishing" the notes and its liability for them, it can transfer an equivalent amount to the government budget.

With so much cash handed in at banks, the amount remitted to government by the RBI might amount to perhaps 0.2-0.3% of GDP. Proceeds from a tax-amnesty scheme for cash-hoarders may swell the figure. Even so, it will not be enough to justify the costs of demonetisation—or even, perhaps, the damage to the reputation of the RBI, which is already facing questions about its independence. But having imposed the costs, Mr Modi will be keen to trumpet whatever benefits he can find. ■

#### Impact investing

## Coming of age

**Investing to do good as well as to make money is catching on**

WHEN investors gathered in Amsterdam in late 2016 for perhaps the largest annual conference on "impact investing", the mood was upbeat. The concept of investing in assets that offer measurable social or environmental benefits as well as financial returns has come a long way from its modest roots in the early 2000s. Panelists at the conference included, among others, representatives of two of the world's largest pension funds, TIAA of America and PGGM of the Netherlands, and of the asset-management arm of AXA, a French insurance behemoth. A niche product is inching into the mainstream.

In the past two years BlackRock, the world's biggest asset manager, launched a new division called "Impact"; Goldman Sachs, an investment bank, acquired an impact-investment firm, Imprint Capital; and two American private-equity firms, Bain Capital and TPG, launched impact funds. The main driver of all this activity is investor demand. Deborah Winshel, boss of BlackRock Impact, points to the transfer of wealth to women and the young, whose investment goals, she says, transcend mere financial returns. Among institutions, sources of demand have moved beyond charitable foundations to hard-bitten pension funds and insurers.

The sector has also been boosted by increased attention from policymakers and the development of industry standards. International organisations—such as the UN, and a global task force founded under the aegis of the G8—have promoted impact in-

vestment. Bodies such as the council of investors and borrowers that sets the Green Bond Principles, guidelines for bonds earmarked for environmental projects, have helped set common standards.

Definitional squabbles still plague the impact community. For sticklers, investment only deserves "impact" status if it delivers both near-market level returns and strict measurement of the non-financial impact: eg, of the carbon emissions saved by a renewable-energy project; or of the number of poor people who borrow from a microcredit institution. Others, however, include philanthropic investment, where financial returns are sacrificed for greater social benefits; or less rigorous types of good investments.

Such disagreements make it hard to gauge the true extent of impact investment. For instance, BlackRock Impact and Goldman both also offer two looser investment categories: "negative screening" (ie, not investing in "bad" sectors—say, tobacco or oil); and "integrated" investments that take environmental, social or governance (ESG) considerations into account (eg, by selecting for firms with, say, good working conditions). Neither firm, however, provides a complete breakdown of these categories by assets under management.

The industry is also held back by a restricted choice of asset classes, and by the limited scale of investment opportunities. According to a survey by the Global Impact Investing Network, which organised the conference in Amsterdam, investors were managing \$36bn in impact investments in 2015. But the median size of investment remained just \$12m. Urban Angehrn, chief investment officer of Zurich Insurance, says the Swiss firm has had trouble fulfilling its pledge to commit 10% of its private-equity allocation to impact investments.

Cynics may still dismiss impact investing as faddish window-dressing. Of Zurich's \$250bn-plus in assets under management, only \$7bn-worth are classified as impact investments. At Goldman's asset-management arm, impact and ESG-integrated investments combined only make up \$6.7bn out of a total \$1.35tn in assets un-

der management.

But that is to ignore the scale and progress that large institutional investors have brought to impact investing. Although \$7bn is a tiny slice of Goldman's portfolio, it is huge compared with the investments of even well-established impact specialists, such as LeapFrog, whose commitments total around \$1bn. And the entry of hard-nosed financial giants sends an important message about impact investing: that they see it as profitable for themselves and their clients. It is not enough to make investors feel good about themselves; they also want to make money. ■

#### Bank capital

## Polishing the floor

**Supervisors put off finalising reforms to the Basel rules**

SOME banks find existing capital requirements too taxing. To no one's surprise, on December 23rd Monte dei Paschi di Siena, at present Italy's fourth-biggest bank, asked the Italian state for help, having failed to raise from the private sector €5bn (\$5.2bn) in capital demanded by the European Central Bank before the year's end. Three days later Monte dei Paschi said that the ECB had redone its sums—and concluded that the stricken lender faced an even bigger shortfall, of €8.8bn.

Plenty of other European banks—in far better nick than poor old Monte dei Paschi, which is overloaded with bad loans—are grumbling that they too may eventually have to find more capital. They have spent years plumping up cushions that the financial crisis showed to be worryingly thin, but fear that proposed adjustments to Basel 3, the latest global standards, will require more. The Basel Committee on Banking Supervision, which draws up the standards, had hoped to agree on the revisions by the end of 2016. It's not there yet: on January 3rd an imminent meeting of central-bank governors and supervisors, to approve the changes, was postponed.

The amendments are intended to reduce the variation in banks' own calculations of risk-weighted assets (RWAs), largely by restricting their use of in-house models. Under Basel rules, the ratio of a bank's equity to its RWAs are a key gauge of its strength: if lenders are too sanguine about risk, their estimated RWAs will be too low and their reported capital ratios misleadingly high.

The main obstacle to an agreement is the committee's proposal of an "output floor"—a lower bound for banks' RWAs—calculated as a percentage of the figure ►



► churned out by a “standardised” method. The higher the percentage, the tighter the standard: a first version of the proposals suggested 60-90%; a failed compromise last month proposed gradually raising it to 75% over four years, starting in 2021.

American officials like the floor, believing that it limits banks’ ability to play games with the rules. European banks and officials don’t. Both the Association of German Banks and the Bundesbank, for example, want no floor at all. They argue that internal models make capital calculations more, not less, sensitive to risk.

America’s banks would be little affect-

ed; several European lenders could be stung. That is partly because America has already installed floors in its domestic rules—and, Americans would add, its banks shaped up faster after the crisis. Europeans retort that it also reflects transatlantic differences in business models. European lenders tend to keep more residential mortgages on their books than American banks, which often sell them on; they also lend more to companies and for project finance. All this may carry heavier risk-weights under the revised rules.

Officials are still aiming for agreement in the first quarter of 2017. That probably

means fixing a floor, but how high? Omar Keenan and Kinner Lakhani, of Deutsche Bank, estimate that a 75% floor would increase the RWAs (and hence reduce the capital ratios) of 26 of the 34 listed European banks they cover; at 60%, the number drops to ten, mainly in the Netherlands and Nordic countries.

Phasing in the rules would give banks time to adapt. Under the timetable envisaged by the committee, they would have until 2025—almost two decades after the world’s financial system started to crack. If the stand-off continues, the repairs will take even longer to complete. ■

## Buttonwood | The third regime

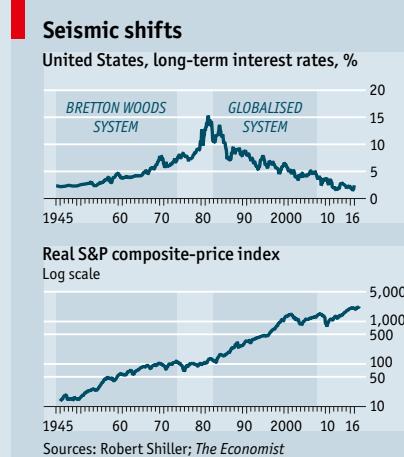
**The world is changing and investors may be too optimistic about the results**

**T**HANKS to Brexit and the election of Donald Trump, 2016 is widely viewed as a political turning-point. But it may also come to be seen as an economic turning-point, marking the third big change of direction since the second world war.

The post-war period from 1945 to 1973 was the era of the Bretton Woods system of fixed exchange rates and capital controls. It was a time of rapid economic growth in the rich world as countries rebuilt themselves after the war and as the technological innovations of the first half of the 20th century—cars, televisions, and so on—came into widespread use. High taxes reduced inequality; fiscal policy was used to control the economic cycle. It all came crashing down in the early 1970s as the fixed-currency system collapsed, and an oil embargo imposed by Arab producers ushered in stagflation (ie, high unemployment combined with inflation).

By the early 1980s, a new system had emerged. Currencies floated, capital controls were abolished, the financial sector was liberalised, industry was privatised and tax rates on higher incomes were cut. In this system inequality widened again (although economists still debate how to parcel out the blame between technological change and globalisation, as China and other countries took a full part in trade). Growth was slower than in the Bretton Woods era but inflation was reined in. Monetary measures replaced fiscal ones as the main policy tool. This era suffered its defining crisis in 2007-08 and has come to an end.

The final years of both periods were marked by a degree of monetary experimentation. In the late 1970s many policymakers were converted to the doctrine of monetarism—the idea that by setting a target for the growth of the money supply governments could control inflation (and



that controlling inflation should be the main aim of their policies). But monetarism proved harder to implement than its proponents thought; the monetary targets behaved unpredictably. By the mid-1980s, monetarism had been quietly dropped.

Since the 2008 crisis, monetary policy has had to be rethought again, with central banks grappling with the “zero bound” for interest rates. Their first move was to adopt quantitative easing, the purchase of assets to drive down longer-term borrowing costs. Some have since followed this up with negative rates on bank reserves.

Financial-market trends have played out against the backdrop of these two policy eras. Equities did very well for 20 years under the Bretton Woods regime, but started to falter in the mid-1960s, well before the system’s collapse. Perhaps investors already took fright at signs of inflation; bond yields had been trending upwards since the end of the second world war.

In the era of globalisation a great equity bull market began in 1982 but declined in 2000-02 with the bursting of the dotcom

bubble. That was a portent of the bigger crisis of 2007-08. Both showed how investors could be prey to “irrational exuberance” and push asset prices to absurd levels. Just as rising bond yields in the 1960s presaged the inflationary battles of the 1970s, so falling bond yields in the 1990s and 2000s foreshadowed today’s struggles with deflation and slow growth.

Financial markets seem to expect that political turmoil will indeed lead to another change of economic regime. Since the American election the MSCI World equity index has rallied and the Dow Jones Industrial Average has hit record highs. Valuations reflect this optimism. In the early 1980s price-earnings ratios were in single digits. In contrast, the S&P 500 now trades on an historic price-earnings ratio of 25. Another contrast with the 1980s is that, back then, short-term interest rates were at double-digit levels and equity valuations were able to climb as rates fell. That cannot happen now.

So what kind of economic regime are investors expecting? They seem to be cherry-picking the best bits from the previous two regimes—the tax cuts and deregulation of the 1980s with an expectation that (as under Bretton Woods) fiscal, rather than monetary, policy will be used to smooth the ups and downs of the cycle.

