

INSIDE THIS WEEK: TECHNOLOGY QUARTERLY

The Economist

MARCH 7TH-13TH 2015

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How Obamacare saves America money

Warren Buffett's confused message

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Boys: the weaker sex

The new nuclear age

Why the risks of conflict are rising





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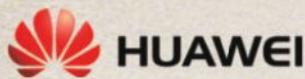
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Print edition: available online by 7pm London time each Thursday
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The Economist**Volume 414 Number 8928**

Published since September 1843 to take part in "a severe contest between intelligence, which presses forward, and an unworthy, timid ignorance obstructing our progress."

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Atlanta, Beijing, Berlin, Brussels, Cairo, Chicago, Hong Kong, Johannesburg, Lima, Los Angeles, Mexico City, Moscow, New Delhi, New York, Paris, San Francisco, São Paulo, Singapore, Tokyo, Washington DC

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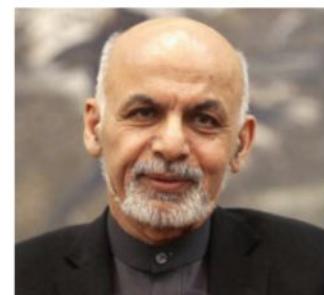
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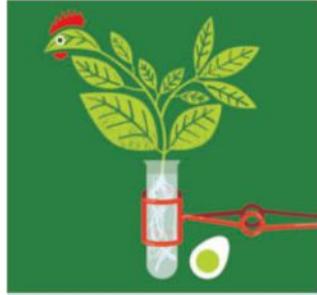
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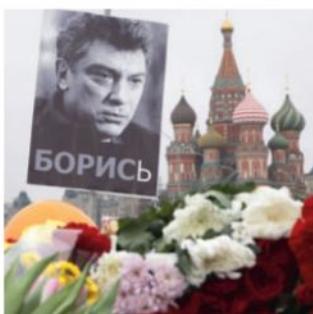
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Politics



Thousands of **Russians** attended the funeral of Boris Nemtsov, an opposition politician who was murdered in Moscow two days before he was due to take part in a rally to protest against the war in Ukraine. Many blamed his assassination on a rising climate of fear and nationalistic hatred fomented by government propaganda.

Ukraine's central bank raised its key interest rate from 19.5% to 30% in an effort to halt the slide of the hryvnia. The currency has lost 80% of its value since April 2014, when the war in eastern Ukraine broke out. The UN estimates that 6,000 people have since died in the conflict. Meanwhile, the Ukrainian parliament passed a slate of reforms demanded by the IMF as conditions for a \$17.5 billion bail-out package.

The leader of **Turkey's** Kurdish rebels, Abdullah Ocalan, called on his Kurdistan Workers' Party (PKK) to end the armed struggle it has waged against the Turkish state since 1984. A peace deal could bring more freedoms and benefits to Kurds in Turkey as well as in Iraq and Syria.

The Council of Europe reprimanded France for failing to outlaw the **smacking of children** by parents. It wants all European countries to ban the practice, but French law recognises a right for parents to discipline their children.

Spain's finance minister said that **Greece** would need a third bail-out package of about \$50 billion after its current programme ends in June. The

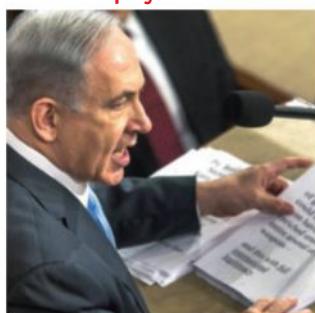
finance ministers of Germany and the Netherlands denied that a new bail-out was being discussed. The remarks continued a war of words begun when Alexis Tsipras, the far-left Greek prime minister, accused Spain of working to undermine his Syriza party for fear of its own far-left movement, Podemos.

Tusk force

Kenya burned 15 tonnes of ivory with a black-market value of \$30m in an effort to stigmatise the trade and curb poaching. This was in response to a sharp increase in elephant and rhino poaching across sub-Saharan Africa.

Iraqi government forces, supported by Iran, started the largest military campaign yet to take back ground lost to **Islamic State** (is). The offensive centres on Tikrit, which is about midway between the capital Baghdad and Mosul, a big city that fell to is last year.

Bibi won't play ball



Binyamin Netanyahu gave a speech to the American Congress, where he had been invited by the Republicans without bothering to consult the White House. In his address the Israeli prime minister denounced the way the Obama administration is negotiating a deal over nuclear weapons with the Iranian regime, which, he said, is competing with is "for the crown of militant Islam".

America's Justice Department released its report into policing in **Ferguson**, the town in Missouri where the shooting of a black teenager by a white policeman sparked nationwide protests. Eric Holder, the attorney-general, said that

Ferguson's "policing practices disproportionately harm" black residents, but he is not bringing charges against the officer, who says he shot the teen in self-defence.

Hillary Clinton reportedly used a private e-mail account to conduct nearly all her official business when she was America's secretary of state, a possible breach of rules intended to encourage transparency. Since the e-mails are stored on her private server, critics charge that Mrs Clinton will pick and choose which ones to make public. Jeb Bush, who has published a trove of e-mails from his time in office as Florida's governor, wasted no time in calling on Mrs Clinton to release hers.

Deeper and deeper

Brazil's chief prosecutor asked the Supreme Court to investigate 54 people, including politicians, for their role in the scandal surrounding Petrobras, the giant state-controlled oil company. Police have accused former executives at the company of accepting bribes in exchange for awarding contracts to them. The executives allegedly funnelled the money to political parties allied with the government, including the Workers' Party of the president, Dilma Rousseff.

Mexican security forces arrested two alleged drug kingpins. Federal police nabbed Servando Gómez, also known as "El Profe", a former teacher who heads the Knights Templar cartel, which deals in methamphetamines. He was a powerful figure in the state of Michoacán. And police and armed forces captured Omar Trevino Morales, the alleged leader of the Zetas cartel, in the city of Monterrey.

A federal judge in **Argentina** dismissed allegations that the president, Cristina Fernández de Kirchner, and officials interfered with the investigation of the bombing of a Jewish centre in 1994 in Buenos Aires in order to cover up the complicity of Iran. Alberto Nisman, the prosecutor who made that

accusation, was found dead in January. The prosecutor now dealing with Mr Nisman's claims has appealed against the judge's ruling.

Lowering expectations



The annual session of **China's** rubber-stamp parliament, the National People's Congress, began in Beijing. The prime minister, Li Keqiang, told the 3,000 delegates that China's economy was expected to grow by around 7% this year. It grew by 7.4% in 2014, the slowest rate in 24 years. A budget submitted to the legislature called for a 10% increase in military spending. Earlier, the People's Bank of China cut its benchmark interest rate for the second time since November.

Barack Obama criticised China's plan to require tech companies to hand over **encryption keys** and provide back doors into their software if they want to operate in China. Chinese officials say that this is necessary to combat terrorism.

Police in **Hong Kong** arrested more than 30 people in connection with a protest against shoppers from the Chinese mainland. It was the third such demonstration in a month. Many in Hong Kong blame an influx of Chinese shoppers for causing scarcities of goods by buying them to resell across the border.

The sale and consumption of beef was banned in the west Indian state of Maharashtra, including **India's** biggest city, Mumbai. Several Indian states have restrictions relating to beef, but Maharashtra's are among the strictest. People who sell or eat cow meat could be jailed for up to five years. ➤

Business

India's central bank lowered its main interest rate by a quarter of a percentage point to 7.5%. It was the second cut this year, but markets were surprised by the timing, coming soon after the legal framework was approved for the Reserve Bank of India to set official inflation targets for the first time. An initial target was set at 6% until January 2016, with 4% the aim after that within a 2-6% range. Inflation has slowed considerably in India over the past two years. It was an annual rate of 5.1% in January.

The road less travelled

The rate cut followed the Indian government's annual budget, which included plans to rationalise the country's labyrinthine tax system and to reduce the corporate-tax rate to 25%. Investors were also cheered by the start of the auction for 3G telecoms licences in India, which are expected to raise \$13 billion over the coming weeks.

Consumer prices in the euro zone fell by 0.3% year on year in February, the third consecutive month of negative inflation in the currency bloc. The unemployment rate dropped to 11.2%, the lowest since April 2012 (though in Greece it was 25.8% and in Spain 23.4%).

Brazil's central bank raised its benchmark interest rate by half a percentage point to 12.75%, a six-year high. Although other countries are fretting about deflation, Brazil's inflation rate soared in January to 7.14%.

In a big victory for the City of London, a court in the European Union overturned a decision by the European Central Bank that would have forced clearing houses to relocate their euro-denominated business to within the euro zone. The ECB had argued that it could not help clearing houses that operate outside the currency area if they got into trouble, but the court

ruled that the central bank does not have the regulatory power to intervene anyway.

It's taken a while

The NASDAQ stockmarket index closed above 5,000 on March 2nd for the first time since the height of the dotcom boom in March 2000.

A German court ordered Jürgen Fitschen, one of the two co-chief executives at Deutsche Bank, to stand trial next month in the legal saga related to the collapse of the Kirch media group in 2002. Mr Fitschen will share the defendants' bench with two former chief executives, Josef Ackermann and Rolf Breuer, and two former board members. The trial is a distraction for the bank, which is undertaking a big rethink of its strategy.

Actavis, a drugs company, issued \$21 billion in bonds, making it the second-biggest corporate-debt offering to date (behind Verizon's \$49 billion bond sale in 2013). Actavis issued the bonds to fund its acquisition of Allergan, the maker of Botox. With safer government debt now offering very low, or even negative, yields, the corporate-bond market is attracting hordes of income-hungry investors.

AbbVie, a drugs company that ditched a bid for Britain's Shire last year after the American Treasury changed the rules on inversion takeovers, agreed to buy **Pharmacyclics**, which specialises in cancer treatments, in a \$21 billion deal.

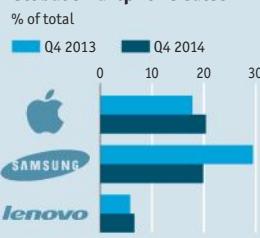
A changing culture

Toyota took steps to diversify senior management by appointing its first non-Japanese vice-president as well as its first foreign female executive and first African-American executive (the latter two are based in America). Like other Japanese companies Toyota is noted for its lack of foreign staff, even though 74% of its sales come from abroad. The Japanese government is pushing for more corporate diversity, and wants 30% of Japan's senior executive jobs to be held by women by 2020.

The British government sold its 40% stake in **Eurostar**, which runs trains through the Channel Tunnel connecting Britain and France, to an Anglo-Canadian consortium. The deal raised £757m (\$1.2 billion) for the Treasury, about twice what had been expected. SNCF, the French state-owned railway company, still owns 55% of Eurostar; and SNCB, its Belgian equivalent, the remaining 5%.

Uber, a ride-sharing firm, made its first significant acquisition by agreeing to buy deCarta, a startup specialising in navigation tools for maps. The deal could lessen Uber's dependence on mapping services provided by Google and Apple, and also boost its research into driverless-car technology.

Global smartphone sales



Source: Gartner

Annual sales of smartphones exceeded 1 billion for the first time in 2014, according to Gartner, a research firm.

Buoyed by demand in China and the release of the iPhone 6, Apple overtook Samsung in the fourth quarter as the world's biggest seller of the devices. But the South Korean company retained the top spot for the year as a whole, taking 24.7% of the market compared with Apple's 15.4%.

Other economic data and news can be found on pages 92-93

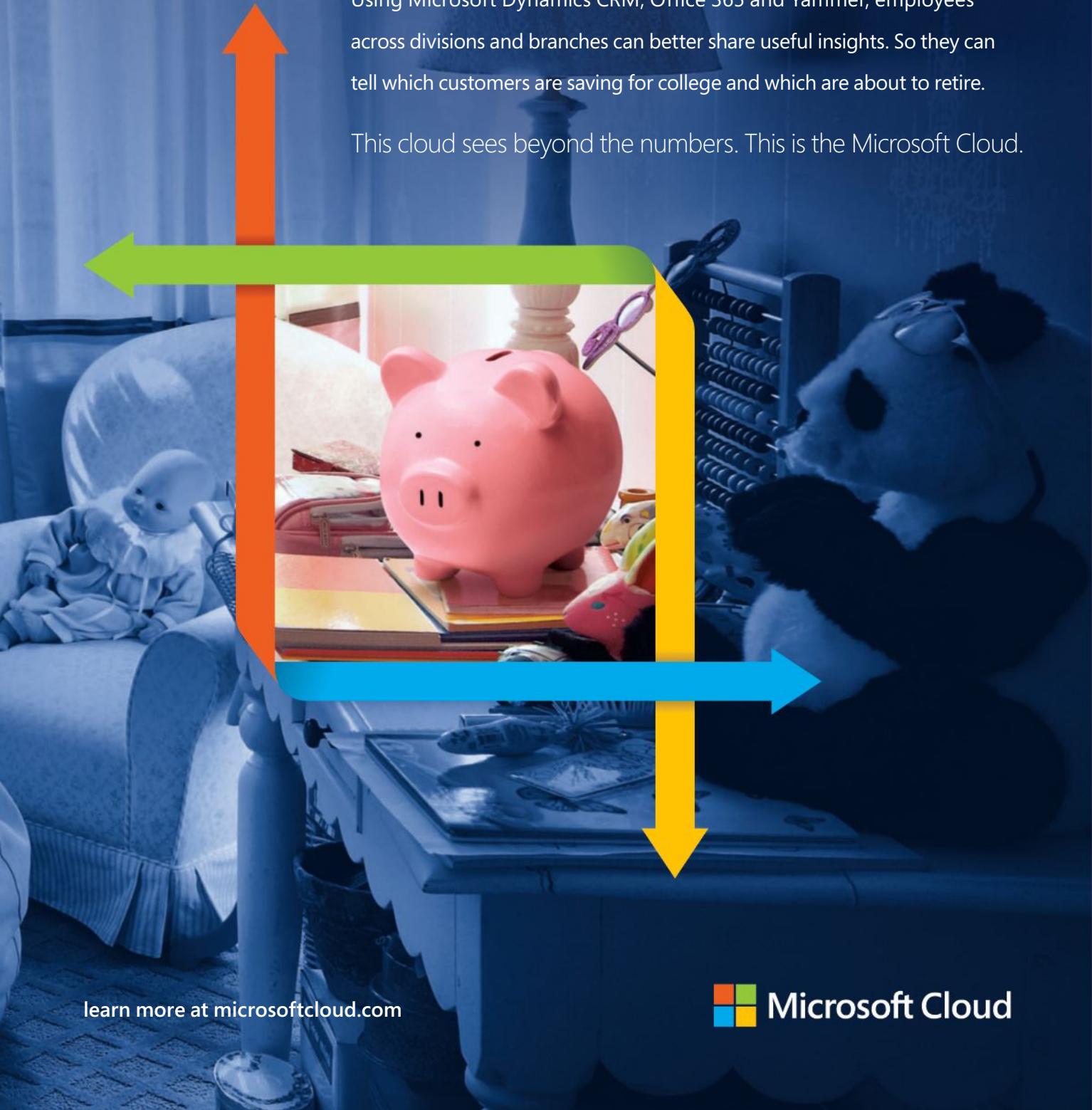


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The new nuclear age

A quarter of a century after the end of the cold war, the world faces a growing threat of nuclear conflict



WITHIN the next few weeks, after years of stalling and evasion, Iran may at last agree to curb its nuclear programme. In exchange for relief from sanctions it will accept, in principle, that it should allow intrusive inspections and limit

how much uranium will cascade through its centrifuges. After 2025 Iran will gradually be allowed to expand its efforts. It insists these are peaceful, but the world is convinced they are designed to produce a nuclear weapon.

In a barnstorming speech to America's Congress on March 3rd, Binyamin Netanyahu, Israel's prime minister, fulminated against the prospect of such a deal (see page 30). Because it is temporary and leaves much of the Iranian programme intact, he said, it merely "paves Iran's path to the bomb". Determined and malevolent, a nuclear Iran would put the world under the shadow of nuclear war.

Mr Netanyahu is wrong about the deal. It is the best on offer and much better than no deal at all, which would lead to stalemate, cheating and, eventually, the dash to the very bomb he fears. But he is right to worry about nuclear war—and not just because of Iran. Twenty-five years after the Soviet collapse, the world is entering a new nuclear age. Nuclear strategy has become a cockpit of rogue regimes and regional foes jostling with the five original nuclear-weapons powers (America, Britain, France, China and Russia), whose own dealings are infected by suspicion and rivalry.

Thanks in part to Mr Netanyahu's efforts, Iran commands worldwide attention. Unfortunately, the rest of the nuclear-weapons agenda is bedevilled by complacency and neglect.

The fallout from Prague

After the end of the cold war the world clutched at the idea that nuclear annihilation was off the table. When Barack Obama, speaking in Prague in 2009, backed the aim to rid the world of nuclear weapons, he was treated not as a peacenik but as a statesman. Today his ambition seems a fantasy. Although the world continues to comfort itself with the thought that mutually assured destruction is unlikely, the risk that somebody somewhere will use a nuclear weapon is growing apace.

Every nuclear power is spending lavishly to upgrade its atomic arsenal (see pages 23-26). Russia's defence budget has grown by over 50% since 2007, and fully a third of it is devoted to nuclear weapons: twice the share of, say, France. China, long a nuclear minnow, is adding to its stocks and investing heavily in submarines and mobile missile batteries. Pakistan is amassing dozens of battlefield nukes to make up for its inferiority to India in conventional forces. North Korea is thought to be capable of adding a warhead a year to its stock of around ten, and is working on missiles that can strike the west coast of the United States. Even the Nobel peace laureate in the White House has asked Congress for almost \$350 billion to undertake a decade-long programme of modernisation of America's arsenal.

New actors with more versatile weapons have turned nu-

clear doctrine into guesswork. Even during the cold war, despite all that game theory and brainpower, the Soviet Union and America frequently misread what the other was up to. India and Pakistan, with little experience and less contact, have virtually nothing to guide them in a crisis but mistrust and paranoia. If weapons proliferate in the Middle East, as Iran and then Saudi Arabia and possibly Egypt join Israel in the ranks of nuclear powers, each will have to manage a bewildering four-dimensional stand-off.

Worst of all is the instability. During much of the cold war the two superpowers, anxious to avoid Armageddon, were willing to tolerate the status quo. Today the ground is shifting under everyone's feet.