But the populist revolt is, in large part, a reaction against the free movement of capital and labour that has made so many financiers rich. A much bleaker outcome is possible, whereby rising nationalism leads to trade wars and an ageing workforce makes it impossible for the rich world to regain the growth rates of past decades. Change is coming. But rather than resembling the 1980s, the new regime could look more like the 1930s.

## Sub-national currencies

# Local difficulties

### From Brixton to New York, local currencies struggle to survive

TUCKED away in a corner of Brixton, in south London, a rainbow-coloured ATM dispenses cash, looking for all the world like any other. But the notes it spews out are not pounds sterling. They are Brixton pounds (B£). Not to be mistaken for silly Monopoly money, the Brixton pound can actually be spent, legally: the currency, which has a fixed one-for-one exchange rate with sterling, is accepted at over 150 local shops and businesses. It can even be used to pay local taxes.

Launched in 2009, this is one of many such initiatives. Local currencies have been adopted in other towns and cities in Britain, such as Bristol, Exeter and Totnes. Elsewhere, examples include the eusko, used in the French Basques; BerkShares, used in western Massachusetts; and the Ithaca Hour, in Ithaca, New York. Barcelona plans an experiment in 2017.

Such schemes aim to boost spending at local retailers and suppliers, by encouraging the recirculation of money within a community. Because the currency is worthless outside its defined geographic area, holders spend it in the neighbourhood, thus creating a "local multiplier effect". Backers of the schemes also claim environmental benefits: stronger local businesses cut transport distances and carbon emissions.

But local currencies have a poor record. Of over 80 launched in America since 1991, only a handful survive. Elsewhere, the Guardiagrele simec in Italy, the Toronto dollar, the Stroud pound and others are languishing or are already defunct. Even

the Ithaca Hour, the most hyped "success", has seen its circulation fall precipitously from two decades ago, says its founder, Paul Glover.

Local currencies face three hurdles. First, they are relatively illiquid, being accepted only at willing local businesses. They are, in effect, a form of self-imposed economic sanction, narrowing the range of choice for consumers and businesses. Second, local-currency schemes suffer from a trust deficit: they are not backed by the central bank, so holders do not want to risk having too much. Finally, having to deal with two parallel currencies imposes transaction costs—and those wanting to back local businesses can easily use the national currency.

All of which helps explain why local-currency circulation in most of these places is very low. Just B£100,000 (\$123,000) circulates, for example, in an area of 300,000 people. That is too little to have much of an economic impact one way or another. The odd-looking notes, however, do make good souvenirs. ■

## Futures and options trading

# Out of the pits

### CHICAGO

## A long era of trading closes as the underlying business gathers steam

AS A new trading year began this week in the art-deco tower that houses the Chicago Board of Trade, big men were clustered around pits dealing in futures and options tied to various commodities. Their approach dates back to the building's opening in 1930, and was once familiar in cities throughout America. But after decades of attrition, on December 30th the CME Group (named after the Chicago Mercantile Exchange) closed the "open outcry" trading pits that it operated in New York. In America, Chicago's hue and cry has become unique.

Even this exchange is a shadow of its former self. There are now nine pits, down from 32 in 2007. A once teeming trading floor was closed in 2015. Most activity in the contracts still traded in the pits is electronic. No one in the surviving CME pits in Chicago seems worried by the New York closures. But they have a symbolic impact. The markets have long been a colourful, fractious component of America's financial architecture.

They have always lured the ambitious. Two alumni of New York's commodity markets have joined the Trump administration. Gary Cohn parlayed a cab ride into a job as a silver trader, into a position at Goldman Sachs, and, eventually, that



Nothing to outcry about

bank's presidency. His new post is as Mr Trump's chief economic adviser. Vincent Viola swapped a job at an exchange for Virtu Financial, the electronic-trading firm he founded that made him a fortune. He will be nominated as army secretary.

Tales of failure as well as of success abound. A scandalous default in the potato market in the 1970s wiped out several firms. A failure to corner the silver market in the 1980s led to the spectacular bankruptcy of one of America's richest families. The destruction of the World Trade Centre in 2001 obliterated the floor used by four of New York's commodity exchanges but even before the flames were extinguished they were back to business, some in small temporary facilities like technological junk shops, knit together by familiar cries.

In the end it was not scandal or terrorism that undermined open outcry; it was efficiency. Computers turned out to be quicker, cheaper and more precise than humans. Almost all the important contracts ended up in the hands of the CME Group, which was first to realise that the most dynamic business was not in traditional commodities but in interest rates, stock indices and currencies. The strong volume these products provided enabled the CME to create economies of scale in clearing and trading systems, and to scoop up other exchanges as they faltered.

Bit by bit, the exchange has shed its real-estate assets. The Board of Trade building was sold in 2012 and the equivalent New York facility in 2013. This contraction, however, is far from reflecting the health of overall business—which is booming. In 2016 Brexit, the American election and India's monetary experimentation, to cite just three examples, each created demand for futures and options tied to interest rates, precious metals and currency. Transaction volume on the CME grew by 12% to reach a new record. The markets are more important than ever, even if, increasingly, they can be neither seen nor heard. ■



Five Bowies make a Winston

Anthony Atkinson

# For poorer, for richer

**Anthony Atkinson, a great British economist, died on January 1st, aged 72**

“**T**IME is of the essence,” wrote Sir Anthony Atkinson, a British economist, in a report on measuring global poverty, published in July 2016. His sense of urgency may have been influenced by another constraint. In 2014 Sir Anthony had been diagnosed with incurable cancer. Some might have paused; he sped up. He chaired the World Bank commission that produced the poverty report, and wrote a book, “Inequality: What Can Be Done?”, in just three months. On January 1st, his time ran out.

In his lifetime, he was tipped for a Nobel prize. On his death, fellow economists rushed to describe him as “one of the all-time greats” and emphasised his extraordinary “decency, humanity and integrity”. The two were linked. For him, economics was about improving people’s lives.

A six-month stint volunteering as a nurse in a hospital in deprived inner-city Hamburg was an early influence. He saw poverty, and went on to spend his life combating it. He fought his battles gently—shying away from the adversarial style he experienced as a student at Cambridge—but with rigorous precision and an unfailing sense of social justice.

As economists fell in love with markets in the 1980s and 1990s, he wrote the best textbook on their failures, with Joseph Stiglitz, another economist. (Mr Stiglitz’s scrawl was some comfort to Sir Anthony, as evidence of handwriting even worse than his own.) Faced with an imperfect world, he showed how to achieve a second-best compromise.

The theoretical pontificating of 18th- and 19th-century political economists on welfare and inequality had rather fallen out of fashion. Sir Anthony quickly identified a big obstacle to getting the message across: a lack of good data. He pored through historical sources to unearth past trends in income inequality. He created data sets on the highest incomes, findings from which would support the slogans on protesters’ placards. Sir Anthony was a mentor and collaborator of Thomas Piketty, famous for his book, “Capital in the Twenty-First Century”. Mr Piketty says that all work on trends in income and wealth inequality stems from Sir Anthony’s.

In the course of his career, Sir Anthony contributed to an average of nearly a book a year and sat on numerous government commissions. The legacy of his most cited paper, published in 1970, is an inequality index that bears his name. Existing mea-

Insuring talent

# Death Star

**When the famous die, it is increasingly costly for insurers**

**T**HE death of Carrie Fisher, a much-loved actor in the “Star Wars” movies, left a hole in the force for fans. It may also burn a hole in the pockets of underwriters, syndicated under Lloyds of London. They may have to fork out as much as \$50m to meet Disney’s claim for its loss. The studio, which owns the sci-fi saga, had wisely taken out so-called contractual-protection insurance (CPI) in case death thwarted a contractual obligation: in Ms Fisher’s case to film and promote future “Star Wars” episodes.

Contrary to the headlines, 2016 was not an especially lethal year to be a celebrity. Like the rest of us, they do die. But unlike most of us, their employers can be left with astronomic bills. When Paul Walker, an actor in “The Fast and the Furious”, a series of action movies, died in 2013 while filming the seventh instalment, Universal Pictures had to spend considerable effort (and dollars) to make

his on-screen persona live on. This included hiring body-doubles and digitally inserting Mr Walker into the movie with hundreds of computer-generated images.

Most workers are easier to replace. Employers can take out simple life insurance that pays a fixed lump sum. But the value of a film star to a studio, or a striker to a football club, is harder to calculate in advance. It depends on all sorts of things, especially timing. This is where contingency insurance, such as CPI, comes in. Unlike a life policy, how much of the \$50m Disney receives depends on how it now calculates and justifies the losses caused by Ms Fisher’s death. This could include, for example, her role in boosting sales of storm-trooper figurines.

Insuring talent is becoming popular outside Hollywood. The aptly named Exceptional Risk Advisors, a company based in New Jersey that reportedly brokered the Fisher policy, also helps insure against the deaths of hedge-fund managers, company executives and sports teams’ star players. Publishers have taken out CPI in case bestselling authors die with books half-written.

Jonathan Thomas, from Munich Re, who has written contingency policies for over 30 years, says they are “exactly what Lloyd’s is good at”. The greatest change he has seen is in the sums involved. But some worry that underwriters are dropping their standards and taking on too much risk. This could well become a problem if contingency insurance grows much larger. But today it is still tiny compared with life insurance.

With rock stars remaining on stage into their dotage and long-running sequels one of the surest ways to make money in Tinseltown, the risks of losing a “key human” (or on occasion animal) are growing. That creates business opportunities for insurers, so long as they remain prudent and don’t become star-struck.



Carrie trade

sures, he showed, might seem like neutral indicators of the spread of incomes in a country. In fact they contained implicit value judgments. Some were more sensitive to sagging incomes for the poorest; others would respond more to soaring incomes at the top. Always constructive, he then created a new class of inequality measures, making explicit what had been implicit. Today they are used by the US Census Bureau.

He went beyond analysing the world to trying to fix it—in ways that many rejected.

His faith in the power of government to right the world’s ills led to radical proposals. His final book on inequality argued for a participation income (a payment for all who contribute to society) and a tax on wealth to finance an inheritance for everyone on reaching the age of 18. He pushed back against pressure to cut taxes and prioritise containing inflation over reducing unemployment. To the end, he was battling lifelong challenges: inadequate data; how to harness government for good; and closed minds. ■

# Free exchange | The fallacy of the fallback

The “WTO option” for Brexit is far from straightforward



**T**HE two sides of the Brexit debate do not agree on much, but they agree on this: if Britain fails to reach a trade deal with the EU it will have to revert to the “WTO option”. This involves trading only under rules set by the World Trade Organisation. The Leave camp is happy with this idea; Remainers less so. But the awkward truth is that the WTO option is not much of a fallback. Becoming an independent WTO member will be tortuous.

It is puzzling that Brexiteers, whose campaign was summed up as “Vote Leave, take back control”, seem happy with the WTO option. The WTO is truly global, with only a handful of countries outside it (zealous as they are about sovereignty, Brexiteers do not want to join the ranks of Turkmenistan and Nauru). But forsaking one unelected, unaccountable bureaucracy in Brussels for another housed in a leafy district of Geneva seems perverse. WTO members are at the mercy of its “dispute-settlement” regime, which allows other countries to enforce penalties.

Inconsistency has its upside. Membership of the WTO appears to be good for trade. Most economists believe Britain’s overall trade will suffer if Britain leaves the single market. But Brexiteers argue that, out of the EU’s clutches, Britain will be the WTO’s star pupil, striking trade deals across the world. China’s explosive export growth after joining in 2001 testifies to its potency.

However, there is a snag. Britain is already a member of the WTO, but operates through the EU. To become a fully independent member, Britain needs to have its own “schedules”, WTO-speak for the lists of tariffs and quotas that it would apply to other countries’ products. Alan Winters, of the UK Trade Policy Observatory at the University of Sussex, says that, in theory, it would not be too hard for Britain to acquire its own schedules. Any change would require the acquiescence of other members. But, using a “rectification” procedure, the government would simply cut “EU” at the top of the page and paste in “UK” instead. Bigger changes—say, raising tariffs on certain goods—might require a more ambitious “modification” and more thorough negotiations.

The most simple course, then, would seem to be for Britain to keep its schedules as they are under the EU, including the “common external tariff”, applied uniformly by EU members to imports from third countries. The government has recently hinted as much. This avoids diplomatic wrangling. But simply to readopt

EU-approved commitments hardly looks like “taking back control”. It would also lead to other problems.

WTO trade agreements assume that the EU as it currently stands is a coherent economic bloc. Trade in goods between the 28 member states is pretty free. Multinationals, which need to move components back and forth frequently between different member states, have set up supply chains accordingly. Brexit complicates this arrangement. If Britain kept the common external tariff in place, then it might also apply to a company moving components between the EU and Britain. Such a firm could incur tariff charges each time a border is crossed. A WTO member might kick up a fuss if, say, one of its car companies with production facilities in both Britain and the EU suddenly found it more expensive to assemble a model.

A related problem concerns the WTO’s “tariff-rate quotas” (TRQs). These allow a certain amount of a good to enter at a cheaper tariff rate. The EU has almost 100 of them. Peter Ungphakorn, formerly of the WTO secretariat, uses the example of the “Hilton” beef quota (named after a hotel where the agreement was reached) to illustrate how gnarly Brexit could be.

The EU’s current official quota on beef imports is about 40,000 tonnes, charged 20% import duty, he reckons. Above the quota, the duty is much higher. Britain and the EU will need to divide those 40,000 tonnes. The EU might push Britain to take a big share, appeasing European beef producers. British farmers would howl as low-tariff beef flooded in. The quotas might need to be increased because Britain-EU trade would now come under them. Expect to hear more about TRQs in 2017. According to Luis González García of Matrix Chambers, a legal-services firm, they are likely to become “the most contentious issue” in Britain’s re-establishment of its status as an independent WTO member.

## Least-favoured nation

The WTO will even shape the Brexit negotiations themselves. In recent weeks, the government has appeared keen to ensure that, even after Brexit, Britain’s big exporters will be able to sell freely to the single market. It has mooted paying into the EU budget to guarantee access for the City of London’s financiers. It has assured Nissan, a carmaker, that it will not lose from Brexit. It has studiously refused to spell out the terms of this guarantee, rumoured to entail as-yet-unspent regional-development funds.

WTO rules, however, make such industry-specific deals hard. If Britain were to agree bilaterally with the EU not to apply tariffs on cars, the WTO’s “most-favoured nation” principle would force it to offer tariff-free access to other countries’ too, says Mr Ungphakorn. And free-trade deals are not supposed to cover just one or two goods, but “substantially all the trade” between the countries involved. Meanwhile, channelling government money to boost exports is frowned on in Geneva.

Some of these problems are surmountable. The WTO is not as legalistic as you might think, says Mr Winters; countries that stay in others’ good books find things easier. But so far, British politicians are also struggling on that front. Boris Johnson, the foreign secretary, has irritated his counterparts with clownish comments. “We are pro-secco but by no means anti-pasto,” he recently told the Sun, a newspaper, alluding to food imports from the EU. When the reality of Brexit dawns, Mr Johnson and his fellow Brexiteers will find no trade deal to be especially appetising. ■



## Medicine and computing

## The shoulders of gAInts

### Artificial intelligence may help unpick the complexity of biology

**I**N A former leatherworks just off Euston Road in London, a hopeful firm is starting up. BenevolentAI's main room is large and open-plan. In it, scientists and coders sit busily on benches, plying their various trades. The firm's star, though, has a private, temperature-controlled office. That star is a powerful computer that runs the software which sits at the heart of BenevolentAI's business. This software is an artificial-intelligence system.

AI, as it is known for short, comes in several guises. But BenevolentAI's version of it is a form of machine learning that can draw inferences about what it has learned. In particular, it can process natural language and formulate new ideas from what it reads. Its job is to sift through vast chemical libraries, medical databases and conventionally presented scientific papers, looking for potential drug molecules.

Nor is BenevolentAI a one-off. More and more people and firms believe that AI is well placed to help unpick biology and advance human health. Indeed, as Chris Bishop of Microsoft Research, in Cambridge, England, observes, one way of thinking about living organisms is to recognise that they are, in essence, complex systems which process information using a combination of hardware and software.

That thought has consequences. Whether it is the new Chan Zuckerberg Ini-

tiative (CZI), from the founder of Facebook and his wife, or the biological subsidiaries being set up by firms such as Alphabet (Google's parent company), IBM and Microsoft, the new Big Idea in Silicon Valley is that in the squiggy worlds of biology and disease there are problems its software engineers can solve.

### Drug money

The discovery of new drugs is an early test of the belief that AI has much to offer biology and medicine. Pharmaceutical companies are finding it increasingly difficult to make headway in their search for novel products. The conventional approach is to screen large numbers of molecules for signs of pertinent biological effect, and then winnow away the dross in a series of more and more expensive tests and trials, in the hope of coming up with a golden nugget at the end. This way of doing things is, however, declining in productivity and rising in cost.

One explanation suggested for why drug discovery has become so hard is that most of the obvious useful molecules have been found. That leaves the obscure ones, which leads to long development periods and high failure rates. In theory, growing knowledge of the basic science involved ought to help. The trouble is that too much new information is being produced to be

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turned quickly into understanding.

Scientific output doubles every nine years. And data are, increasingly, salami-sliced for publication, to lengthen researchers' personal bibliographies. That makes information hard to synthesise. A century ago someone could still, with effort, be an expert in most fields of medicine. Today, as Niven Narain of BERG Health, an AI and biotechnology firm in Framingham, Massachusetts, points out, it is not humanly possible to comprehend all the various types of data.

This is where AI comes in. Not only can it "ingest" everything from papers to molecular structures to genomic sequences to images, it can also learn, make connections and form hypotheses. It can, in weeks, elucidate salient links and offer new ideas that would take lifetimes of human endeavour to come up with. It can also weigh up the evidence for its hypotheses in an even-handed manner. In this it is unlike human beings, who become unreasonably attached to their own theories and pursue them doggedly. Such wasted effort besets the best of pharmaceutical firms.

For example, Richard Mead, a neuroscientist at the University of Sheffield, in England, says BenevolentAI has given him two ideas for drugs for ALS, a neurodegen-

### The Richard Casement internship

We invite applications for the 2017 Richard Casement internship. We are looking for a would-be journalist to spend three months of the summer working on the newspaper in London, writing about science and technology. Applicants should write a letter introducing themselves and an article of about 600 words that they think would be suitable for publication in the Science and Technology section. They should be prepared to come for an interview in London or New York. A stipend of £2,000 a month will be paid to the successful candidate. Applications must reach us by January 27th. These should be sent to: casement2017@economist.com

erative disease that he works on. Both molecules remain confidential while their utility is being assessed. One is bang in the middle of what he and his team are doing already. To him, this confirms that the artificial intelligence in question is generating good ideas. The other, though, is complicated and not obvious, but mechanistically interesting. Without the AI to prompt them, it is something his team might have ignored—and that, he admits, might in turn be a result of their bias.

For now, BenevolentAI is a small actor in the theatre of biology and artificial intelligence. But much larger firms are also involved. Watson, a computer system built by IBM, is being applied in similar ways. In particular, IBM has gone into partnership with Pfizer, an American pharma company, with the intention of accelerating drug discovery in immuno-oncology—a promising area of cancer therapy that encourages the body's own immune system to fight tumours.

Artificial intelligence will also move into clinical care. Antonio Crimini, who, like Dr Bishop, works at Microsoft Research in Cambridge, observes that today the process of delineating the edges of tumours in images generated by MRI machines and CT scans is done by hand. This is tedious and long-winded (it can take up to four hours). AI can reduce the time taken to minutes, or even seconds—and the results are completely consistent, unlike those arrived at by human doctors.

Another example of AI's move into the clinic is described in a recent paper in *JAMA*, an American medical journal. This paper showed that it is possible to use AI to detect diabetic retinopathy and macular oedema, two causes of blindness, in pictures of the retina. Enlitic, a new firm based in San Francisco, is using AI to make commercial software that can assist clinical decisions, including a system that will screen chest x-rays for signs of disease. Your.MD, a firm based in London, is using AI, via an app, to offer diagnoses based on patients' queries about symptoms. IBM is also, via Watson, involved in clinical work. It is able to suggest treatment plans for a number of different cancers. All this has the potential to transform doctors' abilities to screen for and diagnose disease.

### The power of networking

Another important biological hurdle that AI can help people surmount is complexity. Experimental science progresses by holding steady one variable at a time, an approach that is not always easy when dealing with networks of genes, proteins or other molecules. AI can handle this more easily than human beings.

At BERG Health, the firm's AI system starts by analysing tissue samples, genomics and other clinical data relevant to a particular disease. It then tries to model

from this information the network of protein interactions that underlie that disease. At that point human researchers intervene to test the model's predictions in a real biological system. One of the potential drugs BERG Health has discovered this way—for topical squamous-cell carcinoma, a form of skin cancer—passed early trials for safety and efficacy, and now awaits full-scale testing. The company says it has others in development.

For all the grand aspirations of the AI folk, though, there are reasons for caution. Dr Mead warns: "I don't think we are in a state to model even a single cell. The model we have is incomplete." Actually, that incompleteness applies even to models of single proteins, meaning that science is not yet good at predicting whether a particular modification will make a molecule intended to interact with a given protein a better

drug or not. Most known protein structures have been worked out from crystallised versions of the molecule, held tight by networks of chemical bonds. In reality, proteins are flexible, but that is much harder to deal with.