Some countries want nuclear weapons to prop up a tottering state. Pakistan insists its weapons are safe, but the outside world cannot shake the fear that they may fall into the hands of Islamist terrorists, or even religious zealots within its own armed forces. When history catches up with North Korea's Kim dynasty, as sooner or later it must, nobody knows what will happen to its nukes—whether they might be inherited, sold, eliminated or, in a last futile gesture, detonated.

Others want nuclear weapons not to freeze the status quo, but to change it. Russia has started to wield nuclear threats as an offensive weapon in its strategy of intimidation. Its military exercises routinely stage dummy nuclear attacks on such capitals as Warsaw and Stockholm. Mr Putin's speeches contain veiled nuclear threats. Dmitry Kiselev, one of the Kremlin's mouthpieces, has declared with relish that Russian nuclear forces could turn America into "radioactive ash".

Just rhetoric, you may say. But the murder of Boris Nemtsov, an opposition leader, on the Kremlin's doorstep on February 27th was only the latest sign that Mr Putin's Russia is heading into the geopolitical badlands (see page 51). Resentful, nationalistic and violent, it wants to rewrite the Western norms that underpin the status quo. First in Georgia and now in Ukraine, Russia has shown it will escalate to extremes to assert its hold over its neighbours and convince the West that intervention is pointless. Even if Mr Putin is bluffing about nuclear weapons (and there is no reason to think he is), any nationalist leader who comes after him could be even more dangerous.

Towards midnight

China poses a more distant threat, but an unignorable one. Although Sino-American relations hardly look like the cold war, China seems destined to challenge the United States for supremacy in large parts of Asia; its military spending is growing by 10% or more a year. Nuclear expansion is designed to give China a chance to retaliate using a "second strike", should America attempt to destroy its arsenal. Yet the two barely talk about nuclear contingencies—and a crisis over, say, Taiwan could escalate alarmingly. In addition Japan, seeing China's conventional military strength, may feel it can no longer rely on America for protection. If so, Japan and South Korea could go for the bomb—creating, with North Korea, another petrifying regional stand-off.

What to do? The most urgent need is to revitalise nuclear di- ►

► plomacy. One priority is to defend the nuclear Non-Proliferation Treaty, which slows the spread of weapons by reassuring countries that their neighbours are not developing nukes. It was essential that Iran stayed in the treaty (unlike North Korea, which left). The danger is that, like Iran, signatories will see enrichment and reprocessing as preparation for a bomb of their own—leading their neighbours to enrich in turn. That calls for a collective effort to discourage enrichment and reprocessing, and for America to shore up its allies' confidence.

You don't have to like the other side to get things done.

Arms control became a vital part of Soviet-American relations. So it could between China and America, and between America and Putin's Russia. Foes such as India and Pakistan can foster stability simply by talking. The worst time to get to know your adversary is during a stand-off.

In 1960 Albert Wohlstetter, an American nuclear strategist, wrote that, "We must contemplate some extremely unpleasant possibilities, just because we want to avoid them." So too today, the essential first step in confronting the growing nuclear threat is to stare it full in the face. ■

Global banks

Cocking up all over the world

Badly managed and unrewarding, global banks need a rethink



BANKS are yet again in trouble—not pure investment banks such as Lehman Brothers, or mortgage specialists such as Northern Rock; but a handful of huge global "network" banks. These lumbering giants are the woolly mammoths of finance, and if they cannot improve their performance they deserve a similarly grievous fate.

The pressure is intense. Last month JPMorgan Chase felt obliged to tell investors why it should not be broken up. Citigroup awaits the results of its annual exam from the Federal Reserve: if it fails, as it did last year, its managers will be for the chop. Deutsche Bank is rethinking its strategy, after years of feeble performance and drift. HSBC, the world's local bank, has been hammered for both a tax scandal in its Swiss operation and because of its poor profits.

A shining Citi on a hill

On paper global banks make sense. They provide the plumbing that allows multinationals to move cash, manage risk and finance trade around the world. Since the modern era of globalisation began in the mid-1990s, many banks have found the idea of spanning the world deeply alluring.

In practice, however, they have been a nightmare to run. Their sprawl remains vast. Citi is in 101 countries, employs 241,000 people and has over 10,000 properties. Talk of global best practice is hollow, given the misdemeanours that banks have been accused of facilitating, including money-laundering in Mexico (HSBC and Citigroup) and breaking sanctions (Standard Chartered and BNP Paribas). No boss but Jamie Dimon of JPMorgan Chase gives a convincing impression of being in full control—and even he suffered a \$6 billion trading loss in 2012. Some, like Royal Bank of Scotland (RBS), having decided that they have suffered enough, have sounded a full-scale retreat and pledged to concentrate on their home markets. Others, like Citi (see page 75) and HSBC, are slimming down and shrinking their global presence.

The wave of regulation since the financial crisis is partly to blame. Regulators rightly decided not to break up global banks after the financial crisis in 2007-08 even though Citi and RBS needed a full-scale bail-out. Break-ups would have greatly multiplied the number of too-big-to-fail banks to keep an eye

on. Instead, therefore, supervisors regulated them more tightly—together JPMorgan Chase, Citi, Deutsche and HSBC carry 92% more capital than they did in 2007. Global banks will probably end up having to carry about a third more capital than their domestic-only peers because, if they fail, the fallout would be so great. National regulators want banks' local operations to be ring-fenced, undoing efficiency gains. The cost of sticking to all the new rules is vast. HSBC spent \$2.4 billion on compliance in 2014, up by about half compared with a year earlier. A discussion of capital requirements in Citi's latest regulatory filing takes up 17 riveting pages.

Partly as a result, global banks are now flunking a different test: that of shareholder value. Most of these titans struggle to make returns on equity better than (much safer) electrical utilities. Last year Citi's was a dismal 3.4%. JPMorgan Chase estimates that its scale adds \$6 billion-\$7 billion a year to its profits. Yet the costs of the additional capital it must carry, and of the extra rules and complexity that being global entails, offset a big chunk of that. (No other firm makes estimates this explicit, presumably because the figures would not flatter.) Up to half the capital invested in the big global banks failed to make a return on equity of 10% or more last year (see page 71).

Investors are asking if the costs of their global spread outweigh the benefits. If the likes of Citi and HSBC don't buck up soon, they will be dismembered—not by regulators, but by their shareholders.

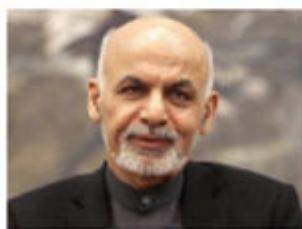
Global banks insist they have a competitive advantage. No one else can do what they do. A mesh of alliances between hundreds of local banks would be rickety and hard to police; Silicon Valley has yet to invent a virtual international bank; and emerging-market contenders such as Bank of China are a decade away from having global footprints. But genuinely global activities, such as foreign-exchange trading and providing cross-border banking services to multinationals, typically account for only a quarter of big banks' revenues.

It is hard to avoid the conclusion that global banks are, by the standards of normal firms, dysfunctional conglomerates that struggle to allocate their resources well. Their bosses must now try to forge lean firms that facilitate global trade at low cost and risk. If clients find these services valuable, the banks will be able to charge enough to offset their huge overheads, and make a decent return for their shareholders on top. If clients do not, the global bank deserves to become just another of finance's failed ideas. ■

Afghanistan, Pakistan and the Taliban

Seize the day

Pakistan is helping Afghanistan's president make peace with the Taliban. Other powers should back him



ON THE face of it, prospects for lasting peace in Afghanistan look as bleak as at any time in the 13 years since NATO-led forces ousted the Taliban—only for them to regroup in a long, bloody insurgency. Last year a record 3,700 civilians died in the fighting. As America and other NATO countries pull out their troops, Afghanistan's own army, less well trained and equipped, is being hammered. It has struggled to find enough recruits to replace those who die or desert. And now the Taliban and other insurgents are preparing for a spring offensive.

Fortunately, this grim picture is not the whole story. The bright spot is the efforts made by Ashraf Ghani, Afghanistan's president since September, to improve his country's tattered dealings with Pakistan. Closer relations hold out the tantalising possibility of making peace with the Taliban.

From meddling to making

Peace in Afghanistan is inconceivable without help from Pakistan. Machinations by the Pakistani army's spy agency in the 1990s helped bring the Taliban to power. The country's military establishment still backs them and related groups, such as the Haqqani network, which have wreaked havoc in Afghanistan from their bases in Pakistan's tribal areas. The Taliban's senior leaders live unmolested in the Pakistani cities of Quetta, Peshawar and Karachi.

Yet whereas his predecessor, Hamid Karzai, went out of his way to taunt Pakistan, not least by flaunting his friendship with India, Mr Ghani is staking his political career on finding ways to work with it (see page 39). On a visit to Pakistan in November Mr Ghani broke with protocol by calling on the all-powerful army chief, General Raheel Sharif, as well as on the

prime minister, Nawaz Sharif (who is no relation). Mr Ghani understands that General Sharif needs help to deal with Pakistan's own terrorists, its version of a home-grown Taliban: a threat that Pakistani commanders and politicians for too long refused to acknowledge, but which was brought home by a murderous attack on a school in Peshawar in December that killed 132 children. So the Afghan president has sent forces to fight anti-Pakistan militants in their refuges in eastern Afghanistan, an unthinkable course under Mr Karzai. The army claims that it is now reciprocating by making it hard for Afghan militants to train in Pakistan. General Sharif is helping Afghan forces secure the long border. And he appears to be urging Taliban leaders to sit down with Mr Ghani and discuss peace.

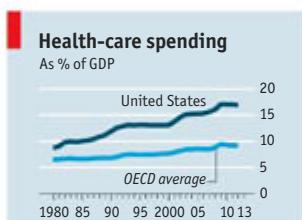
There are good reasons for them to do so. Although the Taliban can cause mayhem inside Afghanistan, they struggle to hold territory. Last year's election saw a clear vote against them and their violence. Plenty within the group have long been keen on a deal; talks were mooted in Qatar in 2013. Some Taliban might settle for more autonomy in the Pashtun heartland in southern Afghanistan, which is their main base of support. Many Afghans resent an overcentralised state.

The goal, in the long run, should be a new constitutional settlement. If he hopes to fix a fractious, multi-ethnic country and lay the foundations for peace and prosperity, Mr Ghani must come round to the idea that power should be devolved. All sorts of other issues will arise, including education for girls, which the Taliban abhor. But that is not for now. The urgent task is to get the two sides round a table. Pakistan is critical in achieving that—and China and America, acting in concert, could help press it into action. Moreover, outside powers, including Iran and India, must also make clear to both sides that they will stand behind a deal and offer plenty of economic assistance if one is done. Mr Ghani's chance may prove fleeting. He deserves all the help he can get. ■

Health care in America

Don't kill Obamacare

As the Supreme Court considers whether to gut Obamacare, evidence is mounting that the law is working



America's health-care system is the costliest in the world, gobbling up 17% of GDP. The average for rich nations is only 9%; even the French spend less than 12%. Despite this avalanche of cash, one American in ten has no cover and American life expectancy, at 79, is four years worse than Italy's.

The Affordable Care Act of 2010, better known as Obamacare, was supposed to deal with these problems. Five years later, Barack Obama's most important domestic reform is unpopular (56% of Americans disapprove of it) and under renewed

attack. This week the Supreme Court heard yet another legal challenge. In *King v Burwell*, the law's opponents argue that its subsidies for individuals buying health insurance on the federally organised online exchanges are illegal (see page 28). They are unlikely to prevail but, if they do, the law will be gutted and the insurance market thrown into turmoil.

That would be a terrible shame, for Obamacare appears to be working better than expected. First, despite the incompetent rollout of healthcare.gov (the website that allows people to use the federal exchanges), the proportion of Americans who lack cover has fallen from 16.2% to 12.3% since 2009. Second, the previously terrifying pace of medical inflation has slowed. The amount that America spends on health care grew ▶

► by 3.9% a year in nominal terms between 2009 and 2011—having grown by 7.3% a year in 2000–08. The trillion dollar question is: how much of this squeeze is because of Obamacare?

Not all, clearly. The economic downturn accounted for much of the fall in health-care inflation: 77% by one estimate, 37% by another. Yet Obamacare also played its part. For one thing, it may have helped trim some of the fat from Medicare, the bloated public-health scheme for the old. Many hospitals appear to have changed the way they behave in anticipation of the law. The old rule of thumb for American health care—and particularly for Medicare—was that doctors were paid for every test and surgical procedure, and so performed many that were unnecessary. The new law has provisions that encourage them to keep people well; for example, it imposes penalties on hospitals where patients are frequently readmitted. Hospitals are merging, streamlining and restraining their enthusiasm for buying all the latest expensive equipment (see page 63). A new paper in *Health Affairs* shows that they have improved productivity in the past decade, and especially since 2009.

Annual spending per Medicare beneficiary has fallen in real terms from \$12,000 in 2011 to an estimated \$11,200 in 2014.

This is highly unusual—the last time Medicare spending fell was in the late 1990s. Granted, Medicare beneficiaries are healthier than they were, since swarms of baby-boomers have pulled down their average age. But the programme has also grown more efficient. The Congressional Budget Office projects that Medicare spending per head will be no higher in 2020 than it is now. By then, spending on Medicare and Medicaid (cover for the poor) could be \$160 billion a year less than previous estimates. In the wider market, too, health inflation is subdued (see page 27).

Plenty more flab to trim

As Americans age and Obamacare continues to extend coverage, federal outlays on health will probably start to grow again as a share of GDP over the next decade. America still spends far more than it needs to on health care, as the gap with other nations shows. But there is hope at last that health inflation can be made more manageable. Scrapping Obamacare and starting again from scratch would make this harder. Far better to build on what appears to be working. For the Supreme Court to rule for the challengers would be a woeful outcome. ■

Gender and education

Nature plus nurture

Girls do better than boys in school and university. But both can still improve—sometimes for surprising reasons



STENDHAL once wrote that all geniuses who were born women were lost to the public good. At least in the rich world, that wasteful truth has been triumphantly overcome. More than half of new graduates in the OECD club of mostly rich countries are now female. In several the share is around 60%. Former male redoubts such as medicine and law have increasingly been captured by women. Indeed, elite American colleges are widely suspected of admitting male applicants with lower grades, to even up the numbers. Yet despite this monumental advance, prejudices continue to hamper girls—and boys, too. Happily, neutralising them, at least within schools, should be much easier than reversing centuries of patriarchy.

Educational results still seem to support the old idea that male and female intellectual capabilities differ. An analysis by the OECD of PISA tests for 15-year-olds in 60-odd countries turns up some eerily similar patterns. Girls trounce boys in literacy, but boys do better in mathematics. Boys do less homework and are more likely to fail in all subjects. The courses that both sexes choose at university mirror their earlier strengths at school. Women dominate in education, health, arts and humanities; men lead in computing, engineering and physics (see page 61).

All this might suggest that intellectual differences are hard-wired, with women abler and more assiduous, but men better at the exact sciences. A closer look at the data reveals a new version of Stendhal's lament: that much ability, both male and female, is wasted because of tenacious stereotypes.

One startling fact uncovered by the OECD number-crunchers is that, when teachers mark a reading test without knowing

who took it, the gender gap shrinks by a third. Most of the world's teachers are now women, who find it easier to spot ability when it appears in their own likeness. They give better marks, perhaps unconsciously, to the punctual, orderly and neat: fine qualities that society associates with girls, but which are not the same as reading and understanding a text. Poor grades damage motivation and mean that pupils are put in lower ability groups, so that biased assessments turn into self-fulfilling prophecies. Falling behind in literacy, as boys disproportionately do, is particularly worrying, since reading is needed to learn anything else. The solution is simple: whenever possible, school tests should be made anonymous.

Sometimes it makes sense to go with the grain. Young boys are more likely to read when the topic is zombies or superheroes; older ones prefer newspapers or comic books. So make them all available. More often stereotypes get in the way: if girls believe they cannot do sums and boys think that books are sissy, neither will do as well as they could. Pupils live down to low expectations or pick up subtle cues about gender differences. In maths, for instance, when female teenagers are asked how confident they feel about solving an abstract equation, they rate their chances almost as highly as boys. But when the question involves calculating a car's fuel efficiency, many balk.

Easy on the carburettors

The most encouraging finding is that gender gaps can be narrowed as attainment rises across the board. Even more important than rooting out hidden bias is improving education for all. Boys in countries with the best schools read better than girls elsewhere. In Shanghai hardly any youngsters, of either sex, fail in everything, and girls are almost as good at maths as their male classmates—and far ahead of boys elsewhere. Had there been a Mrs Stendhal, she would have smiled. ■

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Deflation isn't all bad

The Economist has fallen for the conventional view that deflation is worse than inflation ("Feeling down", February 21st). Yet the direction of causality between prices and investment may also run the other way. The global economy has been hit by successive booms in tech markets, housing and the rise of China. Falling inflation is a benign consequence of this, yet central banks are desperate to avert deflation and have injected vast amounts of liquidity into the financial system. Rather than inflating the prices of goods and services, this has simply resulted in asset-price inflation.

The data bear this out. Our analysis of the past 300 years across 30 countries found that average productivity growth during periods of both inflation and deflation was the same, at 1.6%. Moreover, pointing to the situation in the euro area since 2008 misses the point that inflation was actually positive for most of those years, so it is not a panacea. Over the past year Spain and Greece have experienced deflation, yet growth has picked up. And although the euro area will go through a bout of deflation this year, growth will be higher.

The problem is not deflation. For Europe it is finding the right way to clean up bad debts and provide investment. For America it is preventing new bubbles forming. For China it is how best to unwind from a long period of overinvestment.

BILAL HAFEEZ
Global strategist
Deutsche Bank Konzept
London

This land is your länder

German-Americans, you reckoned, "have assimilated and prospered without any political help specially tailored for their ethnic group" ("The silent minority", February 7th). That would come as a huge surprise to the politicians in Pennsylvania and Ohio who in 1839 managed to get laws passed requiring that school

classes be taught in German should parents want it. By 1850 this had spread to Illinois, Iowa, Kentucky, Missouri and Nebraska. Local governments in Indiana, Minnesota and Wisconsin soon joined the bandwagon. By 1880 four out of five German-American children were enrolled in bilingual schools. By 1900, 4% of American school-age children were learning in German-language schools.

One has to wonder what the reaction would be if Spanish speakers today demanded the same privileges.