More work at the molecular level is therefore needed before AI will be able to crack open the inner workings of a cell. One of czr's first projects is generating just such basic data. That, in itself, is a massive undertaking—but it is one which collaboration with artificial intelligence will also speed up. AI will nudge people to generate new data and run particular experiments. Those people will then ask the AI to sift the results and make connections. As Isaac Newton put it, "If I have seen further, it is by standing on the shoulders of giants." If the brains of those giants happen to be made of silicon chips, so be it. ■

### Olfactory medicine

## Whiff of danger

### A prototype device to detect the smell of disease

**O**NE of a doctor's most valuable tools is his nose. Since ancient times, medics have relied on their sense of smell to help them work out what is wrong with their patients. Fruity odours on the breath, for example, let them monitor the condition of diabetics. Foul ones assist the diagnosis of respiratory-tract infections.

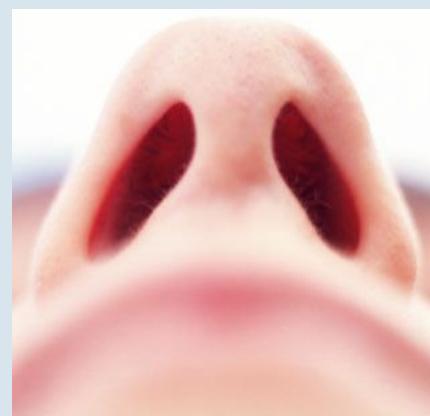
But doctors can, as it were, smell only what they can smell—and many compounds characteristic of disease are odourless. To deal with this limitation Hossam Haick, a chemical engineer at the Technion Israel Institute of Technology, in Haifa, has developed a device which, he claims, can do work that the human nose cannot.

The idea behind Dr Haick's invention is not new. Many diagnostic "breathalysers" already exist, and sniffer dogs, too, can be trained to detect illnesses such as cancer. Most of these approaches, though, are disease-specific. Dr Haick wanted to generalise the process.

As he describes in *ACS Nano*, he and his colleagues created an array of electrodes made of carbon nanotubes (hollow, cylindrical sheets of carbon atoms) and tiny particles of gold. Each of these had one of 20 organic films laid over it. Each film was sensitive to one of a score of compounds known to be found on the breath of patients suffering from a range of 17 illnesses, including Parkinson's disease, multiple sclerosis, bladder cancer, pulmonary hypertension and Crohn's disease. When a film reacted, its electrical resistance changed in a predict-

able manner. The combined changes generated an electrical fingerprint that, the researchers hoped, would be diagnostic of the disease a patient was suffering from.

To test their invention, Dr Haick and his colleagues collected 2,808 breath samples from 1,404 patients who were suffering from at least one of the diseases they were looking at. Its success varied. It could distinguish between samples from patients suffering from gastric cancer and bladder cancer only 64% of the time. At distinguishing lung cancer from head and neck cancer it was, though, 100% successful. Overall, it got things right 86% of the time. Not perfect, then, but a useful aid to a doctor planning to conduct further investigations. And this is only a prototype. Tweaked, its success rate would be expected to improve.



The nose knows

## Atmospheric physics

# The storm before the calm

**Something is damping down cyclones before they reach the American coast**

IN 2015, a bit over two years after Hurricane Sandy hit his city, Bill de Blasio, New York's mayor, announced the creation of a \$3 billion restoration fund. Part of the money is intended to pay for sea walls that will help protect the place from future storms.

Building such walls may be an even more timely move than Mr de Blasio thought when he made his announcement. As a paper just published in *Nature* explains, for the past two decades a natural form of protection may have been shielding America's Atlantic coast, stopping big storms arriving. Such protection, though, is unlikely to last forever. Mr de Blasio is thus taking the prudent course of mending the roof while the sun is shining.

The study in question was conducted by James Kossin of America's National Oceanic and Atmospheric Administration, using wind and ocean-temperature data collected since 1947. In it, Dr Kossin shows that the intensity of hurricanes which make landfall in the United States tends to be lowest when the Atlantic's storm-generation system is at its most active.

In Dr Kossin's view, the cause of this apparent paradox is that, when conditions in the deep Atlantic conspire to produce the most hurricanes, precisely the opposite conditions obtain along the American coast. That creates a buffer zone which lowers the intensity of incoming storms before they make landfall. The agent responsible for this lowering of intensity is vertical wind shear—in other words, wind speeds and directions that vary greatly with altitude. Vertical wind shear removes energy from hurricanes by pulling heat and moisture out of a storm's centre. When the Atlantic is in its hurricane-producing phase, with low wind shear and high surface temperatures in its central region, the part along the American coast behaves in the opposite manner, with high wind shear and low surface temperatures that sap storms' energy.

The obverse is also true. When wind shear and sea-surface temperatures keep the Atlantic's hurricane-generating region quiet, as they did between 1970 and 1992, those storms which do appear are two to three times more likely to intensify rapidly (defined as gaining 15 knots of wind speed in six hours) when they are near the coast than is the case during active periods.

Not everyone agrees with Dr Kossin's proposed mechanism. James Elsner, a ge-

## Palaeontology

# Cracking a puzzle

## How reptilian were dinosaur eggs?

DID dinosaur eggs hatch quickly, like those of birds (which are dinosaurs' direct descendants), or slowly, like those of modern reptiles (which are dinosaurs' collateral cousins)? That is the question addressed by Gregory Erickson of Florida State University and his colleagues in a paper just published in the *Proceedings of the National Academy of Sciences*. It is pertinent because it touches on the wider matter of just how "reptilian" the dinosaurs actually were. Researchers already know that many were warm-blooded, and that some had insulation in the form of feathers, even though they could not fly. Fast-developing embryos would drive a further wedge between them and their truly reptilian kin.

To investigate, Dr Erickson looked at two sets of fossilised dinosaur eggs. The first, from a Mongolian nest (pictured),



A dinosaur's nest

was laid by *Protoceratops andrewsi*, a sheep-sized creature that lived 70m years ago. The second, from Canada, was laid by *Hypacrosaurus stebingeri*—a species contemporary with *P. andrewsi* that grew to something between the weights of a rhinoceros and an elephant.

In each case the researchers used an x-ray scanner to examine the teeth of embryos found inside the eggs. In cross-section, dinosaur teeth display growth rings, called von Ebner lines, that are reminiscent of the annual growth rings of a tree trunk. In all living species which have von Ebner lines those lines represent a day's growth. It therefore seems reasonable to believe that this was true for dinosaurs as well.

Assuming also, as Dr Erickson and his colleagues did, that dinosaurs' teeth began to grow about halfway through embryonic development (which is when a crocodile's embryonic teeth first appear), they conclude that the *P. andrewsi* eggs they looked at were about 83 days old, making that the lower bound of their incubation period. This compares with the 42 days an ostrich egg takes to incubate and the 200-plus days required by a Komodo dragon egg—both of these animals being, when adult, of comparable size to *P. andrewsi*.

The bigger eggs of *H. stebingeri* needed, according to Dr Erickson's calculations, a minimum of 171 days incubation. Sadly, no egg-laying animal of its size is around today for comparison. But projections based on size and incubation-period data from modern birds and reptiles suggest 171 days is substantially more than would be expected if the eggs of *H. stebingeri* were developing in a birdlike way.

The truth, then, is that in this as in other matters, dinosaurs are less reptilian than was once thought, but not as avian as some revisionists would like to believe. A messy answer, perhaps. But, in nature, things are not always clear-cut.

ographer at Florida State University, suggests that the correlations between storm generation and storm strength at landfall which Dr Kossin observes could be explained another way. The biggest storms tend to start out far from land rather than near it, and during periods of high activity hurricanes are generated farther out in the Atlantic than happens during lulls. These distant storms thus have more time to veer north—pushed that way by the interaction

between Earth's rotation and their own, a phenomenon called the Coriolis effect—and therefore avoid landfall altogether.

Whatever its physical explanation, though, the correlation looks secure. And, with the current period of active hurricane formation now 24 years old, a lull, with accompanying superstorms, may not be long in coming. Time, perhaps, for other mayors along America's Atlantic coast to follow Mr de Blasio's example. ■



## Britain and the European Union

### Why Brexit won

The first crop of Brexit books includes entries rich with detail and analysis

ONE explanation of Britain's vote to quit the European Union last June is that Eurosceptics worked towards it for decades. A young Daniel Hannan joined their number in the early 1990s, first as a student, later as a journalist and Tory MEP. In his new book Mr Hannan duly slams the EU's erosion of national sovereignty and supposed antipathy to free markets. His vision is of a more liberal, open and less regulated Britain, trading freely around the globe and no longer held back by a bureaucratic and stagnant EU.

Yet this differs sharply from the ideas of other Brexiteers, such as Nigel Farage, the former leader of the UK Independence Party. Because Mr Hannan has economic nous, he likes a Norwegian-style "soft Brexit", at least as a transition. Norway is outside the EU but in its single market, so it accepts most of its rules, freely admits EU migrants and pays into its budget. Mr Farage will have none of this: anything less than a "hard Brexit" that takes Britain out of the single market would betray voters.

This tension between hard and soft Brexit is one reason why Theresa May's Tory government has remained so opaque about its goals. It was also evident during the campaign, as Owen Bennett's book shows. Indeed, the rival Brexiteers hated each other even more than they did their opponents—or the EU. On one side stood Mr Farage and his millionaire backer, Arron Banks (whose diary of the campaign is

**What Next: How to Get the Best from Brexit.** By Daniel Hannan. *Head of Zeus*; 298 pages; £9.99. To be published in America in February

**The Brexit Club.** By Owen Bennett. *Biteback*; 340 pages; £12.99

**The Bad Boys of Brexit.** By Arron Banks. *Biteback*; 338 pages; £18.99

**All Out War.** By Tim Shipman. *William Collins*; 630 pages; £25

tellingly called "The Bad Boys of Brexit"), bent on talking about immigration and little else. On the other, with Mr Hannan, were leading Tory MPs like Michael Gove and Boris Johnson, backed by UKIP's only MP, Douglas Carswell, who played down immigration and talked up global trade liberalisation instead.

Mr Bennett is good on the internecine warfare among Brexiteers, but his book lacks the detailed reporting that is in Tim Shipman's "All Out War". Mr Shipman, political editor of the *Sunday Times*, has interviewed almost everyone involved in the referendum (though apparently not Mrs May's predecessor, David Cameron, who is writing his own memoir). He has in a remarkably short time produced a story that is thorough, comprehensive and utterly gripping. It is hard to imagine a better first

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draft of history. It will not give Mr Cameron much satisfaction.