NOEL MAURER
Washington, DC

Germans from the Rhineland who settled in New York colony in the early 1700s were not immigrants to America, they were subjects of the British Empire under the terms of an agreement with Queen Anne. Half a century before that, Prince Rupert of the Rhine had enthusiastically encouraged his people to cross the Atlantic.

The point is that Germans were never outsiders, but have been among those who sorted out the geopolitics of the continent of North America over the past four centuries. And they have not merely assimilated, but have authenticated the culture.

V.J. PHILLIPS
Englewood, Florida

Your leader outlining how to fix America's "broken immigration system" disingenuously compared the migration of Germans in the 19th century to today's influx of migrants from Latin America ("Let the states decide", February 7th). Germans in the 19th century immigrated here legally under a system administered by a federal government that observed and enforced the laws. Most of today's migrants from Latin America arrive here illegally.

ARTHUR ASSON
Spring Creek, Nevada

Immigration to America today is a more complex situation than in the past. Take the case of the Indian immigrants who went wild when Narendra

Modi visited New York. Globalisation has meant that Indian-Americans are more connected to their place of origin than previous waves of migrants ever were, causing them to be less likely to assimilate fully.

My personal experience is that Indian immigrants who arrived here in the 1960s assimilated to a much greater degree than more recent arrivals, who came after the revolution in communications. Not that you need to give up your culture, food, religion or language to be a good American.

SUBRAMANIAN IYER
Mount Kisco, New York

Made famous by Pink Floyd

I was surprised to see you lay the blame for the lack of regeneration over the past few decades in London's Nine Elms area at the door of local government ("Building on the boundaries", February 21st). In fact, central government was the primary cause of any delay. The main site in Nine Elms is Battersea Power Station. After it closed in 1983 it was listed as a heritage site by the British government, immediately adding huge costs to any future development of the site. This meant that any scheme would only become viable when either the building fell down or property prices in London reached astronomical levels.

Whether you love or hate the iconic building (and I am a huge fan), there is little doubt that the heritage listing was the largest factor inhibiting the regeneration of Nine Elms.

RUSSELL KING
Former cabinet member for strategic planning in the London Borough of Wandsworth
Sydney

Money for something

A curious tale in the rich history of money ("Means of exchange", February 14th) is that of J.S.G. Boggs, an American artist who drew one-sided dollar banknotes by hand, and exchanged (not sold) the works of art for goods at the same value his dollars depicted. His habit of "spending" his art, exchanging an image of a \$100 note for \$100 in goods, and even accepting change, got him arrested and prosecuted, but never convicted.

It has been noted that the government and Mr Boggs could fund their court cases indefinitely simply by "making money". But "Boggs bills", especially the early work that was sought by collectors and museums, increased in value far more dramatically.

PAUL KLENK
New York

It's square to be hip

You described U Street in Washington, DC, as "an inferno of hipsterdom" ("Bring on the hipsters", February 21st, 2015). Please. U Street is so passé. H Street is the current epicentre of designer facial hair, overpriced small plates, Mumford & Sons, and slow, "ironic" fixed-gear bicycles. The always soon-to-open H Street streetcar, a multimillion dollar "cool" boondoggle that combines the charm of a slow-moving bus with the steering manoeuvrability of a railway train, will only increase the area's cachet.

I would mock further. However, as I am reading your newspaper on an iPad, accompanied by a \$12 White Lady expertly concocted by a mixologist at a bar in the heavily gentrified Shaw neighbourhood, I fear I haven't a skinny-jeaned leg to stand on.

S.D. PLATTON
Washington, DC ■

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A rap on the knuckles

Corporal punishment is out of fashion across most advanced economies, but in France nearly 70% of parents admit to having given their sprogs a smack. Now the Council of Europe is reprimanding the country for not outlawing the practice



Why can't I get a signal on my phone?

By 2020 80% of adults may have a smartphone in their pocket, but wimpy 3G signals often disappoint. The problem largely lies with the telecoms operators who have financial incentives to build the worst network they can get away with



Fever pitch

Last October North Korea sealed its borders to outsiders wanting to visit as an Ebola epidemic raged in west Africa. Why the hermit kingdom, ever suspicious of the outside world, reacted so dramatically remains something of a mystery

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European lenders are hunting for yield in the corporate sector and American companies are lining up to borrow from them at historically low rates



Religion: Divine purposes

Leaders of big countries often claim grand destinies for their people. But exceptionalism can be bad news for their smaller neighbours, as Russia's are learning



America: Shot in the right direction

Amid the worst outbreak in decades vaccinations look to be on the up in America. That's cheering news to scientists who worried that children were skipping jabs

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Chief, Treasury Division

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The unkicked addiction

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Despite optimistic attempts to rid the world of nuclear weapons, the threat they pose to peace is growing

IN JANUARY 2007 Henry Kissinger, George Shultz, William Perry and Sam Nunn—two Republican secretaries of state, a Democratic defence secretary and a Democratic head of the Senate Armed Services Committee—called for a global effort to reduce reliance on nuclear weapons. The ultimate goal, they wrote in the *Wall Street Journal*, should be to remove the threat such weapons pose completely. The article generated an astonishing response. Long seen as drippily Utopian, the idea of getting rid of nuclear weapons was suddenly taken on by think-tankers, academics and all sorts of very serious people in the nuclear-policy business. The next year a pressure group, Global Zero, was set up to campaign for complete nuclear disarmament. Its aims were endorsed by scores of government leaders, present and past, and hundreds of thousands of citizens.

In April 2009 Barack Obama, speaking in Prague, promised to put weapons reduction back on the table and, by dealing peacefully but firmly with Iran's nuclear ambitions, to give new momentum to the nuclear Non-Proliferation Treaty (NPT). Processes could now be set in train, he said, that would lead to the worldwide renunciation of nuclear weapons within a generation. This speech, along with his ability not to be George W. Bush, was a key factor in landing Mr Obama the Nobel peace prize a few months later.

The following year he returned to Prague to sign an arms agreement with Russia, New START, which capped the number of deployed strategic warheads allowed to each side at 1,550. His co-signatory, Russia's then president, Dmitry Medvedev, had endorsed Global Zero's aims. A month later the NPT's quinquennial review conference agreed a 64-point plan intended to reinforce the treaty's three mutually supportive legs: the promise that all countries can share in the non-military benefits of nuclear technology; the agreement by non-weapons states not to become weapons states; and the commitment of the weapons states to pursue nuclear disarmament. There were hopes that, when the parties to the NPT met again in May 2015, there would be substantial progress to report.

An idea whose time has gone

Alas, no. Mr Obama's agreement with Iran remains possible, even likely—but it will hardly be one that energises the cause of a nuclear-free world (see box on next page). Iran will continue to sit close to the nuclear threshold, retaining an ability to enrich uranium which, if it were to withdraw from the agreement, would allow it to create a bomb's worth of weapons-grade material in about a year. That is more than the current estimated breakout period of three months, and long enough, it is felt, for

America and its allies to mount a response, should it come to that. But it is hardly a huge step back from the threshold, or forward for peace.

And the Iran deal is pretty much the only item on 2010's list of high hopes that has got anywhere at all. Co-operation on New START has been suspended thanks to Russia's aggression in Ukraine; promised follow-on measures have been abandoned. Vladimir Putin, Mr Medvedev's predecessor and successor, takes every opportunity to laud his country's nuclear prowess, and is committing a third of Russia's booming military budget to bolstering it.

It is not the only power investing in its nukes (see box on subsequent page). America is embarking on a \$348-billion decade-long modernisation programme. Britain is about to commit to modernising its forces, as well, while France is halfway through the process. China is investing heavily in a second-strike capability. In short, there has been no attempt to reduce the role of nuclear weapons in the military and security doctrines of the five permanent members of the UN Security Council, despite their commitments under the NPT. An initiative aimed at making nuclear weapons illegal under international humanitarian law, backed by over 150 NPT signatory countries, has attracted little to no support from the weapons states and only lip service from countries which wel-

Negotiating with Iran

Deal or no deal?

Negotiations on Iran's enrichment and plutonium facilities are nearly over

WITH the March 24th deadline for reaching agreement looming, and Israel's prime minister, Binyamin Netanyahu, kicking up a fuss in Washington (see page 30), the outlines of a deal to constrain Iran's nuclear programme are in place. But as another round of negotiations between Iran and the P5+1 countries—America, Britain, China, France, Germany and Russia—wrapped up in Montreux, Switzerland, on March 4th, there were still gaps between the parties.

The aim of the negotiators is to increase by at least a year the “breakout” time it would take Iran to create enough weapons-grade material to make a bomb—currently estimated to be about three months. To that end, in return for an easing of sanctions, Iran should reduce both the capacity of its uranium-enrichment facilities and its stocks of low-enriched uranium. According to the London-based International Institute for Strategic Studies the shape of the deal may be like this:

- Iran would cut the number of centrifuges it is using for enrichment from the 9,500 in service today to about 7,000. Most would be at Natanz; perhaps only a few hundred would be in the deep underground hard-to-bomb facility at Fordow (see map). Its other centrifuges, including 9,000 that are installed but not operating, would be placed in secure stores under the seal of the International Atomic Energy Agency.
- Much of Iran's 8,000kg stockpile of low-enriched uranium would be either exported to Russia or converted into uranium oxide, which cannot easily be used for further enrichment.
- The way in which material passes between the remaining centrifuges would be changed so as to make it harder

to get up to high levels of enrichment.

- Because bombs can also be made from plutonium, Iran's reactor at Arak would be reconfigured to produce only around 1kg of plutonium a month.

These measures would remain in force for ten years, after which there would be a staged relaxation and the time taken for a bomb's worth of enrichment would start to reduce again. The rate at which it might do so is a continuing concern for the P5+1 negotiators, especially as Iran wants to develop faster centrifuges between now and then.

For its part Iran is demanding the immediate removal of all sanctions against it. Although Mr Obama can suspend most American sanctions, only a deeply sceptical Congress can legislate to end them, a non-starter for the foreseeable future. A final unresolved issue is that no reliable inspection regime can be implemented unless Iran provides a full account of its weapons programme, something it has refused to do because it still denies one ever existed.



► come America's nuclear protection.

The truth is that enthusiasm for a push to zero was never quite as global as it seemed. America's superiority in conventional weapons, although not readily converted into lasting victory in real wars, was striking enough to make gradual nuclear disarmament attractive to a number of American security professionals and academics. Some of them, former cold warriors, shared a guilty awareness of how close the planet had come to destruction as a result of accident and miscalculation. In a world of failing banks and successful jihadists, nuclear weapons felt to many like dangerous, expensive anachronisms.

Elsewhere, things looked rather different. Nuclear weapons are an effective way to make up for a lack of conventional military power—as America readily appreciated when, in the 1950s, it used the threat of retaliation with its comparatively sophisticated nuclear weapons to hold off massed Soviet tank divisions in Europe. Now the fact of America's immense conventional power puts the boot on other feet.

The evening-up effect is most obvious for the smallest fry. A presumed handful of weapons allows North Korea to bully and subvert its otherwise far more powerful southern neighbour and cock a snook at America. One of the reasons China contin-

ues to provide the hermit kingdom with energy and food aid is the fear of what a Kim regime facing collapse might do with its nukes. Iran has wanted a nuclear option in part because of the contrasting fortunes of the two other countries that appeared with it on Mr Bush's “axis of evil” in 2002: North Korea and Iraq. Some Ukrainian politicians bemoan the fact that, in 1994, the country gave up the nuclear weapons it had inherited from the Soviet Union. The security guarantees it received in return from Britain, France, America and Russia ring more than a little hollow today.

Calling Major Kong

But big countries, too, can value the heft added to their conventional might by nuclear supplements. Thérèse Delpech, a distinguished French nuclear strategist, argued shortly before her death in 2012 that the West's adversaries were already deploying a range of asymmetric tactics to offset their conventional military disadvantage; it would be wrong to assume that nuclear weapons might not find a place in that range. Russia is a case in point. In 1999 Mr Putin was struck by the effectiveness of the West's precision weapons in Kosovo. When he became president a year later he introduced a military doctrine of “de-escalation”, in which the threat of a limited nuclear strike, probably though not necessarily against a military target, could be used to force an opponent back to the status quo ante. It was aimed at deterring America and its NATO allies from involving themselves in conflicts in which Russia felt it had vital interests.

The key to the doctrine's credibility is for the West to believe that Russia might be willing to take the risk of using nuclear weapons because it cares far more about the outcomes in its “near abroad” than others do. Since 2000 nearly all Russia's big military exercises have featured simulations of limited nuclear strikes, including one on Poland in 2009. After a crash modernisation effort, Russia now has greater confidence in its conventional forces. That may explain why a major exercise staged in 2013 went without a simulated nuclear attack. But the conflict in Ukraine is disconcertingly similar to the kind that Russian forces have consistently war-gamed and planned for. Russia's keenness for nuclear-backed bullying can be seen in its threats to launch pre-emptive strikes against American missile-defence sites due in Romania this year and in Poland in 2018. In late 2013 Russia stationed nuclear-capable Iskander missiles in Kaliningrad, the enclave which borders Poland and Lithuania.

The thought of “nuclear combat—toe-to-toe with the Russkies”, as Major Kong put it in Stanley Kubrick's “Dr Strangelove”, feels like a return to the cold war. But this is different. In the cold war the two sides were broadly committed to international ►

► stability, with nuclear weapons seen as a way to preserve, rather than challenge, the status quo. This did not mean there were no risks—things could quite easily have gone terribly wrong by accident or design, and the mutual interest in stability could have waned. But both American and Soviet leaders showed themselves highly risk-averse when it came to nuclear weapons. Protocols such as the use of the “hot line” evolved to defuse and manage crises, and

great care was taken to prevent the possibility of accidental or unauthorised launch. The development of “second-strike” nuclear forces, which could guarantee a response even after the sneakiest of sneak attacks, bolstered stability.

The new nuclear age is built on shakier foundations. Although there are fewer nuclear weapons than at the height of the cold war (see chart on next page), the possibility of some of them being used is high-

er and growing. That increasing possibility feeds the likelihood of more countries choosing the nuclear option, which in turn increases the sense of instability.

Many of the factors that made deterrence work in the cold war are now weakened or absent. One is the overarching acceptance of strategic stability. Some of today’s nuclear powers want to challenge the existing order, either regionally or globally. Both China and Russia are dissatisfied with what they see as a rules-based international order created for and dominated by the West. There are disputed borders with nukes on both sides between India and both China and Pakistan.

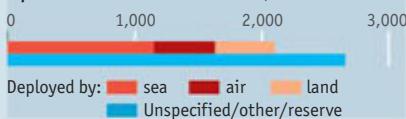
The kind of protocols that the cold-war era America and Soviet Union set up to reassure each other are much less in evidence today. China is particularly cagey about the size, status and capabilities of its nuclear forces and opaque about the doctrinal approach that might govern their use. India and Pakistan have a hotline and inform each other about tests, but do not discuss any other measures to improve nuclear security, for example by moving weapons farther from their border. Israel does not even admit that its nuclear arsenal exists. The protocols that used to govern the nuclear relationship between America and Russia are also visibly fraying; co-operation on nuclear-materials safety ended in December 2014.

Arsenals and aspirations

United States (estimated total warheads: 4,764)

In line with its 2010 New START agreement with Russia, America has no plans to increase the size of its strategic arsenal, but it is developing a new warhead that would fit on both submarine-launched and ground-launched missiles. The 14 Ohio-class ballistic-missile submarines currently in service will be replaced at a rate of about one a year from 2027 onwards. There is also a programme to field a new long-range bomber capable of penetrating enemy air defences and a new air-launched missile for it to carry. The ability of such a system to attack well-defended targets using low-yield weapons is seen as making it a particularly credible deterrent against a minor nuclear power.

Operational nuclear warheads, 2014

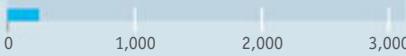


Russia (4,300)

Several new intercontinental ballistic missiles (ICBMs) are being planned as replacements for old land-based systems. One of them, the liquid-fuelled Sarmat, is a monster which can carry up to 15 independently targeted warheads; some see it as being designed for use as a first-strike weapon. Ten new Borei-class submarines, three of which have recently entered service, will allow Russia to keep ballistic-missile submarines on permanent patrol for the first time since the end of the cold war. The country also has plans for a stealthy nuclear bomber. Having once promised to reduce its commitment to tactical nuclear weapons, Russia appears to be increasingly incorporating them into its war-fighting doctrines. It may be developing new ones to be carried on cruise missiles, which might violate the Intermediate-Range Nuclear Forces treaty of 1987.

China (250)

Despite testing its first nuclear weapon half a century ago, China had until recently built up its nuclear forces extremely slowly. Until 2006 its only ICBMs were a small number of liquid-fuelled DF-31As which sat in silos that were vulnerable to a first strike. But with the recent arrival of the DF-31A, which can be moved around on roads, and the deployment, after many false starts, of at least four Jin-class ballistic-missile submarines, China now has a plausible second-strike capability. If it chose to make new warheads it could easily accommodate them on some of its huge arsenal of medium- and short-range missiles. President Xi Jinping appears to have dropped the country’s long-standing promise not to be the first to use nuclear weapons.



France (300)

The core of the force is four *Triomphant*-class missile submarines, the most recent of which entered service in 2010. France is also updating its airborne systems with 40 new Rafales that can carry the ASMPA cruise missile. A thorough-going modernisation programme for the submarines, aircraft, missiles, warheads and weapons-production facilities will continue into the next decade.

Britain (225)

Four ageing *Vanguard*-class missile submarines will be replaced with new *Trafalgar*-class boats in the middle of the next decade; they will be equipped with refurbished American Trident D5 missiles because, unusually for a nuclear power, Britain does not design its own missiles. It is possible that the next government will only commit to building three of the submarines, which would make it much harder always to have one on patrol at sea.

Pakistan (120)

In the world’s fastest-growing nuclear-weapons programme, Pakistan has up to 11 aircraft, ballistic missiles and cruise missiles in development as delivery systems. Particularly troubling is the possibility of low-yield, short-range ballistic-missile systems (Hatf-2 and Hatf-9) for early use against an attack by conventional Indian forces.

India (110)

The Agni family of land-based missiles are improving in range, payload and accuracy. The new road-mobile Agni V has a range of up to 8,000km (5,000 miles); later versions will carry multiple warheads. India’s first missile submarine, the *Arihant*, is being deployed after years of troubled development. It will be followed by three more.

Israel (80)

The mobile Jericho III missile, with a range of 6,000km, will soon be deployed. Israel also has F-16 and F-15 aircraft capable of nuclear attacks and three *Dolphin*-class submarines that can fire nuclear-capable cruise missiles with a range of around 1,500km, making it one of only five nations to have a land-sea-air triad of delivery systems.

North Korea (10)

Though the reality is hard to disentangle from the rhetoric, North Korea may have as many as ten warheads and designs that would miniaturise them for use on missiles; it could probably add one weapon a year. Its Scuds can reach most of South Korea and its Nodongs could hit Japan. Its work on a Pacific-spanning ICBM continues.

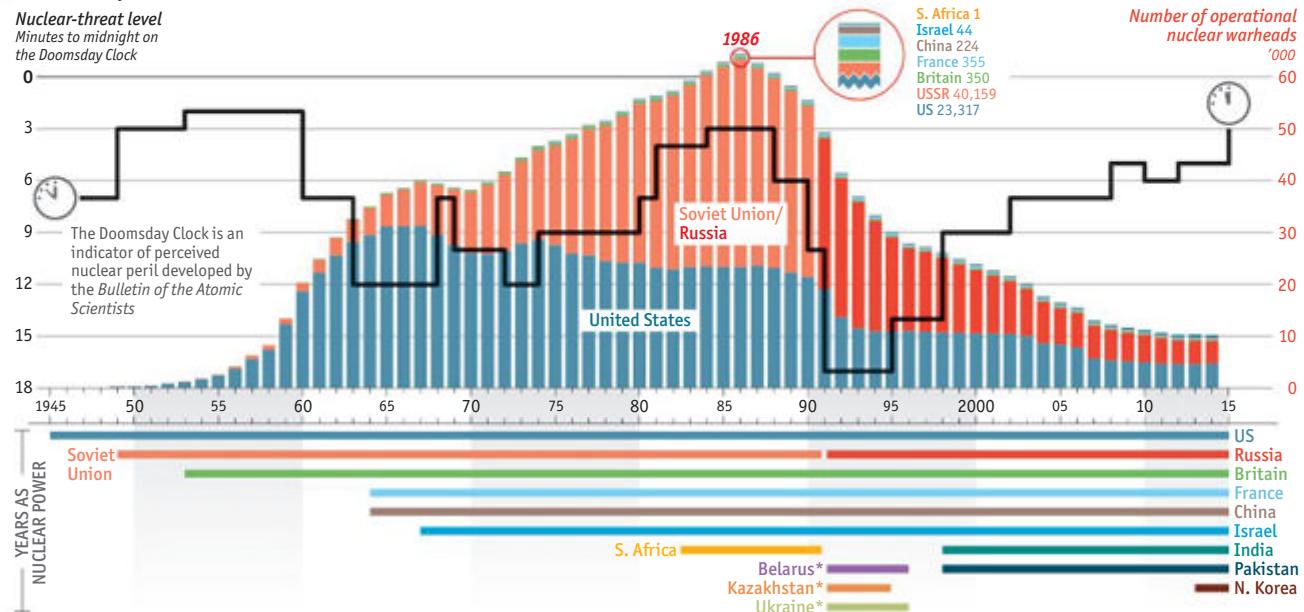
Can’t live with them...

Second-strike capabilities—which theorists believe, under some circumstances, to strengthen deterrence—are spreading, which may provide some comfort. An assured second-strike capability greatly reduces the destabilising “use them or lose them” dilemma that a country with a small or vulnerable nuclear force faces in a crisis. Russia, America, France and Britain have long enjoyed this assurance thanks to missile submarines that are practically invulnerable while at sea. China now has mobile missiles that might survive a first strike, and is deploying its own fleet of ballistic-missile submarines. India has just begun trials of its first missile sub. Israel has submarines which can launch cruise missiles that could carry nuclear warheads.

It is worth remembering, though, that the prospect of one of the two parties in a conflict developing such a capability while the other lacks it can in itself be destabilising. There is also a worry that the leaders of some current and aspirant nuclear powers may be less risk-averse than their cold-war analogues. A wariness of leaders who feel their regimes to be under internal or external threat, or whose religion or ideology embraces apocalyptic confrontation, adds to fears about nuclear weapons in North Korea and possibly Iran.

Weak institutions also increase the danger of the unauthorised use of weapons, or

Fewer weapons, more worries



Sources: Federation of American Scientists; Arms Control Association; *Bulletin of the Atomic Scientists*; SIPRI

*From break-up of Soviet Union, figures n/a

► of some ending up with non-state groups. This danger is especially acute in Pakistan, where responsibility for short-range systems may be delegated to field commanders during a crisis, a large part of the army has been radicalised and jihadist networks have multiplied.

Putting together the risk that nuclear suasion could be used to push for change instead of stability, the increasing number of actors, and the ever greater possibilities for confusion as to what might actually be going on, Ms Delpech wrote in 2012 that the world was entering a new "era of strategic piracy". This new piracy was characterised by lawlessness and deception, and she saw it as including surprise attacks as well as blatant threats. China was a particular concern because of its refusal to engage in serious discussions about what sort of strategic stability might suit it. The West, she warned, was ill prepared.

Some strategists believe that, given the existential threat nuclear weapons pose, new forms of deterrence will be found. It worked in the cold war and *mutatis mutandis* can work today. But as Lawrence Freedman, a British strategist, observes, "deterrence works; until it doesn't." In a much more complicated and chaotic future, "doesn't" becomes more likely, especially if thought is not given to the problem. America is willing to spend heavily on new nuclear kit, but there is little sign of the intellectual effort needed to develop new theories of deterrence.

One way to bolster stability could be through a more overt doctrine of extended deterrence on America's part. In Asia and the Middle East, America's security guarantees to its allies are more ambiguous than they are in Europe, where the NATO

commitment is clear. China's growing military capabilities and the wild card of North Korea threaten Japan and, less so, South Korea, American allies that have thus far forborne from becoming nuclear-weapons powers. Both could do so quickly were they so minded. Were Iran to break out from the NPT and pursue a bomb, Saudi Arabia, the UAE and maybe Egypt, too, would be under pressure to do so.

America can help practically as well as doctrinally. It has increasingly effective anti-ballistic missile systems that it can share with allies; they might sometimes be destabilising, but perhaps not as much so as proliferation would be. America is also developing "prompt global strike"—the ability to deliver a precision strike using conventional weapons anywhere in the world within an hour—which would allow the possibility of quickly neutralising small, hostile nuclear forces without recourse to nuclear weapons.

...Can't live without them

Such things are not much help, though, against the largest and smallest threats. An emerging near-peer nuclear power such as China may have a much higher tolerance for risk during some sorts of regional crisis (over Taiwan, say) than has been seen in the past. At the other end of the spectrum, when it comes to non-state groups without assets that can be held at risk, deterrence may simply not have much to offer.

The recent hopes for a Global Zero now seem desperately premature. As long as great-power relations remain unstable, regional rivalries linger unresolved and rogue

states continue to see nuclear weapons as a way of intimidating purportedly powerful adversaries, the incentive to hang on to nuclear weapons will outweigh other considerations. This is all the more true given that nobody has shown convincingly that renouncing nuclear weapons would really make the world safer.

The economist and strategist Thomas Schelling has argued that a world of renunciation has no good answer to the problem of reconstitution—the ability of a former nuclear power to restore its nuclear capability very quickly. No government could allow itself to lose a war that it would win if it were to re-produce nuclear weapons. Thus there would be very strong incentives to cheat, for example by caching some weapons-grade material just in case. Mr Schelling concludes that such a world might have a dozen countries with "hair-trigger mobilisation plans to rebuild nuclear weapons and mobilise or commandeer delivery systems". "Every crisis would be a nuclear crisis", he warns. "Any war could become a nuclear war."

Mr Obama was right six years ago to warn the world against complacency when it came to nuclear weapons. The knowledge that at some point, either by accident or design, one or more is very likely to be used is no reason not to work hard to postpone that wicked day. Their use should certainly never be considered part of the normal currency of international relations. But for now the best that can be achieved is to search for ways to restore effective deterrence, bear down on proliferation and get back to the dogged grind of arms-control negotiations between the main nuclear powers. ■



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Health policy (1)

Will Obamacare cut costs?

CHICAGO

The growth in America's health-care spending is slowing

BACK in 1980, when Jimmy Carter was president and leg warmers were cool, America spent 9% of GDP on health care. Now it spends a whopping 17%—far more than any other rich country. In absolute terms it spends more than twice as much per head as Britain. And for what? American figures for diabetes, infant mortality and life expectancy are worse than the median for the OECD, a club of rich countries.

For decades health spending has grown faster than the economy as a whole. The soaring cost of health insurance provided by employers has left little or nothing in the pot for pay rises. Out-of-control public-health programmes such as Medicare and Medicaid have threatened to crowd out everything else that Uncle Sam pays for.

Yet something appears to have changed. America is experiencing its slowest growth in health spending in five decades. In 2013 the share of GDP devoted to health care was the same as it was in 2009. Some of this is due to the recession and its aftermath—when Americans lose their jobs, they often lose their health insurance, too. But the Affordable Care Act of 2010, better known as Obamacare, may also have helped to curb costs. As the Supreme Court considers whether to strike down a crucial pillar of that law (see next article), economists are furiously debating how big that effect has been. By one estimate the economic downturn accounted for 77% of the dip in health-care inflation; by another, it was only 37%.

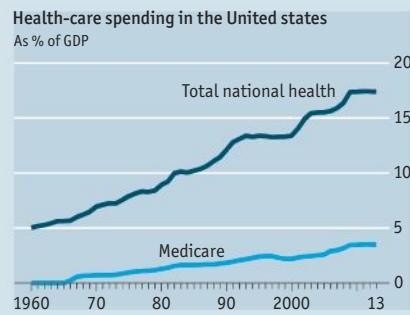
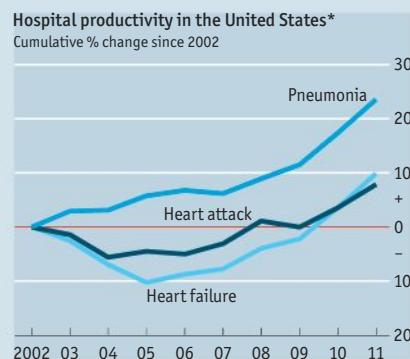
Obamacare sought to fix two problems: coverage and cost. To extend coverage, the

law made it compulsory for Americans to have health insurance, on pain of a fine. It also offers subsidies for those who cannot afford it and bars insurance firms from charging people more if they have “pre-existing conditions”; ie, they are already ill. Before the exchanges arrived in 2013 some

41.3m Americans lacked health insurance. That has fallen to 30m (of whom 48% are eligible for assistance).

Curbng costs is more complicated. Traditional American health care is inefficient and wasteful. Costs vary enormously from provider to provider—sometimes by an order of magnitude—and until recently were largely opaque. Medical bills were long paid by third parties, such as insurers, so patients neither knew nor cared whether one option was cheaper than another. Under the “fee-for-service” system every blood test, bandage or x-ray triggers a payment. Doctors are tempted to order lots of unnecessary procedures to pay for a new yacht or their children’s education. ➤

America the outlier



Sources: OECD; Bureau of Economic Analysis;
 Centres for Medicare and Medicaid Services; *Health Affairs*

*Labour and capital used for
 each successful treatment

► Obamacare introduced (or encouraged the adoption of) various tools to restrain all this. For example, health-care providers receive financial rewards for cutting costs and penalties for bad care, such as when patients have to be readmitted to hospital after they have been discharged or when they catch nasty infections in a clinic. Between January 2012 and December 2013 there have been 150,000 fewer readmissions among Medicare patients—an 8% decline. The law also requires greater price transparency.

Doctors and hospitals are encouraged by the law to club together in Accountable Care Organisations. Instead of charging fees for everything they do, most ACOS try to keep people healthy. Obamacare rewards them for keeping costs below a set limit per person covered. Not everyone is convinced that ACOS—which strongly resemble the unpopular Health-Maintenance Organisations of the 1990s—will work: Regina Herzlinger of Harvard Business School calls them a “fantasy” because they are so difficult to manage.

Stop shovelling cash out of the door

The health law encourages the use of “bundled payments”, where a hip replacement or a heart bypass generates a single fee, no matter how many tests are performed or how many complications arise. These bundles may also help to cut spending on drugs, says Paul Keckley of Navigant, a consultancy. When hospitals cannot simply charge extra for each pill, they are more likely to haggle for discounts with the drug firms that supply them.

On January 26th Sylvia Burwell, the health secretary, said she hoped that by the end of 2016, 85% of Medicare’s payments would have some link to value and quality (as opposed to simply shovelling money out of the door willy-nilly), and almost a third will be via ACOS or bundles. Private insurers such as Anthem, Aetna and UnitedHealthCare are following suit.

The amount that Medicare spends on each beneficiary has actually declined in real terms, from \$12,000 in 2011 to \$11,200 in 2014. If this is sustained, it could make a huge difference. Medicare has long been the most frightening part of the federal budget. Falling Medicare spending could be driven by falling demand—lots of baby-boomers have just turned 65, and they are healthier than their elders. But it could also be because hospitals and doctors are working more efficiently. A paper by the Congressional Budget Office suggests that over the previous decade providers were trimming costs, for example by treating beneficiaries at lower-cost clinics, adopting more efficient procedures and introducing new technology more slowly.

Much of the American health-care system still clings to fee-for-service. But towards the end of the past decade doctors,

hospitals and other providers surely saw Obamacare on the horizon. Anticipating changes in the way hospital payments are updated each year, they realised they would have to shape up. Anecdotally, they have been preparing for years. New evidence from the journal *Health Affairs* suggests that hospitals grew more productive between 2002 and 2011—particularly after 2009 (see chart on previous page). Chapin White of the RAND Corporation says that the fall in Medicare spending in hospitals last year was worth \$98 billion, for which Obamacare can take some credit.

Overall the CBO projects that, if the law is unchanged, net federal spending for the government’s main health-care pro-

grammes in 2039 will be 8% of GDP, about 15% less than had been projected in 2010. Projections for Medicare and Medicaid spending between 2011–2020 have been revised downwards by \$1.1 trillion. The government also claims that since 2011 some 50,000 fewer patients died in hospitals as a result of Obamacare.

Far from bankrupting the nation, as its critics predicted, Obamacare may be making medicine thrifter. Even so, health-care spending as a share of GDP is likely to rise over the next decade as Americans age. With the economy recovering this year, the total health-care bill is projected to grow by 6%. Hold the champagne, then, and not just because it is bad for you. ■

Health policy (2)

Obamacare in court, again

WASHINGTON, DC

Five words that could upend America’s health-care system

THREE years ago Chief Justice John Roberts infuriated conservatives when he cast a deciding vote to uphold the Affordable Care Act, also known as Obamacare. On March 4th, when the justices heard arguments in *King v Burwell*, the latest episode in what Justice Elena Kagan called a “never-ending saga” of challenges to the law, the chief kept his poker face. He was all but mum for the 80-minute hearing.

The issue in *King* is whether five words in a 1,000-page, ill-drafted and almost incomprehensible statute spell doom for the rest of it. Obamacare provides subsidies to the cash-strapped when they buy health insurance through “exchanges established by the state”. But 34 states opted not to set up exchanges. The federal government set exchanges up for people in those states, and offered them subsidies like everyone else. Since the law does not expressly allow sub-

sides for people who buy insurance on a federal exchange, the challengers say, such payments are illegal.

Michael Carvin, the challengers’ lawyer, called the case “straightforward”. Stephen Breyer, a liberal justice, disagreed. “What’s the problem,” he asked, with viewing a federal exchange as the functional equivalent of state-run markets? Donald Verrilli, the solicitor-general, who made a bumbling defence of Obamacare in 2012, took off his gloves this time. The challengers’ view “makes a mockery” of the law and leads to a “textual brick wall”, he said, “revok[ing] the promise of affordable care”. Here Justice Antonin Scalia huffed that while “it may not be the statute they intended”, it is “the statute that they wrote”. Only Congress, not the justices, he said, has the authority to “rewrite” a bad law.

The stakes are high. With subsidies removed, many people would find their insurance policies unaffordable. The Urban Institute estimates that 8.2m Americans would lose coverage if the challengers prevail. And the broader insurance market would be thrown into turmoil unless Congress acted swiftly to re-draft the law. Given the vast differences between the Republican-controlled Congress and the president, a deal to revise Obamacare would be nearly impossible to reach.

On the court, there seem to be three votes to gut Obamacare and four to salvage it. As for the other two, Mr Roberts was inscrutable and Justice Anthony Kennedy may have revealed his hand when he said that coercing states to set up their own exchanges raised a “serious constitutional question” of federalism. A ruling is expected by the end of June.



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Israel's prime minister

Bibi in DC

His speech helped Republicans, but will not stop Iran going nuclear

AS A guide to how America might craft a deal that would stop Iran building a nuclear bomb, the doom-laden speech given by Binyamin Netanyahu to a joint meeting of Congress on March 3rd was not very helpful. To repeated ovations from Republicans and a divided response from Democrats, the Israeli prime minister mostly explained his conviction that an agreement currently being brokered by the American government and other world powers is so bad that it “doesn't block Iran's path to the bomb; it paves Iran's path to the bomb.”

Mr Netanyahu (pictured) did identify elements of a possible deal that he thought especially naive and foolish, notably its ten-year expiry date for curbs on Iran's nuclear programme. The accord, in its current form, leaves Iran with a vast nuclear infrastructure and relies on inspectors to prevent a breakout, Mr Netanyahu said, calling a decade “the blink of an eye” in the life of a regime bent on “conquest, subjugation and terror” across the Middle East.

He did not describe an alternative deal with any chance of being accepted by Iran, or indeed the European and other countries working with America. Instead he set out three extra, non-nuclear conditions that should be imposed on Iran before sanctions are lifted. “First, stop its aggression against its neighbours in the Middle East. Second, stop supporting terrorism around the world. And third, stop threatening to annihilate my country,” he said.

In reality Mr Netanyahu's plan amounts to “no deal” with Iran, grumbled Barack Obama. An accord which freezes Iran's nuclear infrastructure for ten years with intrusive inspections is the best that is possible, the president said after Mr Netanyahu's speech, which he did not attend. “Nothing else comes close,” he said. “Sanctions won't do it. Even military action would not be as successful as the deal that we have put forward.”