Partly because they expected to win easily, as Harold Wilson did in 1975, Mr Cameron and the Remainers made tactical mistakes. These included accepting a pre-vote period of official government "purdah", constraining what it could publish; allowing cabinet ministers to back Leave without resigning; and avoiding direct "blue-on-blue" attacks on fellow Tories. Mr Cameron's renegotiation of Britain's membership in February was also successfully portrayed by Leavers as trivial.

In the campaign itself, Mr Cameron's team relied heavily on what became tarred as "Project Fear". Modelled on the defeat of the Scottish independence referendum in September 2014, it stressed Brexit's risks to the economy. George Osborne, the chancellor, issued gloomy forecasts of lost income, output and jobs. Many domestic and international bodies were wheeled out to support such warnings, culminating with Barack Obama saying that Britain would be at "the back of the queue" for trade deals. There was little effort to put out a positive message about the EU or to defend immigration, Leavers' key weapon.

The main Vote Leave campaign led by Matthew Elliott and Dominic Cummings was more vigorous and more aggressive than the Stronger In team led by Will Straw and Craig Oliver from 10 Downing Street. Downing Street also misjudged the mood of Tory MPs. It hoped gratitude for the 2015 Tory election victory and respect for Mr Cameron's leadership would reduce rebel numbers to 50-60. But careful canvassing by Steve Baker, a Eurosceptic backbencher, pushed them up to over 140, including the critical duo of Mr Gove and Mr Johnson. Letting the Remain campaign seem largely Tory-run was another error.

The Leavers made mistakes, too. They ►

▶ failed to answer the economic argument, being reduced to Mr Gove's notorious attack on "experts". They did not set out clear alternatives to membership. Their internal splits and focus on immigration often made them seem nasty, a big worry when a Labour MP, Jo Cox, was brutally murdered in mid-June, just before the vote, by a man linked to the far right. By then many Leavers thought they would lose.

That they won is down to three causes deeper than Remainers' tactical errors. One was the Labour Party leadership. The arrival of Jeremy Corbyn, a far-left anti-EU figure, in late 2015 made winning the refer-

endum harder. Although he nominally backed Remain, he and his team often sabotaged the Labour In campaign, for example refusing to use the word "united" to describe Labour's position or to share a platform with former party leaders.

A second was the rising anti-elite, anti-London and anti-globalisation mood of many voters, especially in the Midlands and north. Those who feel they were left behind after the financial crisis have turned to populists in many countries (including to Donald Trump in America). In the Brexit referendum they voted in unexpectedly large numbers, a big reason why

many pollsters got the result wrong.

The third goes back to Mr Hannan and his friends. For three decades British governments of both parties, egged on by a shrilly Eurosceptic press, did little but carp at Brussels. Mr Cameron's delusion was that, having himself hinted that he might campaign to Leave, he could turn sentiment round completely in just three months. Instead, his past stance made him seem unconvincing when he portrayed EU membership as vital for Britain's economy and security. This same legacy could now make it trickier for Mrs May to persuade voters to accept a soft Brexit. ■

## Johnson | Word of the year

**The past 12 months saw many words enjoy a breakthrough. Unfortunately most of them are grim**

CHOOSING the "word of the year" can be an unenlightening exercise. The last several years have seen language mavens and dictionary publishers pick an emoji (the one meaning "crying with joy"), "because" as a preposition (because teenagers), and "hashtag" (as in "I'm so happy, hashtag irony," to signal a hashtag in speech). Most are probably passing fads; a "word of the year" should ideally both summarise the feel of the 12 months and have a chance of surviving.

If recent years have offered slim pickings, that is certainly not the case of 2016. Last year gave the English language an unusually big crop. Take "adulting", an unlikely verb used by younger millennials to describe the joys of paying rent and making it to work on time and sober. Memes circulate online with the likes of a picture of a puppy lying passed out on the floor under the text "I Can't Adult Today. Please Don't Make Me Adult". With slang rising and falling faster than ever before, though, it is anyone's guess whether adulting will survive as long as it takes for its users to become seasoned grown-ups.

The same short shelf-life might be reserved for "hygge", a venerable Danish word for a kind of relaxed happiness, and a phenomenon that hit Britain's publishing industry like the hammer of Thor in 2016. No fewer than nine books on hygge were released or planned. Danes are amused that Britons think its joys can be found in a book, as it has a lot more to do with good company than things like the socks and mulled wine touted on these books' covers. It is hard to imagine non-Danes still going on about hygge in 2026.

Many words do look more likely to survive. The Chinese do not actually curse you with "may you live in interesting times," but 2016 certainly has been a bit too interesting, its politics making a



mark on the lexicon.

First came "Brexit", a strong runner for word of the year. It isn't the first portmanteau word with a country name and "exit"—that was Greece's possible exit from the euro, or "Grexit"—but it's the one that has actually happened, and its consequences will be around for a long time. Britain's vote to leave the European Union has others talking of a potential "Frexit", should Marine Le Pen become president of France, or "Italeave", if Italy should be forced out of the euro. The portmanteau that spawned a thousand others, Brexit has also resulted in "Remoaners", those who voted for Britain to remain in the EU, and who are still grousing about the result.

It was America's turn to embrace leap-into-the-unknown populism with the election of Donald Trump in November. The "alt-right", another newly prominent group, played a role in Mr Trump's victory. After firing two more conventional cam-

aign managers, the candidate hired Steve Bannon to run his election bid. Mr Bannon had been the chairman of Breitbart, a website devoted to the worldview of maverick conservatives who sometimes call themselves "race realists", while others call them "white nationalists". Most reject labels like "white supremacist" or the dreaded "racist": white nationalists merely say that whites, like other peoples, should have their own countries, for everyone's good.

Many people voted for Mr Trump not because they thought he was a racist, but because they could believe anything they liked about him and his opponent, Hillary Clinton. It was the year of "fake news", "viral" stories in that word's original infectious-plague sense, convincing many voters that Mrs Clinton had sold weapons to Islamic State, or that Pope Francis had endorsed Donald Trump.

Truly fake stories were relatively rare, though. The more worrying phenomenon was a general disappearance of the expectation that politicians should even be expected to stick to the facts. So Johnson's word of the year is "post-truth". Politicians have always strayed from the truth, but shame kept them in the general postcode. But in 2016 Pro-Brexit campaigners said falsely that Britain sent the EU £350m a week, successfully goading the Remain camp into debating the figure endlessly—and so keeping the topic in the public's mind. Mr Trump, after a series of misogynist comments, said that nobody in the world respected women more than he does. In 2016 the only rule was "anything goes, so long as it gets attention," and the most audacious at following it were the winners. Other campaigners have been watching and taking note, a frightening sign that "post-truth" may be around for some time to come. ■

## Chinese economics

# Western takeaway

**Unlikely Partners: Chinese Reformers, Western Economists, and the Making of Global China.** By Julian Gewirtz. *Harvard University Press; 389 pages; \$39.95. To be published in Britain on January 31st*

IN 1985 James Tobin, a Nobel laureate in economics, delivered a talk at a conference in China. Mao had died less than a decade earlier and modern economic concepts, shorn of socialism, were still unfamiliar to many in the country, including the interpreter on this occasion. Struggling to find the right words, she burst into tears. Two conference participants stepped aside after Tobin spoke and, on the spot, devised the Chinese term for "macroeconomic management". Future interpreters would have it easier.

Chinese officials and academics, especially those with a reformist bent, were acutely aware of their tenuous grasp on economics at the time. Five years earlier, Deng Xiaoping, the country's paramount leader, had put it bluntly when meeting Robert McNamara, president of the World Bank: "We have lost touch with the world."

With China's economic rise now into its fourth decade, it is easy to forget how shaky its footing was at the start of its ascent. It began not just in poverty, but beset by basic uncertainty about how to develop. There was even disagreement over whether development, in so far as it entailed market forces, was the right goal.

The oft-told story is that the Communist Party forged ahead with policy experiments—"crossing the river by feeling for the stones", as the Chinese reformers' saying goes—and, little by little, found the ingredients for growth. There is much truth to this. But the role of Western economists in helping shape that journey is missing. "Unlikely Partners" by Julian Gewirtz, a doctoral candidate in Chinese history at Oxford (and an occasional reviewer for these pages), fills that gap. It vividly brings to life China's economic debates from Mao's death in 1976 until 1993, by which time the country's direction was clearer.

The claim is not that Westerners were responsible for China's development. A large constellation of Chinese reformers deserves the credit for that. Indeed, one of the book's virtues is that it puts the spotlight on Zhao Ziyang, the Communist Party chief who wound up under house arrest after the 1989 Tiananmen protests. Mr Zhao has been written out of official histories, but his consistent support for bold thinking was critical to China's success.

Nevertheless, to understand how Chi-

## Fiction

# Crazy city

**Welcome to Lagos.** By Chibundu Onuzo. *Faber and Faber; 358 pages; £12.99*

AT LEAST in their conception of the world, there are two broad categories of Nigerians—or for that matter Kenyans, Pakistanis, Chinese or anyone from the poor world. The vast majority are those for whom national boundaries represent insurmountable barriers, for whom even a bus ride to the city seems an otherworldly journey. And then there are those who flit between African and European cities as easily as if they were riding the Victoria line from Brixton to Green Park. They are the lucky ones with connections at embassies or stores of capital certified and triple-stamped by bank officials, or, best of all, the burgundy passports of the European Union.

Lagos, a sprawling shambles of some 21m souls, has its fair share of both categories, and they come crashing together in Chibundu Onuzo's second novel, "Welcome to Lagos".

Some welcome. It is hard to imagine a megacity less hospitable to newcomers. At every turn lurk scammers, thieves, crooked cops and rent-extracting landlords. Into this metropolis come Chike and Yemi, two soldiers deserting their posts in the Niger Delta after one too many orders to shoot civilians and burn down villages. Along the way they meet, and become fellow travellers with, a motley crew of runaways: Fineboy, a militant fleeing from the very same army; Isoken, a young girl near-raped by those militants; and Oma, a housewife escaping her abusive husband. Clueless, practically penniless and unaccustomed to the nasty ways of the big city, they find refuge under a bridge until, one day, Fineboy finds an abandoned flat to squat in.

na found its way, it is also necessary to recognise the influence of foreign ideas. In some cases the impact was immediate. The concept of special economic zones, which enabled coastal regions to flourish, began with a Chinese vice-premier's trip to western Europe in 1978, where he saw export-processing zones.