Adding to Mr Obama's anger, the Israeli prime minister's visit to Washington was organised at the invitation of Republican leaders in Congress without consulting the White House, two weeks before elections in Israel. This was an affront to protocol without apparent precedent.

If Mr Netanyahu's speech was poor diplomacy, it was nonetheless a good guide to how the Iran debate may play out in American domestic politics in the coming months. John Boehner, the Speaker of the House of Representatives, essentially invit-



Full marks for oratory; less for diplomacy

ed the Israeli leader to Washington as an expert witness for the Republican case that Mr Obama is a feckless and naive leader who makes concession after concession to America's foreign enemies. In that context, Mr Netanyahu was under little pressure to offer much more than criticism—though in his address the Israeli leader carefully praised Mr Obama as a friend of Israel and said he deeply regretted any perception that his visit was “political”.

The address was doubly useful for Mr Boehner. Excitement over Mr Netanyahu's visit muted anger from the hard right that, on the same day, House Republicans quiet-

ly abandoned an attempt to stop funding for Mr Obama's programme to shield millions of unlawful immigrants from deportation by holding up funding for the Department of Homeland Security. It was a good day to bury news of a surrender that was always inevitable—the party of national security could hardly shut down America's domestic-security apparatus.

Mr Netanyahu's warnings were hailed by the Republican leader of the Senate, Mitch McConnell, who moved quickly to schedule votes as early as March 10th on legislation to give Congress power to approve any final Iran deal, limiting Mr Obama's ability to lift sanctions. That angered centrist Democrats, who have their own vocal concerns about the dealmaking of Mr Obama and his secretary of state, John Kerry, but who do not wish to torpedo those talks before March 24th, a deadline for a provisional agreement.

A Democratic hawk on Iran policy, Senator Robert Menendez of New Jersey, has co-sponsored legislation that would require Mr Obama to submit any Iran nuclear deal to Congress for review. On March 3rd Mr Menendez angrily vowed to block his own bill if Republicans insisted on trying to accelerate its passage.

Ironically, several members of both parties are queasy about the limited goal set by Mr Obama, namely preventing Iran from obtaining an actual nuclear weapon. Many would prefer the goal set by Mr Netanyahu: stopping Iran from becoming a threshold nuclear state with the ability to sprint towards a bomb. The Israeli leader's visit may or may not impress voters back in Israel, where a closely-fought election will be held on March 17th. But it has made bipartisan agreement on Iran policy harder in Washington. ■

Organised labour and the law

Republicans v unions

CHICAGO

Wisconsin may become the 25th right-to-work state

NEVER confuse a single defeat with a final defeat,” wrote Scott Fitzgerald, the novelist. His namesake, Scott Fitzgerald the Wisconsin state senator, suffers no such confusion. Republicans have beaten the unions once in the Badger state, but they are not yet declaring victory.

As the Republican majority leader, Mr Fitzgerald pushed a “right-to-work” law through the senate on February 25th, which would stop private-sector workers from being forced to join a union—and pay dues—as a condition of employment. Union members cried “Shame!” as it passed.

Senator Fitzgerald is confident that his bill will be law by next week. The Republican-controlled state assembly is expected to pass it soon and Scott Walker, the Republican governor, has promised to sign it as soon as it reaches his desk. Opponents of the law may take it to court, but this has been tried before, in Indiana and Michigan, without success. On February 28th unions bused thousands of workers from around the state to Madison, the state capital, where they rallied in frigid temperatures ringing cow bells, waving American flags and holding up signs such as “Stop the ►

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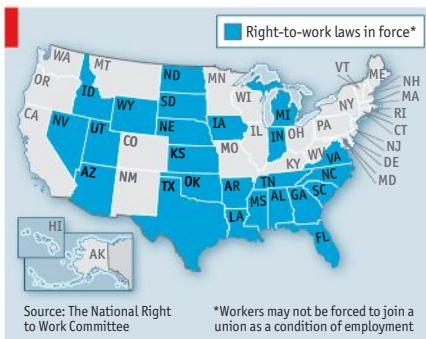
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The crowd was smaller than the tens of thousands who rallied in 2011 against Act 10, a law promoted by Governor Walker, which required government workers to contribute more to their own pensions and health care and limited most public-sector collective bargaining to wages. This time Mr Walker stayed in the background. "Iowa, Michigan, Indiana—they all have [right-to-work]," says Senator Fitzgerald, who claims that the absence of such a law puts Wisconsin at a disadvantage compared with other states in the Midwest.

Twenty-four states already have right-to-work laws (see map). Advocates say it is unfair for unions to levy dues from workers who do not want to join. They add that curbing union power promotes jobs and growth. Figures from the Department of Labour and the Bureau of Economic Analysis support this view. Between 2003 and 2013 right-to-work states created a net 3.6m private-sector jobs, saw wages increase by 15.1% and manufacturing GDP rise by 26.1%. The 26 other states added only 1.5m jobs, saw wages rise by just 8.2% and manufacturing GDP increase by 13.8%.

Unions protest that they face a "free rider" problem if workers who do not pay

dues nonetheless benefit from collectively bargained contracts. By reducing union power, they say, right-to-work laws make pay and conditions worse. According to the AFL-CIO, a union umbrella body, the average worker in a right-to-work state earns \$5,971 less annually than workers elsewhere in America. Only 46.8% of private-sector employers in right-to-work states offer health insurance to their employees, compared with 52.6% in other states, says the AFL-CIO.

It is hard to be sure what effects such laws have, since so many other factors are involved: right-to-work is not the main difference between California and Texas, for example. But Richard Vedder of Ohio University says that right-to-work confers significant economic benefits, since businesses prefer states where there is less uncertainty about the cost of labour.

Emotions run high largely for political reasons. Any attempt to undermine unions hurts the Democratic Party, which relies on organised labour to raise money and knock on doors at election time. Democrats are right to be worried. Only 6.6% of private-sector workers are union members—down from more than 30% in 1960. Firms are free to move to less unionised states, and workers are free to follow the jobs.

The public sector is largely immune from such pressure, but taxpayers often resent the lavish benefits that public-sector unions have negotiated at their expense. This is one reason why Mr Walker was re-elected last year despite his union-bashing, and why conservatives think him a plausible candidate for president. The novelist Scott Fitzgerald once said that "there are no second acts in American lives." Both Mr Walker and (in a different way) the unions must be hoping he was wrong. ■

Hillary Clinton's e-mails

Nothing to hide?

WASHINGTON, DC

A hoo-hah about transparency

AS SCANDALS involving people called "Clinton" go, it seems a bit tame. On March 2nd the New York Times revealed that when Hillary Clinton was secretary of state, she used a personal e-mail account rather than a government one for all her official business. This stumble reveals a more general problem with Mrs Clinton's undeclared presidential campaign.

The finding came through the Republican-controlled House Select Committee on Benghazi. (House Republicans have spent two years hunting fruitlessly for proof that, for political reasons, American missions in Libya were left vulnerable when they were attacked in 2012.) Federal rules require all e-mails sent for government business to be stored by departments. Mrs Clinton's evidently were not. They were in fact stored on a personal server set up in her home in Chappaqua, New York. That looks suspicious: because only Mrs Clinton possesses physical access to her e-mails, she can be selective about which ones she turns over.

For Republicans, the finding is politically convenient. The investigation into Benghazi had all but died for lack of anything interesting to say. The idea that Mrs Clinton may have kept back e-mails could help to revive the allegations. Trey Gowdy, the chairman of the investigative committee, quickly called for all Mrs Clinton's communications to be made available for his committee to scrutinise; on March 4th a subpoena was duly issued.

For Mrs Clinton, the story could prove a lasting headache. It fits into a pattern of cloudy dealings. Republicans were already complaining about the Clinton Foundation, a charity controlled by Mrs Clinton and her husband Bill, for accepting donations from foreign governments, including some while she served at the State Department, which could raise conflicts of interest. The foundation does plenty of charitable work, but it also helps to provide a platform for Mrs Clinton to do things that look a lot like campaigning.

Few think that such murkiness will be cleared up by better control of e-mails, however. Politicians who want to conceal shady dealings have plenty of other ways to communicate. They can meet in person or use intermediaries. Some might simply use more private electronic systems. A Snapchat message disappears after a few seconds. Does the Freedom of Information Act cover that? ■



Joining a union is so great it should be compulsory



Republican presidential hopefuls

Bobby Jindal's parsimonious pitch

NEW ORLEANS

Another Rhodes scholar from a rural state eyes the White House

BOBBY JINDAL came to America *in utero* when his parents moved from India. He jokes that he was "a pre-existing condition"—the kind of witticism that comes naturally to a health-care wonk.

Mr Jindal is obviously brainy: he was running Louisiana's Department of Health and Hospitals, an agency with 13,000 staff, at the age of 24. Two years later he was director of a bipartisan commission to reform Medicare, the giant federal health scheme for the elderly, under Bill Clinton. As governor of Louisiana since 2008, he is known for his grasp of detail and for his warning to fellow Republicans to "stop being the stupid party". Yet now that he is thinking of running for president, he has started to say things that sound—how can one put this?—less subtle than you might expect from a former Rhodes scholar.

Sharia (Islamic law) is "oppressive and it is wrong". Barack Obama is "unfit to be commander-in-chief" because he won't say that America is at war with radical Islam. The president is also waging a "silent war on religious liberty", Mr Jindal claims, citing an unsuccessful attempt to force companies with devout owners to subsidise contraceptives they consider abortifacients. Asked if this is perhaps a bit of an overstatement, he says it is not, though he concedes that, unlike in some other countries, the war on religious freedom in America is "not a shooting war".

Mr Jindal's change of tone is common among aspirants for the White House. Party primaries demand primary colours. Mr Jindal has neither a famous name nor deep pockets, and he is vying with at least a dozen other plausible contenders for the Republican nomination. He has to make

conservatives who have not yet heard of him fall in love with him. That means offering them plenty of red meat.

He has several qualities that will help. At 43, he is young and energetic. A Hindu-turned-Catholic, he seems comfortable talking about his faith—in a way that Mitt Romney and John McCain never were. He is also not white—an advantage in a party that would like to stop alienating minorities. His family history—of immigrants who struggled and succeeded—has wide appeal. It also makes it easier for him to say fairly tough things about immigration. He wants to let more skilled immigrants into America, but fewer illegal ones. He complains that the current system is "a low wall and a narrow gate". "We need the opposite," he says. Overall, he comes across as more socially conservative than Jeb Bush, more of a defence hawk than Rand Paul and more sensible than Ted Cruz.

In person, Mr Jindal is affable and

smooth. He talks fast, tossing out torrents of statistics. However, he struggles to electrify a crowd or make undecided voters swoon. Polls suggest that Americans are keener on the idea of putting a governor in the White House than they were before Senator Obama first ran for the presidency—executive experience matters, they have concluded. But a small, poor, rural state such as Louisiana makes a wobbly launching pad. Mr Clinton made it from Arkansas to DC, but he was the best retail politician of his generation. Mr Jindal is not. Nor can he claim, as the Republican governors of Ohio or Wisconsin can, that he brings a home-turf advantage to a crucial swing state. It is nearly 20 years since Louisiana last voted for a Democrat in a presidential election.

Mr Jindal's record as governor is mixed. Conservatives will applaud his passion for school choice and his zeal for cutting and simplifying taxes and shrinking the state. But his plan to abolish income tax died in the state legislature, and the recent collapse in the oil price makes his job much harder. Louisiana, a big oil-producer, faces a \$1.6 billion budget shortfall this coming fiscal year—6.5% of the total. On February 27th Mr Jindal proposed slashing more than \$500m in subsidies to business and putting up the state cigarette tax. He also hopes to trim state spending on healthcare services by 0.3% and on higher education by 6%, saving another \$171m or so. How he handles Louisiana's money troubles will be closely watched. If he can muddle through without raising income taxes, fiscal hawks will be impressed.

Mr Jindal remains a long shot for the Republican nomination. But he could make a good running mate for a more centrist candidate, argues Bob Hogan of Louisiana State University. "The governor would satisfy and assuage the concerns social and religious conservatives would have with a candidate like [Jeb] Bush," he says. ■

For a transcript and video of The Economist's interview with Bobby Jindal, please go to www.economist.com/blogs/democracyinamerica

Bobby Jindal's White House checklist

| | Helpful in Republican primary | general election |
|---|----------------------------------|------------------|
| Loves tax cuts; hates spending | ✓ | Maybe |
| Comes from a small, solidly Republican state | ✗ | ✗ |
| Son of Indian immigrants; favours more skilled immigration | ✓ | ✓ |
| Tough on illegal immigrants | ✓ | ✗ |
| Military hawk: calls Obama "unfit" to be commander-in-chief | ✓ | Maybe |
| Plans to repeal and replace Obamacare | ✓ | Maybe |
| Supports school choice | ✓ | Maybe |
| Devout Catholic | ✓ | Not really |
| Accuses Obama of waging a "silent war" on religious freedom | ✓ | ✗ |

Source: *The Economist*

Lexington | Of dogs and democracy

What an elected dogcatcher reveals about small-town America



A MIXTURE of altruism and self-interest first prompted Zebulon Towne, a surveyor's assistant and maple-sugar-maker, to volunteer for the official post of dogcatcher in Duxbury, his hometown in Vermont. Some ten years ago Mr Towne owned a clever but faithless canine called Biscuit whose great joy was running away. So often was the hound found by locals, prompting phone calls either to her owner or to the dogcatcher, that Mr Towne decided: "It might as well be me both times."

The part-time office comes with neither pay nor special equipment. It is mostly a "mediation job", Mr Towne has discovered, after years of resolving disputes about dogs that are noisy, ill-treated or have just eaten someone's chickens. However, holding the office does involve one solemn condition, even if it sounds more like a political punchline. Duxbury's dogcatcher is formally elected each year at "town meeting", an annual mini-parliament that is held in towns across Vermont and New England, typically in early March. In places such as Duxbury, following traditions that date back to colonial times, all adult residents are invited to become legislators for a day, electing dozens of office-holders and debating the fine details of budgets, such as which brand of dump truck to buy.

Even in Vermont some question the value of such citizen-government. On March 3rd, this year's statewide Town Meeting Day, sceptics noted that just 11% of registered voters attend the average town meeting in Vermont, and that the number is falling. This year the town of Monkton rejected a proposal to let residents skip town meeting and take decisions by dropping off a paper ballot at a polling station: a change that other communities have adopted to increase turnout (but which killed their town meetings). Some towns voted to move meetings to the evening, so that more working-age locals can attend, or to a Saturday. The town of Bethel offered those who showed up this year child care and free pie.

Yet after attending Duxbury's assembly, which drew 144 people, or one in seven registered voters, Lexington came away persuaded that—if it can be saved—town meeting has much to teach politicians farther afield. It is not that such gatherings are all beaming goodwill. Mr Towne was re-elected unopposed, retaining his status as America's only elected dogcatcher (some other Vermont towns elect animal-control officers). But the meeting

was bruising for some of his neighbours. The budget was challenged line by line, down to the cost of laundering road-crew uniforms. Individual town employees found themselves explaining why they worked hard enough to deserve their pay.

A member of the selectboard, or town council, abruptly resigned after being accused of arrogance towards the "dirt road people", meaning the many locals who live on the steep wooded tracks that lead up from the town's only paved road. Seething suspicions were aired, notably around public debts run up a few years ago as Duxbury was rebuilt after a big flood. Nor was the meeting strikingly efficient. It lasted more than eight hours, including a break for a potluck lunch, and much time was spent discussing points of procedure.

The impressive part is how Duxbury deals with conflict. Deep differences are often visible, as old-time conservatives butt heads with liberal newcomers, or pony-tailed professionals compete for election against retirees in check shirts. Sometimes transparency is painful, as when votes are held by a show of hands, forcing neighbour to snub neighbour. There is a lot of grumbling. As Duxbury's elected moderator drily asked at one point, as he attempted to press on with the agenda: "Is everyone relatively happy?" But transparency also eases distrust: some of the angriest interventions turned out to have roots in a misunderstanding. The mere fact of being allowed to air grievances left several speakers visibly mollified, and willing to bow to the consensus in the room. All those hours sitting on hard chairs in a school canteen left Duxbury residents weary. But the repeated votes and endless discussions also left them with a personal stake in the running of the town for the coming year.

People power, unleashed

The absence of party labels helps, as does a taboo against overt campaigning for office. Rebecca Ellis served on the selectboard of the next-door town of Waterbury for eight years. She now sits in the state House of Representatives as a Democrat, and admits that: "At the state level, almost everything goes through on a Democratic or Republican track." A town meeting is less predictable. The system may not always produce elegant decision-making. Waterbury recently spent three years debating whether to build a new municipal office and, if so, whether to combine it with the library. But, says Ms Ellis, it creates a core of engaged citizens: "You get a better town out of this system."

It would be hard to replicate town meeting elsewhere. Vermont is a curious state, where good manners and civic spirit co-exist with curmudgeonly individualism and self-reliance. But there is no need to clone town meeting for its example to do some good. Frank Bryan, a political scientist at the University of Vermont, is the author of "Real Democracy", a study of almost 1,500 New England town meetings. He writes: "If town meeting teaches anything, it is how to suffer damn fools and to appreciate the fact that from time to time you too may look like a damn fool in the eyes of people as good as yourself."

All too often, national politics takes the opposite approach, pandering to partisans and corralling them into tribes that concede nothing to the other side. Not every town needs to elect its dogcatcher. But democracy that asks a bit more of its citizens is worth a try. ■



Mexican education

Flunking the test

OAXACA

Failing schools pose a big challenge to President Enrique Peña Nieto's vision for modernising Mexico

GOING into the offices of the National Co-ordinator of Education Workers (CNTE) in Oaxaca, a city 350km (220 miles) south-east of Mexico's capital, is like entering a world of rebellious teenagers rather than teachers. Graffiti are scrawled on the walls and posters denounce "state terrorism". The trade union's radio station, Radio Plantón (Demonstration Radio), rails against President Enrique Peña Nieto's education reforms, which it blames on the IMF and other capitalist bogeymen.

In the main square nearby, the CNTE's Oaxaca chapter, known as Section 22, maintains a campsite occupied by teachers not a bit repentant about abandoning their classrooms for weeks on end. Drivers have adopted a pragmatic response to the teachers' frequent road blocks: they use a GPS app called, appropriately, s-22 to avoid them. The state government is just as anxious to keep out of the way. It is wary of a repeat of a crisis in 2006, when a teachers' strike turned into a violent rebellion that shut down parts of the city for months.