More often, the impact was diffuse. Academics trained in Marxist economics lapped up translated versions of Western textbooks. American professors came for weeks at a time to teach econometrics. Chinese institutions invited a succession of Western economists to give talks and then sifted through their ideas for those that



Where paths cross

From another world come Ahmed, the pampered, British-passport-holding crusader who returns to Lagos to start a muckraking newspaper after a decade as a banker in London, and Chief Sandayo, the minister of education, on the run from Abuja with \$10m in his suitcase. These worlds—rich and poor, urban and rural, privileged and powerless, Muslim and Christian, Igbo and Yoruba—collide to spectacular effect as their paths cross and power shifts hands in surprising and unexpected ways, and then does so again, and again. It is an unlikely plot, but Ms Onuzo pulls it off, revealing the fault lines in her country's society—or indeed those of any half-formed democracy. Though drenched in Lagosian atmosphere, the book wears its Nigerian setting lightly: it is clearly the work of a pan-African and an internationalist—and is all the better for it.

were actually relevant to China.

The Chinese were most receptive to economists who themselves hailed from planned economies and understood their flaws but also knew that sudden changes were impractical. Ota Sik, from Czechoslovakia, inspired a phased-in pricing strategy in the early 1980s, whereby China gave enterprises ever more control over setting prices. The biggest star was Janos Kornai, a Hungarian economist who moved to Harvard after writing a seminal book in which he identified shortage as the chronic problem of socialism. What came to be called "Kornai fever" gripped the study of economics in China in the late 1980s, and his ➤

► book sold more than 100,000 copies.

The World Bank also had a big hand in China's take-off. The bank has a tainted reputation from that era, when it was seen as pushing a "Washington consensus" agenda of liberalisation that harmed Latin America. Much less attention is paid to its subtler positions in China in the 1980s. It carried out two major studies of the economy (the first of their kind), became China's largest source of foreign capital and, responding to Chinese requests, provided reams of useful policy advice.

Mr Gewirtz's book does not attempt to provide a definitive account of China's economic rise. It dwells in the world of ideas, tracing the arc of debates. Little attention is paid to what was actually hap-

pening on factory floors or in farm fields. But it is still a gripping read, highlighting what was little short of a revolution in China's economic thought.

Reading the book today, it is tempting to conclude that China is ignoring a basic lesson from its success: that being open to foreign ideas served it so well. Under Xi Jinping, officials rail against "Western values". Yet there is also a less gloomy conclusion. China's path has never been linear: reformists and conservatives have constantly jostled for the upper hand. But voices for openness have ultimately prevailed. And the gains that China has made in its understanding of economics and, more fundamentally, in the lives of its people will not be easily undone. ■

a Basel firm that also specialises in museums, completed 111 Lincoln Road in 2010. A ziggurat of bare concrete linked by precipitous ramps, it provides accommodation for a series of art-crowd-friendly shops on the ground floor and a home for the developer, Robert Wennett, on the roof. This giddy stack of concrete cards set a benchmark for audacity, its upper deck providing stunning views and one of the most sought-after party spaces during Art Basel Miami Beach. From this example, the high-end car park became firmly established.

In November, as part of a new six-block development in the mid-Beach area, Alan Faena, an Argentine developer, revealed his parking garage (pictured). It boasts a glazed side elevation that exposes the robotic car elevator, which installs and retrieves cars from closely stacked shelves: a preparation for the dance performances in the Faena Forum arts centre to which it is appended. The car park actually only provides room for around 100 cars (though there are 300 subterranean parking places beneath the development). Yet still Mr Faena felt that the development needed an above-ground car park, to be "a statement". He had his designed, like the adjacent arts centre, by OMA, the fashionable firm founded by Rem Koolhaas.

Soon the designer car park will breach the borders of the Beach into the wider metropolitan area. Later this year in downtown Miami, Terence Riley, a former curator at New York's Museum of Modern Art, will open an 800-car garage that will be clad in a crazy collage of different façades designed by five of the world's trendiest practices. Although Miami has no more cars per person than the rest of America, it is still hugely car-dependent. The competition among developers to build the most extravagant or most striking take on an otherwise dull building is typical of Miami's peculiarly intimate glamour. ■

## Architecture

# Pile 'em in style

### The most exciting architecture in Miami Beach is car parks

CAR parks are rarely well-designed. Even more rarely do they amount to "design": something to enjoy on a purely aesthetic level. However, in Miami Beach, Florida, the car park has become not just a building type that is visually pleasing, but something else entirely: a set piece that offers architects the chance to show off.

Perhaps because the city has expanded rapidly as a travel destination, its new hotels are invariably disappointing dumb citadels of glass and steel that dominate the city's charming old art-deco look apparently on purpose. Most galleries and museums are soulless, too, the glamorous veranda of the Pérez Art Museum notwithstanding. Miami is largely built on sand or swamp and has a high water-table, making subterranean parking expensive; building above ground is a better option.

The first building to turn this inconvenience into a design opportunity was the evocatively titled Ballet Valet. Arquitectonica, a local firm, had established itself in the 1980s with a series of brash, colourful apartment blocks that were immediately snapped up as sets for "Miami Vice", a television series, and "Scarface", a Cuban gangster epic. Asked in the following decade to create a car park that would add something to a block of boutique shops, Arquitectonica adapted its garish palate to the more sensitive 1990s by wrapping the building in a fibreglass mesh with an irrigation system, and filling it with indigenous clusias and sea lettuce, which ran riot.

Ballet Valet might have remained a one-off were it not for the arrival of Art Basel in Miami Beach. When one of the largest art

fairs in Europe was seeking to expand into America it made an inspired choice. Art was popular there, both among the American celebrity set, who had taken to Miami Beach as a place to party, and among the wealthy Latin Americans who saw the city as both their home and their financial base in America. There were only a handful of galleries, however. Entering into the art-led regeneration of Miami Beach, the car parks are in many ways monuments to the success of that relationship, creating spaces that enable commerce and art to exist side by side.

Car parks put developers at the centre of upcoming areas. Herzog and de Meuron,



Starchitects and their car parkitecture

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## Tenders



### ADDENDUM No. 1 FOR EXTENSION OF TENDER SUBMISSION DATE

Kaduna State Ministry of Health and Human Services  
Project Management Unit,  
Independence Way, Kaduna State – Nigeria.

This notification is in continuation of the Notice Inviting Bids published by the Project Management Unit of Kaduna State Ministry of Health and Human Services on 8th October, 2016 for the Procurement/Installation of Medical and Non-Medical Equipment ICB 01 and ICB 02 for the 300-Bed Specialist Hospital Project in Kaduna State from eligible bidders.

Kaduna State Ministry of Health and Human Services has decided to extend the last date of submission of tender further. Revised date and time for submission of bids is by 12.00 noon Local Time on 11th January, 2017. All other tender conditions remain unchanged. Further details and tender document are available on sales.

Signed  
Project Manager,  
Construction/Equipping of 300-Bed Specialist Hospital Project,  
Ministry of Health and Human Services,  
Independence Way,  
Kaduna State – Nigeria  
Tel: +234 8037001891, +234 8028919812  
Email: [musahayatuddini@yahoo.com](mailto:musahayatuddini@yahoo.com), [byuseef@yahoo.com](mailto:byuseef@yahoo.com)