This is not a local affair, however. The CNTE, which is smaller but far more aggressive than Mexico's main teachers' union, the SNTE, holds sway over four of Mexico's most unruly states, Oaxaca, Guerrero, Michoacán and Chiapas, which contain about 15% of the population. All have large concentrations of indigenous people. Using a mixture of intimidation and political skill, the union is trying to knock down one

of the pillars of Mr Peña's government: a transformation of education that is central to a series of reforms aimed at making Mexico a more competitive economy.

Despite its crude methods, in part it is succeeding. "If they give in to these guys, they are giving in to counter-reform and corruption," says Claudio X. González, president of Mexicanos Primero, a charity that champions education reform. Last month he sent a letter to the government accusing it of endangering reform—and the rule of law—by bowing to the demands of the CNTE. He says that blows to Mr Peña's credibility, such as the disappearance of 43 students in September and scandals over his family's properties, have weakened his government's resolve to confront the dissident teachers.

The reform of 2013 is aimed at boosting the quality of education in a country that Mexicanos Primero says gives children an average of 8.8 years of study, compared with 13.3 in the United States. As in much of Latin America, most schools are awful. Graduates of teacher-training colleges have been promised jobs for life, regardless of their performance. According to PISA, a global education study, less than a fifth of Mexican students performed adequately in maths in 2012, compared with more than three-quarters in South Korea. Private schools are little improvement on public ones; the poorest children in Canada do better than the richest in Mexico.

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Mr Peña is getting tough with teachers, who earn, with copious benefits, the equivalent of 513.6 days of salary for 200 days of school, according to Marco Antonio Fernández of the Monterrey Technological Institute's School of Government. His reform exposes them for the first time to independent evaluation, both at entry level and further up the career ladder. Those who miss three consecutive days of school without good reason can be sacked.

The reform has also centralised payments of salaries at federal level, in an effort to end a ludicrous anomaly by which both central and state governments paid teachers, though neither knew how many there were. The reform is supposed to streamline spending, and use the savings to improve education. Largesse continues nonetheless, and unionised teachers still hold powerful positions in national and state education ministries and in Congress. This year's federal budget increases spending on teachers' pay by 6.7%

Imperfect as it may be, pollsters say the education reform is far more popular nationwide than others promoted by Mr Peña, such as bringing competition into the monopolistic energy and telecoms businesses. That is particularly true in the industrialised states in central and northern Mexico, where PISA scores are already well above the national average (see map, next page). They see better education as a way to attract more investment. The moderate SNTE largely supports the reforms, and is implementing them in most states.

In the south, where reform is needed most, resistance is strongest. Teachers there say what they need is electricity, running water and toilets, not evaluations. In Oaxaca and Michoacán, CNTE-affiliated teachers have forbidden inspectors, including those from PISA, to test pupils, let alone themselves. Mohamed Otaqui, the spokes-



► man for Section 22, says the union has successfully blocked the Oaxaca state government from ratifying the constitutional changes. Instead, it wants to enact a local policy rooted in indigenous values, rather than in those of an industrial economy. These include better use of the land, and respect for traditions such as village fiestas.

Despite its extremism, the union has got its way by threatening ruinous blockades if

its demands are not met. It has won open support from Oaxaca's leftist state government. Moisés Robles Cruz, the state's education secretary, challenges the assumption that Mexico's industrial north and poorer south can be united under a common education policy. His area, he says, is too underdeveloped. Only partly in jest, he pulls out a one-peso banknote printed in Oaxaca a century ago, when the state was pressing for autonomy during the Mexican revolution. "I may not be in agreement with [the teachers'] methods, but [their] causes are totally legitimate," he says.

Such statements ought to be a red rag to the federal government. The education minister, Emilio Chuayffet, declares that all children should have the same opportunities and that no state is above the law. But with mid-term elections approaching in June, the interior ministry is handling the crisis, implying that political dealmaking will win out over policy. Last month Oaxaca's teachers occupied the main road in Mexico City to press their claims. Analysts say that they have shrewdly outmanoeuvred the government by forcing it to pay perhaps 5,000 extra school staff, probably including union officials who should not have been on the payroll.

If militant unions can so easily undermine reform by threatening havoc, so may moderate teachers, who still wield huge influence in the states. Vested interests threatened by Mr Peña's other reforms will also be tempted to counter-attack. Sadly for Oaxaca's children, that is probably the most important lesson the CNTE will teach this year, unless the government stands up for what it believes in. ■

Intrigue in Argentina

The end of the affair?

BUENOS AIRES

A case against the president is thrown out. The questions it gave rise to remain

AN EBULLIENT crowd greeted Argentina's president, Cristina Fernández de Kirchner, when she arrived at Congress on March 1st to deliver her final state of the union address. Thousands of kirchneristas had gathered outside the Greco-Roman building, carrying balloons and waving flags. They had reason to cheer. A few days before the speech a federal judge, Daniel Rafecas, threw out allegations that Ms Fernández and her officials had obstructed an investigation into Argentina's deadliest terror attack.

Mr Rafecas's decision does not end the saga, which has gripped Argentina since January. Alberto Nisman, a federal prosecutor, began it by alleging that Ms Fernández had offered to shield Iranians suspected of complicity in the 1994 bombing of a Jewish centre in Buenos Aires. In return, Iran would sell oil to Argentina. Just hours before presenting this claim to Congress, Mr Nisman was found dead in his bathroom from a gunshot wound. The prosecutor's death remains as mysterious as ever. On March 4th Gerardo Pollicita, the prosecutor who is now in charge of the case, lodged an appeal against Mr Rafecas's decision.

Nevertheless, Ms Fernández has won an important victory. In a bluntly worded judgment Mr Rafecas pronounced Mr Nisman's 300-page complaint, which was based mainly on wiretaps of low-ranking officials, "alarming" in its shoddiness. He found no proof that the government had asked Interpol to cancel warrants for the arrest of Iranian suspects; the agency's head has stated that he received no such request. There is not "even minimal evidence" to justify taking the inquiry further, Mr Rafecas concluded.

Although Ms Fernández has co-opted parts of the judiciary, it is hard to dismiss Mr Rafecas as a presidential pawn. He angered the government by ordering a search of the vice-president's flat in an investiga-

Mexican drug cartels

Captured capos

MEXICO CITY

Few of the drug lords who terrorised the country remain at large

HOWEVER unruly Mexico's teachers are, none has had a more chequered career than Servando Gómez Martínez, "El Profe", a former primary-school teacher who became head of the Knights Templar, one of Mexico's most ruthless drug gangs. Federal police captured Mr Gómez on February 27th, ending one of the biggest manhunts conducted under the presidency of Enrique Peña Nieto.

The drug lord's only consolation is that five days later security forces also seized Omar Treviño Morales, the head of his gang's biggest rival, the Zetas, in a swanky suburb of Monterrey, in northern Mexico. Mr Treviño, aka z-42, is believed to have taken over the Zetas after his brother, Miguel, was captured in 2013.

More than a dozen of Mexico's worst drug lords have been captured or killed during Mr Peña's 27-month tenure, and almost all the famous ones are now behind bars. Though the subsequent splintering of their gangs does not necessarily reduce crime, violence or the flow of drugs, analysts say the arrests send a strong message against impunity.

Mr Gómez's arrest is particularly significant. His reign of terror in the south-western state of Michoacán was

one of Mr Peña's biggest security problems. A master of political extortion and public relations, he acted for years as a spokesman for drug lords in Michoacán, saying they were fighting a war to rid the state of the heinous Zetas, only to adopt the same brutality themselves.

Guillermo Valdés, a former head of Mexican intelligence, says Mr Gómez combined guerrilla tactics with the "law of lead or silver" against Michoacán's politicians: those who denied him access to their coffers were murdered. In 2014 videos emerged of him with the son of a recent governor and with an interim governor. Mr Gómez is now in the high-security Altiplano prison, where fellow drug lords recently complained of worm-infested food.

The arrests are good news for Mr Peña, who has been on the defensive ever since September, when 43 students disappeared in Iguala in southern Mexico. He promised to make security a higher priority. On the day of Mr Gómez's capture he moved the attorney-general, Jesús Murrillo Karam, to another ministry. He is the only senior official to pay a price for the bungled handling of the case. It continues to haunt Mr Peña.



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tion of his dealings with a currency-printing company. Mr Rafecas also has the respect of Argentina's Jewish community. He wrote a book on the Holocaust and spoke at the reconstructed Jewish centre on the 17th anniversary of the attack.

Even so, his decision has not cleared the mephitic political air. The opposition called it rushed, as well as obsequious in its tone towards the president. By dismissing Mr Nisman's charges just six working days after taking up the case, Mr Rafecas missed an opportunity to investigate them fully, his critics claim. "The quickness of Mr Rafecas's decision fuels society's uncer-

tainty, and the 63 pages that he wrote, which most people will never read, don't help calm it," says Martín Böhmer, a law professor at the University of San Andrés.

Such quibbles did not dampen the mood of Ms Fernández or the *kirchneristas* gathered outside Congress. In a speech lasting nearly four hours she extolled an eight-year record in office characterised more than anything by defiance. During her tenure Argentina has been prickly towards outside interests and investors; at home she has been unyielding towards her rivals. Argentina defaulted in 2014 rather than pay in full a minority of bondhold-

ers. In her final speech she offered no hint that she would negotiate with them. Instead, she called them "bloodsuckers".

That truculent tone is likely to continue until Ms Fernández steps down as president in December. So far she has endorsed none of the candidates to succeed her. The one most relieved by Mr Rafecas's decision to exonerate her is likely to be Daniel Scioli, a former vice-president and current governor of Buenos Aires province, who belongs to Ms Fernández's party. His task is to win over the *kirchneristas* without driving away the many Argentines who revile them. That may now be a little easier. ■

Bello | A long game in Havana

Cuba wants a controlled courtship with the United States, not a fevered embrace. That may frustrate Americans

THE contrast was striking. On February 28th Venezuela's president, Nicolás Maduro, announced the de facto expulsion of scores of American diplomats. It was a transparent ploy by a deeply unpopular leader to foment a clash with the United States so as to justify his repression of the opposition and the possible cancellation of a forthcoming legislative election that he would otherwise lose. Yet a day earlier diplomats from Cuba, Venezuela's closest ally, sat down in Washington, in an atmosphere that they called one of "respect", for a second round of talks with the Americans on restoring diplomatic relations after a 54-year hiatus.

After the talks, Barack Obama said he hoped the United States could lay the groundwork for reopening its embassy in Havana before the Summit of the Americas in Panama on April 10th-11th, which he will attend along with Cuba's Raúl Castro. Cuba confirmed that it is prepared to restore diplomatic ties as soon as the administration recommends the island's removal from the State Department's list of state sponsors of terrorism. This is likely to happen "very soon", says a State Department official.

Following Mr Obama's historic gamble, announced on December 17th, to start dismantling the embargo against Cuba, American companies are queuing up to offer flights and tours. There is fevered talk of importing cigars and exporting poultry and building materials. Mr Obama said this week that "we're already seeing" change in Cuba.

Such enthusiasm is understandable after the half-century freeze between the two countries, but it may be premature. Even if embassies are reopened in the next five weeks—which looks highly unlikely—this will not lead to a speedy normalisation of relations. Still less will it



prompt an immediate embrace of capitalism, democracy and the American way of life by Mr Castro's communist government. Instead, he has portrayed the diplomatic breakthrough, which followed 18 months of secret talks, as a victory—vindication of Cuba's resistance to American efforts to topple its regime.

Mr Castro told a Latin American summit in January that full normalisation of relations with the United States would depend on the formal lifting of the embargo, compensation for the costs it imposed on Cuba and the restitution of the Guantánamo naval base. The last two items are politically impossible, as he surely knows.

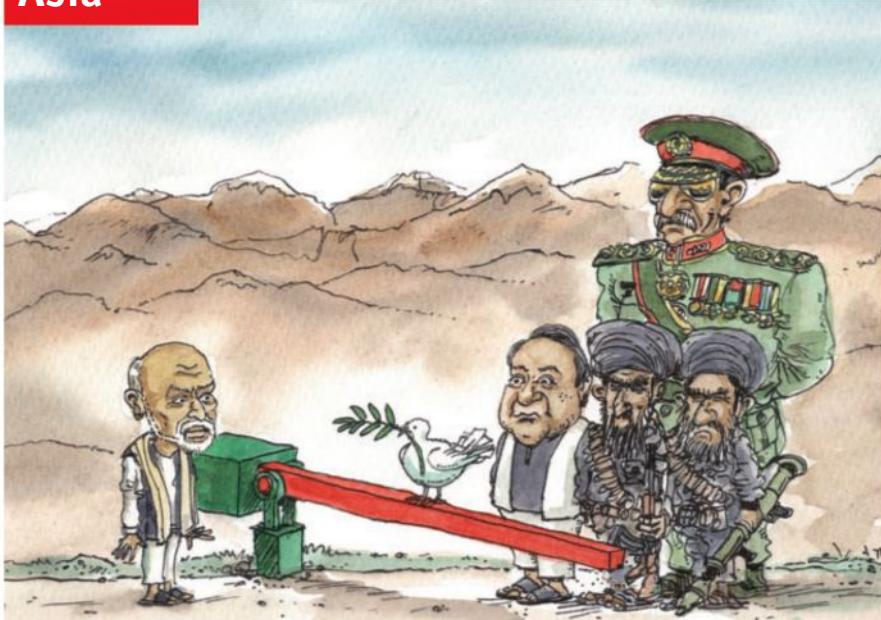
Why is he being so prickly? Since he took office as president in 2008 he has quietly dismantled many of the policies of his elder brother, Fidel. A fifth of Cuba's labour force now works in a fledgling private sector comprising small businesses, farms and co-operatives. While communist rule is still ruthlessly enforced, Cubans enjoy more everyday freedoms.

But change faces stubborn opposition from within the Communist Party and the state bureaucracy. As a Cuban academic in

Havana puts it, the leader of the opposition is Fidel. Raúl cannot ignore his brother's views, even though Fidel is now frail and elderly. And Fidel is not a fan of the rapprochement with the United States. "Cuba's president has taken appropriate steps in accordance with his prerogatives and powers," he wrote stiffly in a letter released on January 26th. But "I don't trust the policy of the United States, nor have I exchanged any words with them."

Raúl has negotiated with Mr Obama regardless. A big reason is that his economic reforms cannot succeed without closer ties with the United States. Despite the reforms undertaken so far, and despite Venezuelan aid (the future of which depends on the survival of Mr Maduro), Cuba's low-wage economy has grown at an average of just 1% a year since 2009. After much delay, the government plans to take two big steps over the next two years. State firms will become autonomous, which implies the freedom not just to compete but also to fail, with the loss of jobs. A trickier change is unifying Cuba's two currencies—state firms use a "convertible peso" at parity to the dollar while wages are paid in Cuban pesos, worth barely four cents. Unifying the currency without triggering high inflation requires the backing of more foreign-exchange earnings. The best hope of those comes from American tourism and remittances—and the foreign loans that the end of American hostility might bring.

Raúl Castro insists that he will step down in 2018. He clearly wants to bequeath a viable Cuba to his successor. It will be one in which markets play an increasing role. To get there he is treading an obstacle-strewn path between past and future. Progress will be halting. But unlike Mr Maduro, he knows that the cold war is over and his country must evolve.



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Afghanistan, Pakistan and the Taliban

Hope springs

ISLAMABAD AND KABUL

The chances are growing that the Afghan Taliban will be brought to the negotiating table

ANYWHERE else, the delivery of food, tents and blankets to victims of avalanches in a neighbouring country would be seen as a welcome but unremarkable humanitarian act. Not, given their history of poisonous bilateral relations, when Afghanistan is the recipient and the donor is Pakistan. The arrival of Pakistani help in the stricken Panjshir valley, where snowfalls have killed more than 280 people, is a sign of how markedly relations between the two countries have improved of late. Now Pakistan may be poised to help broker talks between the Afghan government and the Afghan Taliban who have long fought a bloody insurgency against it. Even an uncertain prospect of negotiations is significant.

Much credit for the improvement goes to Ashraf Ghani, Afghanistan's president since September. In an early speech Mr Ghani declared Pakistan to be his priority and consigned India, once a tight ally of Afghanistan's, to the outer rings of a "five circle" foreign policy. Whereas his predecessor, Hamid Karzai, made frequent forays to India, Mr Ghani has yet to visit. When he went to Pakistan in November, he broke protocol by calling on General Raheel Sharif, the army chief who, more than his (unrelated) namesake and prime minister, Nawaz Sharif, holds real power in Pakistan. That courtesy caused dismay among those back home for whom the Pakistani army is a source of all evil, most notably as the Tali-

ban's historical backer. "Nothing he has done has caused more dishonour to Afghanistan," a former foreign minister, Rangin Dadfar Spanta, fumes.

General Sharif has since made many reciprocal visits to Kabul. Mr Ghani has ordered his security forces to work with their Pakistani counterparts on managing a volatile border. He has also sent cadets to enroll in Pakistan's military academy in Abbottabad, in contrast to Mr Karzai's preference for training officers in India rather than in Pakistan. This counters Pakistani anxiety over the Afghan army's future leaders being indoctrinated by a mortal enemy.

Perhaps most strikingly, Mr Ghani is diverting soldiers away from the fight against the Afghan Taliban—on March 3rd a suicide-bomber killed nine soldiers in Helmand province—to deal instead with Pakistan's own version of the Taliban, Tehreek-e-Taliban Pakistan (TTP), whose militants have taken refuge in Dangam in eastern Afghanistan. After TTP men in December attacked a school for army families in Peshawar in north-west Pakistan, killing 132 children, Mr Ghani's is a notable gesture.

He now needs to win a big prize in return if he is not to be written off as a stooge of Pakistan. The Pakistani army must help lure the Afghan Taliban into early peace talks. Mid-ranking officers in the Pakistani army and its spy agencies have traditionally opposed that. In private they say that

the Afghan Taliban poses no threat to Pakistan itself, while providing a useful channel for Pakistan to influence events over the border.

The good news is that General Sharif is clear-eyed about how negotiations between the Afghan government and the Taliban could help bring wider stability to the region. Pakistan has its own chronic problems with terrorists—the December massacre in Peshawar brought that painfully home.