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## Economic data

% change on year ago

	Gross domestic product			Industrial production		Consumer prices		Unemployment rate, %	Current-account balance		Budget balance	Interest rates, %	Currency units, per \$	
	latest	qtr*	2016†	latest	2016†	latest	2016†		latest 12 months, \$bn	% of GDP 2016†	% of GDP 2016†	10-year gov't bonds, latest	Jan 4th	
United States	+1.7	Q3	+3.5	+1.6	-0.6 Nov	+1.7 Nov	+1.3	4.6 Nov	-476.5 Q3	-2.6	-3.2	2.47	-	-
China	+6.7	Q3	+7.4	+6.7	+6.2 Nov	+2.3 Nov	+2.0	4.0 Q3§	+264.6 Q3	+2.5	-3.8	2.93§§	6.95	6.52
Japan	+1.1	Q3	+1.3	+0.7	+4.6 Nov	+0.5 Nov	-0.2	3.1 Nov	+184.2 Oct	+3.7	-5.6	0.04	117	119
Britain	+2.2	Q3	+2.3	+2.0	-1.2 Oct	+1.2 Nov	+0.6	4.8 Sep††	-138.1 Q3	-5.7	-3.7	1.27	0.81	0.68
Canada	+1.3	Q3	+3.5	+1.2	+1.6 Oct	+1.2 Nov	+1.5	6.8 Nov	-53.6 Q3	-3.5	-2.5	1.71	1.33	1.39
Euro area	+1.7	Q3	+1.4	+1.6	+0.6 Oct	+1.1 Dec	+0.2	9.8 Oct	+380.4 Oct	+3.2	-1.8	0.27	0.95	0.93
Austria	+1.2	Q3	+2.4	+1.5	+0.2 Oct	+1.3 Nov	+1.1	5.9 Oct	+8.0 Q3	+2.1	-1.4	0.50	0.95	0.93
Belgium	+1.3	Q3	+0.7	+1.2	+2.8 Oct	+2.0 Dec	+1.9	7.9 Oct	+3.4 Sep	+0.7	-2.8	0.47	0.95	0.93
France	+1.0	Q3	+1.0	+1.2	-1.8 Oct	+0.6 Dec	+0.3	9.7 Oct	-40.0 Oct‡	-1.1	-3.3	0.78	0.95	0.93
Germany	+1.7	Q3	+0.8	+1.8	+1.2 Oct	+1.7 Dec	+0.4	6.0 Dec	+296.2 Oct	+8.8	+1.0	0.27	0.95	0.93
Greece	+1.6	Q3	+3.1	+0.4	+6.8 Oct	-0.9 Nov	nil	23.1 Sep	-1.0 Oct	-0.2	-5.6	6.72	0.95	0.93
Italy	+1.0	Q3	+1.0	+0.8	+1.3 Oct	+0.5 Dec	-0.1	11.6 Oct	+49.5 Oct	+2.4	-2.6	1.88	0.95	0.93
Netherlands	+2.4	Q3	+3.1	+2.0	+0.6 Oct	+0.6 Nov	+0.2	6.6 Nov	+57.1 Q3	+8.5	-1.1	0.43	0.95	0.93
Spain	+3.2	Q3	+2.9	+3.2	-2.1 Oct	+1.6 Dec	-0.4	19.2 Oct	+23.0 Oct	+1.6	-4.6	1.43	0.95	0.93
Czech Republic	+1.6	Q3	+0.9	+2.4	-1.7 Oct	+1.5 Nov	+0.6	4.9 Nov§	+3.7 Q3	+1.5	nil	0.50	25.8	25.0
Denmark	+1.1	Q3	+1.5	+0.9	-0.3 Oct	+0.4 Nov	+0.3	4.2 Oct	+23.2 Oct	+5.9	-1.0	0.40	7.10	6.91
Norway	-0.9	Q3	-1.9	+0.6	nil Oct	+3.5 Nov	+3.5	4.8 Oct‡‡	+18.0 Q3	+4.4	+3.5	1.67	8.60	8.91
Poland	+2.0	Q3	+0.8	+2.6	+3.3 Nov	+0.8 Dec	-0.7	8.2 Nov§	-2.4 Oct	-0.5	-2.7	3.71	4.17	3.98
Russia	-0.4	Q3	na	-0.5	+2.6 Nov	+5.4 Dec	+7.0	5.4 Nov§	+29.0 Q3	+2.4	-3.7	8.45	60.6	73.0
Sweden	+2.8	Q3	+2.0	+3.1	-0.5 Oct	+1.4 Nov	+0.9	6.2 Nov§	+22.2 Q3	+5.0	-0.3	0.60	9.11	8.50
Switzerland	+1.3	Q3	+0.2	+1.4	+0.4 Q3	-0.3 Nov	-0.4	3.3 Nov	+68.2 Q3	+9.4	+0.2	-0.15	1.02	1.01
Turkey	-1.8	Q3	na	+2.9	+0.2 Oct	+8.5 Dec	+7.8	11.3 Sep§	-33.8 Oct	-4.8	-1.8	11.32	3.57	2.97
Australia	+1.8	Q3	-1.9	+2.9	-0.2 Q3	+1.3 Q3	+1.3	5.7 Nov	-47.9 Q3	-3.5	-2.1	2.79	1.37	1.40
Hong Kong	+1.9	Q3	+2.5	+1.6	-0.1 Q3	+1.3 Nov	+2.8	3.3 Nov‡‡	+13.3 Q3	+2.6	+0.6	1.89	7.76	7.75
India	+7.3	Q3	+8.3	+7.2	-1.9 Oct	+3.6 Nov	+4.9	5.0 2015	-11.1 Q3	-0.9	-3.8	6.37	68.1	66.6
Indonesia	+5.0	Q3	na	+5.0	-2.7 Oct	+3.0 Dec	+3.5	5.6 Q3§	-19.2 Q3	-2.1	-2.6	7.85	13,440	13,918
Malaysia	+4.3	Q3	na	+4.3	+4.2 Oct	+1.8 Nov	+1.9	3.5 Oct§	+5.6 Q3	+1.8	-3.4	4.26	4.50	4.35
Pakistan	+5.7	2016**	na	+5.7	+2.3 Oct	+3.7 Dec	+3.8	5.9 2015	-4.1 Q3	-0.9	-4.6	8.03†††	105	105
Philippines	+7.1	Q3	+4.9	+6.9	+8.3 Oct	+2.6 Dec	+1.8	4.7 Q4§	+3.1 Sep	+0.9	-1.0	5.08	49.7	47.1
Singapore	+1.1	Q3	+9.1	+1.3	+11.9 Nov	nil Nov	-0.6	2.1 Q3	+63.0 Q3	+21.5	+0.7	2.56	1.44	1.43
South Korea	+2.6	Q3	+2.5	+2.7	+4.8 Nov	+1.3 Dec	+0.9	3.1 Nov§	+99.0 Nov	+7.2	-1.3	2.10	1,206	1,188
Taiwan	+2.0	Q3	+3.9	+1.0	+8.8 Nov	+1.7 Dec	+1.3	3.8 Nov	+74.7 Q3	+14.4	-0.5	1.13	32.2	33.0
Thailand	+3.2	Q3	+2.2	+3.2	+3.8 Nov	+1.1 Dec	+0.2	1.0 Nov§	+47.9 Q3	+11.8	-2.3	2.68	35.8	36.2
Argentina	-3.8	Q3	-0.9	-2.0	-2.5 Oct	— ***	—	8.5 Q3§	-15.7 Q3	-2.5	-5.3	na	16.1	13.1
Brazil	-2.9	Q3	-3.3	-3.4	-7.3 Oct	+7.0 Nov	+8.3	11.9 Nov§	-20.3 Nov	-1.1	-6.3	11.31	3.22	4.04
Chile	+1.6	Q3	+2.5	+1.8	-1.4 Nov	+2.9 Nov	+3.7	6.2 Nov§‡‡	-4.8 Q3	-1.9	-2.7	4.26	672	717
Colombia	+1.2	Q3	+1.3	+1.8	+0.4 Oct	+6.0 Nov	+7.5	7.5 Nov§	-13.7 Q3	-5.1	-3.7	7.05	2,963	3,212
Mexico	+2.0	Q3	+4.0	+2.1	-1.4 Oct	+3.3 Nov	+2.8	3.6 Nov	-30.6 Q3	-2.8	-3.0	7.65	21.4	17.4
Venezuela	-8.8	Q4~	-6.2	-13.7	na	na	+424	7.3 Apr§	-17.8 Q3~	-2.8	-24.3	10.43	10.0	6.31
Egypt	+4.5	Q2	na	+4.3	-4.9 Oct	+19.4 Nov	+13.1	12.6 Q3§	-20.8 Q3	-7.0	-12.4	na	18.2	7.83
Israel	+5.1	Q3	+3.4	+3.3	-0.8 Oct	-0.3 Nov	-0.5	4.5 Nov	+13.3 Q3	+2.8	-2.4	2.06	3.85	3.93
Saudi Arabia	+1.4	2016	na	+1.1	na	+2.3 Nov	+3.8	5.6 2015	-46.8 Q3	-5.6	-11.7	na	3.75	3.75
South Africa	+0.7	Q3	+0.2	+0.4	-1.3 Oct	+6.6 Nov	+6.3	27.1 Q3§	-12.3 Q3	-4.0	-3.4	8.93	13.6	15.6

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, Nov 35.38%; year ago 25.30% †††Dollar-denominated bonds.

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**Markets**

	% change on			
	Index Jan 4th	one week	Dec 31st 2015 in local currency terms	in \$
United States (DJIA)	19,942.2	+0.5	+14.4	+14.4
China (SSEA)	3,307.5	+1.8	-10.7	-16.6
Japan (Nikkei 225)	19,594.2	+1.0	+2.9	+5.6
Britain (FTSE 100)	7,189.7	+1.2	+15.2	-3.9
Canada (S&P TSX)	15,516.8	+1.0	+19.3	+24.6
Euro area (FTSE Euro 100)	1,121.9	+1.1	+2.5	-1.1
Euro area (EURO STOXX 50)	3,317.5	+1.2	+1.5	-2.1
Austria (ATX)	2,682.6	+1.7	+11.9	+7.9
Belgium (Bel 20)	3,665.7	+1.6	-0.9	-4.5
France (CAC 40)	4,899.4	+1.1	+5.7	+1.9
Germany (DAX)*	11,584.3	+1.0	+7.8	+4.0
Greece (Athex Comp)	657.5	+3.4	+4.1	+0.4
Italy (FTSE/MIB)	19,626.6	+2.0	-8.4	-11.6
Netherlands (AEX)	487.6	+0.7	+10.4	+6.4
Spain (Madrid SE)	956.1	+1.5	-0.9	-4.5
Czech Republic (PX)	934.2	+1.2	-2.3	-5.8
Denmark (OMXCB)	805.4	+1.0	-11.2	-14.0
Hungary (BUX)	32,649.0	+1.9	+36.5	+35.0
Norway (OSEAX)	772.6	+0.8	+19.1	+22.5
Poland (WIG)	52,753.8	+2.8	+13.5	+7.5
Russia (RTS, \$ terms)	1,176.7	+3.4	+28.9	+55.4
Sweden (OMX30)	1,530.9	+0.2	+5.8	-2.0
Switzerland (SMI)	8,354.8	+1.2	-5.3	-7.4
Turkey (BIST)	76,143.6	-1.8	+6.2	-13.3
Australia (All Ord.)	5,788.2	+1.0	+8.3	+8.4
Hong Kong (Hang Seng)	22,134.5	+1.7	+1.0	+0.9
India (BSE)	26,633.1	+1.6	+2.0	-0.9
Indonesia (JSX)	5,301.2	+1.8	+15.4	+18.4
Malaysia (KLCSE)	1,647.5	+1.1	-2.7	-7.1
Pakistan (KSE)	48,705.0	+2.7	+48.4	+48.3
Singapore (STI)	2,921.3	+0.8	+1.3	-0.2
South Korea (KOSPI)	2,045.6	+1.0	+4.3	+1.4
Taiwan (TWI)	9,287.0	+0.9	+11.4	+13.5
Thailand (SET)	1,563.6	+2.6	+21.4	+22.0
Argentina (MERV)	18,143.1	+9.9	+55.4	+24.9
Brazil (BVSP)	61,589.1	+3.0	+42.1	+74.4
Chile (IGPA)	20,809.5	+1.4	+14.6	+20.9
Colombia (IGBC)	10,288.4	+1.6	+20.4	+28.9
Mexico (IPC)	46,587.7	+2.2	+8.4	-12.5
Venezuela (IBC)	31,839.2	+4.7	+118	na
Egypt (EGX 30)	12,608.4	+2.8	+80.0	-23.3
Israel (TA-100)	1,287.8	-0.1	-2.1	-1.1
Saudi Arabia (Tadawul)	7,198.1	-0.6	+4.1	+4.2
South Africa (JSE AS)	50,760.2	+0.9	+0.1	+14.1

**GDP forecasts**

2017, % change on a year earlier

**Best****Worst**

Source: Economist Intelligence Unit

**Other markets**

	% change on			
	Index Jan 4th	one week	Dec 31st 2015 in local currency terms	in \$
United States (S&P 500)	2,270.8	+0.9	+11.1	+11.1
United States (NAScomp)	5,477.0	+0.7	+9.4	+9.4
China (SSEB, \$ terms)	344.8	+1.1	-13.5	-19.1
Japan (Topix)	1,554.5	+1.2	+0.5	+3.1
Europe (FTSEurofirst 300)	1,443.8	+1.0	+0.4	-3.1
World, dev'd (MSCI)	1,774.0	+1.3	+6.7	+6.7
Emerging markets (MSCI)	871.5	+2.4	+9.7	+9.7
World, all (MSCI)	427.2	+1.4	+7.0	+7.0
World bonds (Citigroup)	877.6	+0.2	+0.9	+0.9
EMBI+ (JP Morgan)	776.0	+0.7	+10.2	+10.2
Hedge funds (HFRX)	1,203.2 <sup>§</sup>	-0.1	+2.5	+2.5
Volatility, US (VIX)	11.9	+13.0	+18.2 (levels)	
CDSs, Eur (iTRAXX) <sup>†</sup>	67.9	-5.5	-12.0	-15.1
CDSs, N Am (CDX) <sup>†</sup>	63.4	-6.6	-28.2	-28.2
Carbon trading (EU ETS) €	5.7	-10.0	-31.6	-34.1

Sources: Markit; Thomson Reuters. \*Total return index.