The Pakistani authorities have influence over the Afghan Taliban, whose leaders enjoy broad protection in the Pakistani cities of Quetta, Karachi, Peshawar and elsewhere. Many Taliban own property in Pakistan, and their children attend local schools. The Quetta Shura, their ruling council, remains intact. A senior Western diplomat in Islamabad, Pakistan's capital, believes that the Pakistanis are actively pushing the Afghan Taliban into negotiations. He judges that among the Taliban are "reasonable people" ready to be guided by instructions from their leader, Mullah Omar, should he sue for peace.

Back channels between the Afghan Taliban and the government in Kabul, the Afghan capital, have long existed, yet previous hopes of talks have foundered. This time could be different. With American-led foreign troops withdrawing, it is harder for the Taliban to claim to be fighting a patriotic war against foreign occupiers (though Mr Ghani will be lobbying hard for more American troops to remain when he visits Washington later this month). And if, this year, Afghan security forces survive their first full fighting season without NATO firepower, it might disabuse those militants who believe that only American forces are denying them victory. Afghan security forces are losing more men in a year—4,350 in 2013, the latest year with full ➤

► statistics—than all foreign troops killed since 2001. Yet the 169,000-strong army and the police are forces to be reckoned with. They should easily deny the Taliban their grandiose promise to capture the provinces of Helmand and Kunar this year.

Further, useful diplomacy is being brought to bear. China, Pakistan's closest ally, has hosted Taliban delegations in Beijing in hopes of securing peace. China has mining interests in Afghanistan, and it is also increasingly concerned about Islamist militancy among its Uighur population. It is keen to see a more stable region. America, too, supports peace talks with the Taliban, having once opposed them.

Some Afghan politicians envisage two years of peace talks, with the Taliban then taking part in parliamentary elections. A national council, a *loya jirga*, is already planned, giving parliament more powers.

Might the Taliban form part of it?

The problem is that Mr Ghani probably does not have two years. His standing at home is already weakened by the way he came to power in an election so tainted by fraud that supporters of his rival, Abdullah Abdullah, claimed that their candidate had been cheated. Although Mr Ghani struck a power-sharing deal with Mr Abdullah, antagonism between the two camps remains high, and there are problems in forming a government. That is all before taking into consideration how deeply unpopular in some quarters Mr Ghani's policy of co-operating with Pakistan remains. Mr Karzai continues to snipe from his minipalace a short distance from Mr Ghani's office, warning that Afghanistan must not "be under Pakistan's thumb". If he is to survive in office, Mr Ghani needs early results to show for his endeavours to find peace. ■

tinguished" legal scholar, adding that the main issue "is the children".

Ordinary Australians have never really taken to Mr Abbott. But he also has problems in his cabinet. His colleagues resent the power wielded by his chief of staff, Peta Credlin. She happens to be married to the Liberal Party's director, Brian Loughnane. A leaked memo from the party treasurer to Liberal party officials fretted about a potential conflict of interest. The press have made much of the leak as an apparent attempt to damage Mr Abbott. He dismissed it as a storm in a teacup.

After the respite produced by the latest poll, Mr Abbott issued a flurry of policy announcements. He pledged 300 more Australian troops for Iraq, on top of 170 special forces there now, to serve with about 100 New Zealand soldiers training the Iraqi army. A much-ballyhooed report was published about the pressure on budgets that can be expected from an ageing population over the next 40 years. And the prime minister finally dropped one of the most unpopular measures in his government's first budget last year: a plan to charge those using public health insurance for visiting doctors.

Mr Robb says the Liberals will now give Mr Abbott "clear air" to carry on as leader until the next budget, due in May, "and beyond". Other colleagues are less happy with that prospect, given that the first budget was bungled between Mr Abbott and his treasurer, Joe Hockey. Moreover, a state election is due on March 28th in New South Wales, Mr Abbott's home state, which is currently governed by the Liberals. Recent defeats of one-term conservative state governments in Victoria and Queensland have rocked the Liberals. If Mike Baird, the popular state premier, does badly, the "Abbott effect" could take most of the blame. ■

Australian politics

The Abbott effect

SYDNEY

Speculation continues to swirl about the prime minister's future

JUST 18 months after Tony Abbott became Australia's prime minister, pundits are writing his political obituary. A string of gaffes, disastrous polls and bitter divisions within his conservative Liberal Party sparked a motion last month to open his leadership to a party ballot. He survived, just. But the drama continues to feed a febrile mood in Canberra, the capital. On March 2nd an opinion poll gave Mr Abbott some breathing space. For how long is another matter.

The Ipsos poll showed the Liberals and their coalition partner, the National Party, trailing the opposition Labor Party by only two percentage points, after including second-preference votes. A month earlier the government had lagged by eight points. Mr Abbott's personal approval rating edged up slightly, though only to a measly 32%. His allies jumped to defend him. Andrew Robb, the minister for trade and investment, says that in the poll the voters "have spoken" and that the push by colleagues to topple the prime minister is "dying".

That may be optimistic. Asked who they would like to lead the Liberals, 39% of voters chose Malcolm Turnbull, the communications minister, and 24% chose Julie Bishop, the foreign minister. Just 19% plumped for Mr Abbott. Some pollsters read the rise in positive sentiment towards the government as a sign that some voters expect to see Mr Turnbull in charge before the next election, due in 2016.

Backed by the Liberals' conservative

wing, Mr Abbott unseated the centrist Mr Turnbull as party leader in 2009. In the latest jostling, Mr Turnbull has taken a steady approach that voters seem to prefer to Mr Abbott's street-fighting style. A telling clash came over a recent report by Australia's Human Rights Commission that criticised both Labor and coalition governments for locking child asylum-seekers in detention centres. Mr Abbott responded by attacking the commission's boss, Gillian Triggs. Mr Turnbull defended Ms Triggs as a "very dis-



Tony Abbott's waking nightmare

Politics in Malaysia

Gathering steam

SINGAPORE

Problems at a state investment fund are bad news for Malaysia's prime minister

SIX years ago Malaysia's prime minister, Najib Razak, launched a national investment fund that he expected to be "bold and daring". The assets that 1Malaysia Development Berhad (1MDB) has since acquired include 15 power stations and desalination plants and some valuable land in Kuala Lumpur, the country's megalopolis. But lately the fund has struggled to service its debts of more than \$11.6 billion. In February it finally repaid overdue loans of about \$550m, perhaps by borrowing from a local businessman. It will probably need to find more cash for an interest payment due by the end of March.

The fund's difficulties have handed Mr Najib's critics an easy target. They have also made Malaysians curious about how 1MDB has been spending its money. On February 28th Sarawak Report, a website, published e-mails that it claimed cast light on a joint venture that 1MDB formed in 2009 with PetroSaudi, an international oil company. If they are genuine, they appear to demonstrate that a prominent role in setting up the deal was played by Low Taek Jho, a high-living Malaysian tycoon whose association with 1MDB the fund had previously downplayed. The website also said it had obtained messages suggesting that around \$670m was transferred out of the venture shortly after it was set up.

The correspondence is among thousands of documents related to 1MDB's transactions which Sarawak Report claims to possess. It says it will pass them to regulators who can investigate whether rules have been broken. The parties involved deny any wrongdoing. PetroSaudi says all funds from 1MDB went to entities owned by PetroSaudi, and that any other inference is false. 1MDB says that it recovered all the money invested in its partnerships with PetroSaudi, which ended in 2012, along with a profit of \$488m. Mr Low has made clear that he has advised the fund "from time to time and without receiving compensation"; a spokesperson says Mr Low provided views on the joint venture but had "no decision-making authority".

The furore is unhelpful to the government, whatever happens next. As for the broader question of 1MDB's poor performance, the government stresses that the prime minister has never been closely involved in 1MDB's day-to-day operations. But he chairs its board of advisers. His standing at home and abroad rests in part on a reputation as a reliable guardian of

India's budget

Waiting for the main act

MUMBAI

A scattergun budget had welcome reforms but lacked real boldness

HOPES were so high for the budget unveiled by Arun Jaitley, India's finance minister, on February 28th, that measures that would have seemed daring until recently looked underwhelming. Narendra Modi's Bharatiya Janata Party (BJP) came to power last year on promises of economic reform. Mr Jaitley set out plans for cutting the budget deficit, reforming taxes, streamlining bureaucracy and improving infrastructure. The central bank, for which Mr Jaitley set an inflation goal of 4% from 2016-17, signalled its approval of Mr Jaitley's fiscal plans on March 4th by trimming its main interest rate by a quarter of a percentage point, to 7.5%. Yet Mr Jaitley's measures were incremental, not the "quantum jump" that he boasted of.

He will meet his target for the budget deficit of 4.1% of GDP this year, but getting it down to 3% of GDP must now wait until 2017-18, to allow for more spending on roads and railways. The state will bear greater risk in so-called PPP (public-private partnership) projects, and legislation will be proposed to make disputes over public contracts less frequent. Some money was found for a new infrastructure fund. But other claims pressed. The finance commission, which advises on fiscal matters, had recommended that more tax revenue go directly to states. Mr Jaitley needs their blessing to replace a myriad of state and federal levies with a harmonised goods-and-services tax over the coming year. That left him a smaller budget from which to squeeze savings.

He might have looked harder. Spending on subsidies will fall next year, but thanks largely to cheaper oil. Although he raised the prospect of replacing subsidies on cooking fuel, basic foods and fertiliser with cash payments to the poor, the BJP's loss of a recent election in Delhi seems to have been taken as a sign that such a move would be unwise.

The measures Mr Jaitley did commit to were sparing of the government's political capital. A plan for a national



How do you play "Giant Steps"?

social-security system based on private insurance was sketched out. Business-friendly measures include making it easier to open or close a firm, a cut in the main corporate-tax rate from 30% to 25%, paid for by pruning tax breaks, and delaying a new regime for going after tax dodgers to assuage concerns about India's trigger-happy tax inspectors. An e-business portal will act as a one-stop shop for 14 of the permits needed to start a business. And public banks will be managed more at arm's length from government.

Missing, though, was a sense of the giant steps that might follow these smaller moves. All is not lost. The planned goods-and-services tax would for the first time create a common market in India. If the government can push that through, and persuade the upper house, where it lacks a majority, to pass planned land-acquisition reforms, history will judge Mr Jaitley's budget more generously.

Malaysia's money. (He is also the country's finance minister.) Analysts say that worries about 1MDB are weighing on Malaysia's credit rating and currency, just as lower oil prices are not good for an energy-exporting economy.

The opposition smells blood. Lim Kit Siang of the Democratic Action Party said that, if journalists really have obtained lots of documents about 1MDB, "we have the

makings of the biggest financial scandal in the nation's history". Mr Najib is probably more worried about criticism from within his own party, the United Malays National Organisation (UMNO). The fund has long attracted sniping from factions loyal to Mahathir Mohamad, a meddling former prime minister who is itching for Mr Najib to step down.

Talk of an imminent rift within the gov- ►

Government subsided a little on March 4th, when the prime minister's office released a statement asserting that the cabinet is confident that 1MDB has done no wrong. As a further safeguard, Mr Najib says that he has asked the auditor general independently to verify the fund's accounts. He also promises that the law will be enforced "without exception" should any wrongdoing be proven.

Nevertheless, the prime minister has seemed to be on borrowed time ever since

the election in 2013 when UMNO, which has ruled Malaysia for almost 60 years, was very nearly thrown out of power. His approval rating has fallen sharply since then, to a new low of 44% in January. Some had thought that his opponents in the party—now said to be rallying behind Muhyiddin Yassin, a deputy prime minister—would have to wait another year to gain enough support for a leadership challenge. But they may choose to move sooner than that. ■

Mr Saotome. Official attempts to document who died began only in 2009 and remain incomplete, although a memorial in a corner of Yokoamicho park bears witness to the dead, next to a charnel house with the mixed ashes of thousands who died. (The park also commemorates those who died in Tokyo's devastating earthquake and fire in 1923.)

After the war, the capital lacked the emotional and financial resources properly to mourn the victims, says Bret Fisk, a novelist who has written about the 1945 raids. Nor was there appetite to take issue with America, Japan's new cold-war ally. A museum project got bogged down in the 1990s. Conservatives said the plans, including descriptions of war crimes, were unpatriotic and "masochistic".

If the suffering of civilians is difficult to acknowledge, it is harder still for Japan's nationalists to accept the atrocities inflicted by the imperial Japanese army across Asia. A custom is now established for each sitting prime minister to issue a statement about the war on every tenth anniversary of Japan's defeat, which is commemorated on August 15th. In 1995 Tomiichi Murayama, a Socialist prime minister, went furthest. He expressed "deep remorse" for Japan's "colonial rule and aggression". In 2005 Junichiro Koizumi, a nationalist from the Liberal Democratic Party (LDP) that has ruled for most of the post-war period, repeated key phrases from the Murayama statement almost word-for-word.

What Shinzo Abe, the current prime minister, will say on the 70th anniversary is now a topic of much speculation. Mr Abe presumably knows what he thinks. In the past he has queried the definition of Japanese aggression, criticised the victors' justice of the Tokyo war-crimes tribunal, and questioned the contents of an apology offered in 1993 by the then chief cabinet secretary, Yohei Kono, to "comfort women" coerced into sex with imperial army soldiers. Yet he has now formed a committee of sensible-minded historians, journalists and others for advice. The panel met for the first time on February 25th.

A consensus exists among many Japanese politicians, not to mention Japan's friends in Washington, that Mr Abe must unambiguously repeat his predecessors' expressions of remorse. China and South Korea will be watching closely for changes. Mr Abe has said that he will uphold "as a whole" the Murayama statement. Yet recent signs suggest that crucial phrases on Japan and the war may be altered.

Mr Abe certainly wants to emphasise Japan's model post-war record of promoting peace and prosperity, and how it will continue. Yet as a senior LDP politician urged last month, the surest way for the prime minister to highlight Japan's promising future would be to inherit without evading previous statements on the past. ■

Japan and the past

Undigested history

TOKYO

Whether as victim or as aggressor, the country finds it hard to face up to the past

MANY asleep in Tokyo did not hear the rumble of the American B-29 bombers. By the time his father shook him awake, Katsumoto Saotome's neighbourhood in Tokyo's lower town was in flames. Canals were no escape, for the jellied paraffin in the bombs turned water into fire. Once it stuck to you, he says, flesh kept on burning, "right down to the bone".

Mr Saotome, now 83, is about to mark the anniversary of Tokyo's firebombing in 1945. In the single night of March 9th-10th, about 100,000 people were killed. With many men away at the war (which was going disastrously), most of the victims were women, children and the old.

The level of casualties that night was somewhat less than from the atomic bombing of Hiroshima on August 6th 1945, but greater than from the nuclear bomb dropped on Nagasaki three days later. Nor was the firebombing confined to the capital. Between November 1944 and August 1945, nearly 70 cities were reduced to rubble and perhaps 300,000, mostly civilians, were killed—a far more devastating campaign than any that took place in Europe (see table below).

But if the British bombing of Dresden a month earlier than Tokyo produced a ripple of public concern in Europe, there was little Allied revulsion over the targeted kill-



Grief and devastation

ing of Japanese civilians on an unprecedented scale. Even today, the firebombings go oddly unremarked. The 70th anniversary of Dresden was commemorated across Europe in February. In Tokyo, however, there is not even a publicly funded museum to commemorate its firestorm, and only a modest number of people are expected to mark the anniversary alongside

Selected bombing campaigns of the second world war

| Target | Estimated deaths | Date | Perpetrator |
|---------------------------|--------------------|--------------------|---------------|
| Warsaw, Poland | 25,800 | Sep 1939 | Germany |
| Britain (of which London) | 40,000 (20,000) | Sep 1940-May 1941 | Germany |
| Dresden, Germany | 18,000 | Feb 13th-15th 1945 | Britain & US |
| Japan* (of which Tokyo†) | 300,000 (100,000†) | Nov 1944-Aug 1945 | United States |
| Hiroshima, Japan | 140,000 | Aug 6th 1945 | United States |
| Nagasaki, Japan | 74,000 | Aug 9th 1945 | United States |

Source: *The Economist*

*Excludes atomic bombs †March 9th-10th 1945



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The economy

Go slow

BEIJING

The prime minister seeks to lower expectations for the economy

GONE are the days of double-digit growth in China, with official targets always far exceeded. That was the message delivered on March 5th by the prime minister, Li Keqiang, at the opening of the annual session of the National People's Congress, the country's rubber-stamp parliament. Mr Li called for growth of "about 7%" this year. At 7.4%, last year's growth was already the slowest in nearly a quarter-century. He said the slowdown was what the government had expected as it tries to build a steadier, stronger economy. But the going will be tough.

In his address to nearly 3,000 delegates in Beijing's Great Hall of the People (pictured above, with posing attendants), Mr Li said economic difficulties in the year ahead "may be even more formidable" than in 2014. "Downward pressure", he said, was intensifying. But he also used a phrase that has in recent months become a mantra for Chinese officials: slower growth, he said, was the "new normal". His speech was peppered with calls for further economic reform, despite the complaints of industries hit by closures and job losses. Mr Li spoke several times of the need to reduce the power and meddling of government. He tossed in a term popular among China's playful netizens, *renxing*, which means doing whatever you want: "It goes without saying, having power doesn't mean you can *renxing*". This touch was his best line: delegates chuckled appreciatively. But Mr Li clearly meant it seri-

ously, as a warning to officials and bosses of state-owned enterprises not to obstruct reforms.

Many will have got that message already from a vigorous anti-corruption campaign, which began more than two years ago and, unlike the economy, shows no sign of a slowdown. Among its targets are 39 legislators, who have either resigned or been dismissed. "Our tough stance on corruption is here to stay," Mr Li said. On March 2nd the army published the names of 14 generals who have been punished for corruption or are under investigation. But this has not dulled the government's fervour for military spending, which continues to grow faster than the economy as a whole. Mr Li announced a 10.1% increase in the military budget, to \$144 billion, compared with a 12.2% increase last year.

State media describe the prime minister's annual speech to the legislature as akin to an American president's state-of-the-union address. The flavour is hardly the same, however—Mr Li's nearly 100-minute oration was as usual, larded with dry statistics and, barring *renxing*, heavy with wooden language. He had no American-style partisan wisecracks to share with delegates, all of whom are hand-picked by the Communist Party and "elected" without a popular vote.