†Credit-default-swap spreads, basis points. <sup>§</sup>Dec 29th.**Indicators** for more countries and additional series, go to: [Economist.com/indicators](http://Economist.com/indicators)**The Economist commodity-price index**

2005=100

	% change on		
	Dec 20th 2016	Dec 27th 2016	Jan 3rd 2017*
	one month	one year	
<b>Dollar index</b>			
All items	142.0	140.8	141.9
Food	154.9	152.6	154.8
Industrials			
All	128.6	128.5	128.5
Nfa <sup>‡</sup>	136.5	136.8	138.1
Metals	125.2	124.9	124.4
<b>Sterling index</b>			
All items	209.0	208.9	210.8
<b>Euro index</b>			
All items	170.1	167.4	169.9
<b>Gold</b>			
\$ per oz	1,131.6	1,133.5	1,156.1
<b>West Texas Intermediate</b>			
\$ per barrel	51.9	52.0	52.3

Sources: Bloomberg; CME Group; Cottlook; Darmenn &amp; Curl; FT; ICO; IOC; ISO; Live Rice Index; LME; NZ Wool Services; Thompson Lloyd &amp; Ewart; Thomson Reuters; Urner Barry; WSJ. \*Provisional

<sup>‡</sup>Non-food agriculturals.**Financing the sustainable ocean economy**

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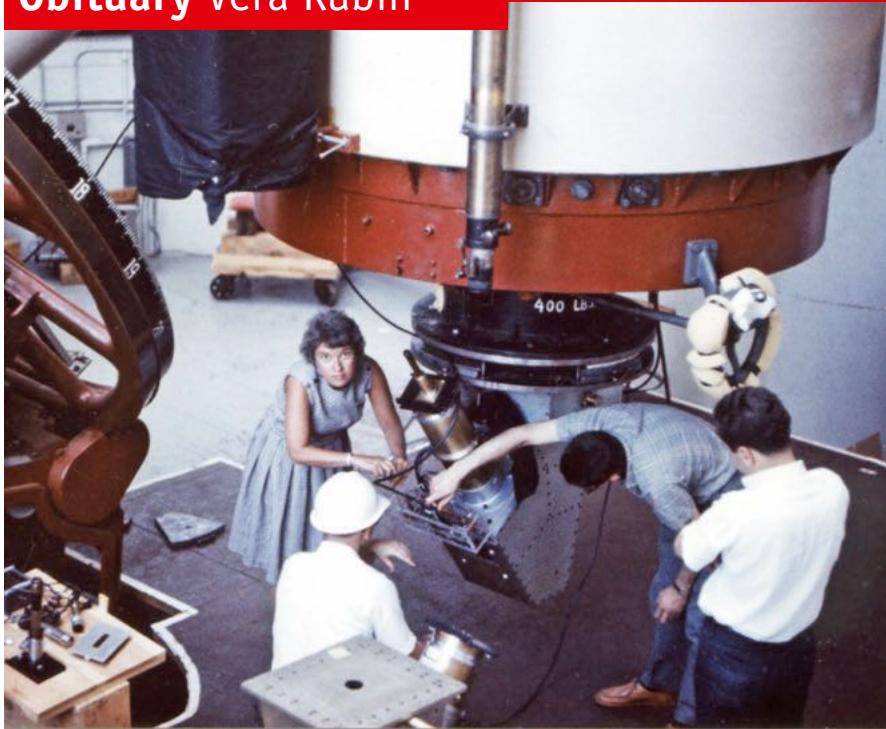
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## Dark star

**Vera Rubin, an American astronomer who established the existence of dark matter, died on December 25th, aged 88**

WHEN in 1965 Vera Rubin arrived for a four-day stint at “the monastery”, as the Palomar Observatory, home of the world’s largest telescope, was dubbed, there were no women’s lavatories. No female astronomer had ever worked there before. How could they, when it would mean walking home late at night?

It had been the same thinking at high school. When she told her revered science teacher of her scholarship to Vassar he said: “You should do OK as long as you stay away from science.” She was the only astronomy major to graduate there in her year. When in 1947 she requested a graduate-school catalogue from Princeton, the dean told her not to bother: women were not accepted for physics and astronomy. George Gamow, later her doctoral adviser, said she could not attend his lecture at the Johns Hopkins Applied Physics Lab “because wives were not allowed”.

She was indeed a wife. She married—aged 19—Robert Rubin, a physicist whom she followed to Cornell, sacrificing her place at Harvard. He was, she said, her greatest ally. Later, when she attended night classes at Georgetown University, he drove her there, eating his dinner in the car until he could drive her home, while her parents baby-sat. Still, she found raising four children “almost overwhelming”.

When she halted her academic career—the worst six months of her life—she wept every time the *Astrophysical Journal* arrived in the house. But, working part-time, she made sure to be home when the kids returned from school. She never inspected their rooms, she said, and they grew up fine, all with PhDs in science or maths.

Her master’s thesis was, her Cornell supervisor said, worthy of being presented to the American Astronomical Society. But she was about to give birth, so, he suggested, he would present it—but in his name.

She refused. Her parents drove up from Washington and took their 22-year-old daughter, nursing her newborn, on a grueling snowy trip from upstate New York to Philadelphia. She addressed the roomful of strangers for ten minutes about galaxy rotation, soaked up some patronising criticism and a smidgen of praise—and left.

Though rows were unpleasant, defeat was worse. “Protest every all-male meeting, every all-male department, every all-male platform,” she advised. At Palomar, she made a ladies’ room by sticking a handmade skirt sign on a men’s room door (she returned a year later: it was gone).

She’d never anticipated such problems. Her father encouraged her childhood habit of watching meteor showers, leaning out of her bedroom window and memorising

their geometry in order to look them up later. He even helped her make her first telescope, from a cardboard tube; she had already made her own kaleidoscope. She hadn’t ever met an astronomer, but it never occurred to her that she couldn’t be one.

But her early research was largely ignored. In other work, male astronomers elbowed her aside. Fed up, she looked for a problem “that people would be interested in, but not so interested in that anyone would bother me before I was done.”

She found it. In the 1930s Fritz Zwicky, an idiosyncratic Swiss astrophysicist, had suggested that the brightly shining stars represented only a part of the cosmic whole. There must also be “dark matter”, unseen but revealed indirectly by the effects of its gravity. That conjecture languished on the margins until Ms Rubin, working with her colleague Kent Ford, examined the puzzle of galactic rotation. Spiral galaxies such as Andromeda, she proved, were spinning so fast that their outer stars should be flying away into the never-never. They weren’t. So either Einstein was wrong about gravity, or gravitational pull from vast amounts of something invisible—dark matter—was holding the stars together.

The discovery reshaped cosmology, though initially her colleagues embraced it unenthusiastically. Astronomers had thought they were studying the whole universe, not just a small luminous fraction of it. New theories developed on what the matter might be—but its fugitive particles escaped all direct detection.

Some are worried by the absence. Ms Rubin was unbothered. Astronomy, she reckoned, was “out of kindergarten, but only in about the third grade”. Many of the universe’s deep mysteries remained to be discovered by eye and brain, with all the joy that involved.

### Shining a light

There were other scientific feats, too: in 1992 she discovered NGC 4550, a galaxy in which half the stars orbit in one direction, mingled with half that head the other way. She won medals aplenty: the Gold Medal of Britain’s Royal Astronomical Society (last awarded to a woman in 1828) and America’s National Medal of Science. Princeton, which had once shunned her, was among the many universities to award her an honorary doctorate. She gave notable commencement speeches.

The plaudits were pleasant, but numbers mattered more: the greatest compliment would be if astronomers years hence still used her data, she insisted. She was a perennial favourite for a Nobel prize in physics—only ever awarded to two women. That call never came: like dark matter, her fans lamented, she was vitally important, but easy to overlook. ■

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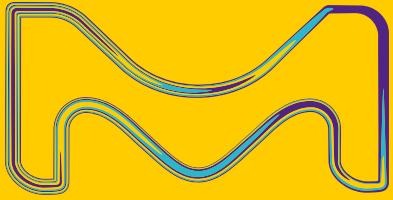
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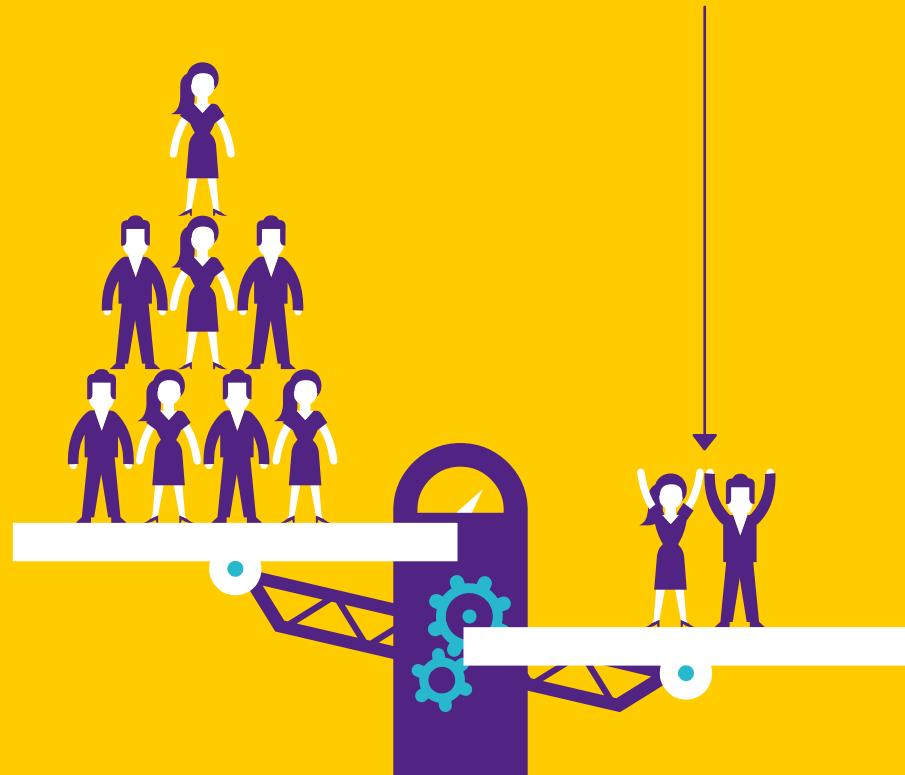


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