Mr Li told them that reforms of state-owned enterprises would continue, and that the government would allow more private and foreign investment in services,

a sector long dominated by the state. He acknowledged one area of desperate need: more non-government nursing homes for the elderly, who face extremely long waiting lists for beds in state institutions. Mr Li also repeated the government's pledges to control smog and other forms of pollution. In last year's speech he declared "war" on the problem, but public anxieties remain high. An independent documentary on the environment has aroused intense debate online recently (see next page).

But there is a number in the prime minister's speech that will command the attention of everyone from village bosses to foreign investors: the one for economic growth. China's formal growth targets used in effect to be irrelevant, with the economy handily outpacing them. But as the economy has matured and slowed, they have emerged as much more important guides to the government's bottom line. Last year, when GDP was at risk of slipping too far below the target, officials sped up public spending plans and loosened monetary policy, which allowed growth to come in only slightly short of the goal of 7.5%.

The lower target for this year is an explicit recognition that the economy faces stronger headwinds. But it is also a way for the government to give itself extra slack to pursue much-needed reforms. These are aimed at shifting from heavy reliance on investment and credit, towards more consumption-led growth.

With regulators tightening the credit flow to both municipalities and companies, many in China had hoped the central government would ease the pain by taking on more spending burdens itself. In the event, it widened its deficit target for 2015 to 2.3% of GDP, up just a touch from last year's 2.1%. If China is really to hit its target of 7% growth, the central government may yet need to provide a bigger fiscal boost. ■

Hong Kong

The power of fish

HONG KONG

A peculiar distortion in Hong Kong's political structure

WONG FOR-KAM has long ceased to make her living only from catching grouper and snapper, but she still fishes and is proud of her profession. She is chairwoman of the Aberdeen Fisherwomen Association, whose 230 members work from a harbour crowded with sampans and trawlers. That obscure post gives her unexpected influence. Unlike most residents, the association has voting rights in the choice of Hong Kong's chief executive, as the city's leader is known.

The group is one of about 160 farming and fishing organisations which fill 60 of the 1,200 seats in the committee that selects the chief executive. The same farming and fishing groups also elect one of the 70 members of Hong Kong's legislative council, or Legco. Granting special voting rights to businesses and professions is a practice dating to Hong Kong's days as a British colony. Pro-democracy politicians want to end the system, but neither China's ruling Communist Party, nor the interest groups themselves, are keen. "Our contributions, if you ask me, are very big," says the 58-year-old Ms Wong, surrounded by piles of baskets, boxes and bamboo poles. "Because everybody eats fish."

When the current chief executive, Leung Chun-ying, was chosen in 2012, delegates to the selection committee were chosen from four sectors: the professions; businesses; labour, social and religious groups; and politicians, including local legislators and delegates to the parliament in Beijing. A frequent complaint about the voting system is that it gives disproportio-

Pollution

Particulates matter

BEIJING

An online video whips up public debate about smog

GRUMBLING about the semi-permanent smog that cloaks Chinese cities has grown louder in recent years. But discussion has been muted by the reluctance of officials to wag fingers too often at large state-owned enterprises (SOEs), or the government itself, for their roles in fermenting the toxic brew. That changed on February 28th with the release of an online video-documentary pointing precisely at these culprits. Within days it had attracted 200m views and raised the temperature of public debate.

Intriguingly, government officials and state-controlled media have been among those singing the praises of the 104-minute video, "Under the Dome". It was made independently by Chai Jing, a former state-television journalist, and was released on busy websites, including that of the Communist Party's mouthpiece, *People's Daily*. The new environment minister, Chen Jining, praised Ms Chai and said the film reminded him of "Silent Spring", a book published in 1962 by an American author, Rachel Carson, which exposed the dangers of DDT and led to a ban on the pesticide.

Such signs of official backing for a work that blames state entities and the government itself for a huge public-

health problem has led to speculation about politics at work. Did some leaders hope it would encourage green reforms in the powerful energy industry? The timing of the release, shortly before the start of the national legislature's annual session, may not be coincidental. Many bosses of SOEs, as well as senior officials, serve as lawmakers.

The film includes poignant individual stories: children saying they have never seen stars or white clouds and only rarely a blue sky. Ms Chai shares her own story of giving birth to a child with a benign tumour. She cites the estimate of a former minister that 500,000 Chinese die prematurely every year from air pollution.

The party's propaganda overlords—a deeply conservative bunch—clearly have mixed feelings. Within a couple of days of the video's appearance, references to it in the official media began diminishing: a strong hint that censors had decided to muffle the brouhaha it had sparked. Yawei Liu, of America's Carter Centre, says some officials may be worried that the video will inspire others to use similar techniques to mobilise public opinion. There is no sign that anyone in the leadership wants to loosen the party's control of the message any further.

ate representation to certain occupations. The 60 seats controlled by agriculture and fishing (aquaculture accounts for less than one-tenth of a percent of Hong Kong's GDP) compare with a mere 18 seats allocated to financial firms. Ms Wong does not see a problem. "I don't think we have enough seats," she says firmly.

The Communist Party does not operate openly in Hong Kong—a nod to its "One country, two systems" principle. But it cultivates groups like Ms Wong's which support its policies. Hong Kong's fishing fleet of 4,000 vessels cannot afford to offend the Chinese authorities, who control vital fishing grounds.

On August 31st China's parliament announced that, in the election for the post of chief executive due in 2017, the winner would be chosen by popular vote for the first time. But candidates must be pre-approved by a committee comprising representatives of much the same interest groups as before. Next month the government is expected to publish a bill that will be needed to implement these changes. Pro-democracy legislators have vowed to block it.

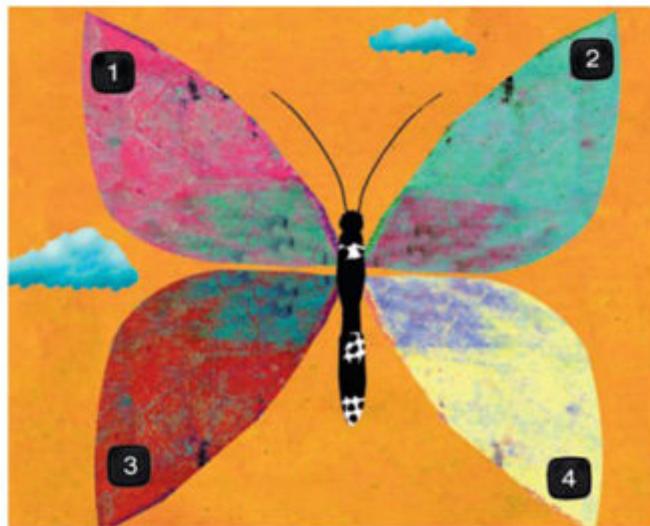
If the bill fails to pass, the current system will be preserved at least until 2022. Any attempt to scrap Legco's "functional constituencies", as the 50% of seats reserved for special interests are known, would then have to wait until 2024. The fisherwomen of Aberdeen harbour are likely to retain their peculiar political role for years to come. ■



Kingmakers convene

Banyan | Comprehensive education

Xi Jinping's new big idea is not quite as vacuous as it first appears



REMEMBER the "Scientific Outlook on Development"? Not many people do. Yet in 2003 when Hu Jintao, then head of the Chinese Communist Party, launched the idea, it seemed a big deal. Four years later the party even amended its constitution to enshrine the principle in its guiding ideology. Mr Hu's successor, Xi Jinping, will hope his own new contribution to the party's canon lingers longer in the public's mind. But his newly unveiled theory—the "Four Comprehensives"—faces similar difficulties. Like Mr Hu's bright idea, Mr Xi's is not exactly a crowd-pleaser—more a vague and prosaic formulation of propositions with which it is hard to argue. Yet it starts life with some advantages, and those mean China may be studying it for years to come.

It may be beneficial that Mr Xi has rejected his predecessor's outlandish precedent of not attaching a number to his doctrine. Before Mr Hu, Jiang Zemin went for the "Three Represents", an opaque theory that seemed to boil down to the idea that it was possible to be both a successful entrepreneur and a good party member. Before Mr Jiang, Deng Xiaoping's thinking was distilled in the phrase: "One centre and two basic points" (or, for audiences in Hong Kong and Taiwan, "One country, two systems").

Chinese Communist slogans do not count if you cannot count by them. The number four, though shunned in many Chinese contexts because the word sounds like "death", has a particularly good party pedigree. Mr Xi grew up under Chairman Mao, learning to smash the "Four Olds" (customs, culture, habits and ideas); he will have cheered when Mao's successor, Hua Guofeng, revived the "Four Modernisations" (agriculture, industry, defence and technology); and he will have been able in his sleep to recite Deng's "Four Basic Principles" (don't ask). Mr Xi is right to add his own offering to the abacus of party thought that proceeds on through the five principles of peaceful coexistence, the six evils (such as gambling)—or these days the six bans—and the seven don't mentions (such as, of course, "freedom of speech").

Another boost for Mr Xi's theory is that, just 2½ years into his tenure, he is already the most powerful Chinese leader since Deng. The "collective" leadership that marked Mr Hu's years has been replaced by one in which Mr Xi is in sole charge. He has broken with precedent by arresting a former member of the party's highest body, the Politburo Standing Committee, on suspicion of

corruption. His predecessors could also rely on the slavish admiration of the party press. But Mr Xi is now the object of hero-worship. The party's mouthpiece, *People's Daily*, ran five front-page editorials last month extolling the Four Comprehensives in gushing terms. It has even set up a special webpage for the theory's devotees. The idea is an "unprecedented and strategic leap forward", it says, and a "major breakthrough in political theories".

Such hyperventilating boosterism is both a reflection of Mr Xi's stature and a way of enhancing it further, putting him in a line of great thinkers who have mastered and elaborated Marx's "dialectical materialism" (the arcane topic of a Politburo "study session" that Mr Xi presided over in January). The Four Comprehensives may sound like an off-the-cuff slogan, but Mr Xi's spin doctors want people to believe it has deep philosophical roots.

A further reason why the theory may have staying power is that it is actually recognisable as the platform Mr Xi has tried to implement. Zheng Yongnian, a Chinese scholar who is director of the East Asia Institute, a think-tank in Singapore, says that the most important of the comprehensives is the first: "Comprehensively build a moderately prosperous society." (The Chinese is considerably less clunky.) This, says Mr Zheng, is the "Chinese dream" Mr Xi has been advertising since he took office. The "dream" actually seems to encompass more than material well-being. But without it, it will be hard to achieve other ambitions: fully shaking off the legacy of a century of humiliation and enabling China to take its place as one of the world's great powers—perhaps even the greatest, as the most ambitious dreamers hope.

The other "comprehensives" are means to this end: deepening economic reform; governing "according to the law"; and "applying strictness in governing the party". No one will be surprised by the mention of economic reform, which has been a mantra of every Chinese leader from Deng onwards. Enforcing the rule of law sounds on the face of it revolutionary, since it implies that the party itself is subject to external authority. It is not clear that is Mr Xi's intention, however. He has disappointed liberal reformers by not repeating a suggestion he made in 2012, that no organisation can "overstep" China's constitution. At present, the law is seen as one of the tools Mr Xi can use to clean up the system, not a way of placing checks on party power. The final "comprehensive", enforcing party discipline, refers to his anti-corruption drive—the fiercest modern China has seen. But the party still polices itself.

Promises, promises

Although they are naturally being interpreted as yet another sign of Mr Xi's all-pervasive sway, it is also possible to see the "Four Comprehensives" campaign as evidence of his anxieties. Since coming to power, he has made many promises to the public that he has yet to redeem. Doing this will be harder as China's economy slows down. Already the fast-growing urban middle classes are grumbling about pollution, food-safety scares and traffic congestion. Even the anti-corruption drive, though broadly popular, has drawbacks: Mr Xi is attacking his own power base of party cadres and government officials.

He has responded to such worries by reaching back in the party's playbook to the timeworn tactic of a mind-numbing ideological campaign. Many of China's young will shrug it off and look at something more interesting on their smartphones. Even those who pay attention may wonder when the party is going to stop trying to reduce complex issues and policy debates to slogans you can count on the fingers of both hands. ■



Iran's economy

Fading hope

TEHRAN

Foreign businesses are looking beyond falling oil prices and a limping economy

TO TEHRAN'S businessmen, they are known as the tea-ceremony set: foreign day-trippers sizing up the bounty that could be on offer if Iran's supreme leader, Ayatollah Ali Khamenei, takes the plunge and backs a conclusive nuclear deal with the West. The number of businessmen entering Iran surged once before, after an interim deal with six world powers was struck in November 2013, raising hopes of a windfall for investors.

With a population close to 80m and the world's 18th-largest economy, Iran could be an attractive market. Hassan Rohani, its outward-looking moderate president, argues the case for foreign investment and the jobs it could create. Yet his hopes of opening up the economy are stymied not just by sanctions and the elusive hope of a deal that would lift them. He also faces strong opposition from hardliners in Tehran, many of whom bridle at the notion of foreign companies on their turf. And time is not on his side. Iran's economy is suffering from the effects of sanctions, a plummeting oil price and decades of mismanagement, not to mention the cost of funding militias and dictators in the region. Youth unemployment is rising and living standards are falling.

The president's team of technocrats has had some successes and stanched the economy's heaviest bleeding. On February 11th, in a speech to mark the 36th anniversary of the revolution, Mr Rohani said the economy had grown at an annual rate

of 4% in the six months to September, pulling it out of two years of recession. Inflation, once around 40%, is now below 17%.

Yet many of these gains are now at risk because of low oil prices. Although Iran's economy is less dependent on the black stuff than some others in the region, it still accounts for 42% of government revenues. The latest budget will cut spending by about 11% after inflation, potentially tipping the economy back into recession. Even this looks optimistic: it was initially based on an oil price of \$72 a barrel. "It's not a question of whether the government wants to do business with us," says a European businessman. "The problem is that they no longer have any money to pay."

The squeeze on government revenues is setting Mr Rohani on a collision course with Iran's powerful Revolutionary Guards. The military force that underpins Iran's clerical regime has a sprawling commercial empire. With their control of seaports and multiple land borders, guard commanders have become rich sanctions-busting traders, dabbling in industries from telecoms to banking. When Mr Rohani speaks of the need for "monopolies" to pay their taxes, people know exactly who he means. "It was impossible to make any money," says Mehrdad, an Iranian-American who recently shut his stationery store in Tehran and moved back to California. "When the Sepah [army] import from China and don't pay any taxes, well, it makes guys like me unviable."

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For daily analysis and debate on the Middle East and Africa, visit

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American and European energy and banking sanctions continue to hammer business. The optimism that a nuclear deal would soon see sanctions lifted has largely evaporated. Domestic investment has stalled. Several state-owned banks are said to be close to collapse. Efforts to circumvent sanctions have made an already corrupt country worse: Transparency International, a Berlin-based anti-corruption lobby, ranks Iran a lowly 136th out of 175 countries in its index for 2014.

Foreign business visitors continue to pop in for tea, but the numbers have dropped sharply in the past quarter, according to a European airline manager in the capital. Other indicators also suggest that hope is fading: the Tehran stock exchange slipped 21% last year after surging by 131% in 2013. Almost the only bright spot is tourism, with numbers up by 35%, according to the government's latest figures.

Mr Rohani has placed much store on the nuclear talks, but his officials seem to be hedging their bets. Until recently many said they wanted to do less business with China—which has happily kept on buying oil—saying it makes shoddy goods, breaks its promises and lacks Western technology. Now such criticism is rarer.

American officials, for their part, are diligently tightening the screws. When a large delegation of French businessmen returned from Tehran last year, many were warned by the American embassy in Paris that they should tread carefully and not sign preliminary contracts in Iran if they wanted to retain access to American financial markets. A group of Germans received a similar warning a few months later. The thought of having their dollars frozen under American banking sanctions, or of being locked out of America's capital markets altogether, has cooled enthusiasm for doing business in Iran.

Yet some foreign businessmen moan ➤

that American companies are not playing by the same rules. Rather than operate openly in Iran, many American firms are busily using local front men. One such middleman in the oil and banking business, who is a frequent visitor to Iran's oil ministry, says prime contracts have already been snapped up. "If there is a nuclear deal, you will find overnight that the Americans have signed one-year options on the best projects," he says. "The Europeans will be queuing up, but they will end up negotiating with Exxon Mobil and Chevron, just as happened in Libya."

Such talk is particularly galling to companies from Western countries that were reluctantly pulled into applying sanctions. "We can't help but think we have been played by the Americans," says one European business leader. ■

Nigeria and its neighbours

Big fish (or shark) in a small pond

COTONOU AND LAGOS

Nigeria's ills spill across its borders

HUGE jars of iridescent yellow liquid glow on almost every street corner in Cotonou, the commercial capital of Benin. Taxi drivers pull over to fill up their cars using a hose and funnel. Proper petrol stations, by contrast, stand empty. "It's cheaper this way," explains a taxi driver, as he tanks up using the unofficial method.

The origins of this black market lie less than an hour's drive away, across Benin's eastern border, in Nigeria, where imported fuel is sold at subsidised rates and the price paid by drivers is capped, thus generating a massive trade in illicit petrol. Known in Benin as *kpayo*, it is a third cheaper than the legal stuff; 80% of the petrol in Benin's cars is said to have been smuggled in. Of the 2m or so barrels of oil pumped out of wells in Nigeria each day, as many as 400,000 are reckoned to be stolen, often with the connivance of politicians.

Some argue that the black market does at least provide jobs. But Daniel Ndoye, a Senegalese economist at the African Development Bank in Cotonou, says that on balance it holds back Benin's development: "It causes huge loss of revenue for government, which affects infrastructure development and the business climate." Illegal fuel can be dangerous: people have been burnt alive in accidents with it.

Sabotage of Nigerian gas pipelines also upsets the country's neighbours. Attacks have been increasing in the approach to Nigeria's presidential and general elections expected (after a delay) later this month. Some say that opposition supporters want

Boko Haram

On the back foot

LAGOS

West African forces may at last be gaining ground

ALMOST two months ago, Abubakar Mohammed fled from Boko Haram as it overran his home town in north-eastern Nigeria. Since then he has been among the wandering ranks of 1m-plus displaced people. But a glimmer of hope now shines on the horizon. Monguno, the fishing village on the edge of Lake Chad that he calls home, was liberated by Nigeria's army last month. Mr Mohammed is now planning to return.

Monguno is one of about 30 villages reportedly reclaimed from Boko Haram since February 7th. That was the day Nigeria announced a delay of the presidential election until the end of March to give the army time to quell the insurgency, which would have prevented a vote in large parts of three north-eastern states. After years of rampaging almost without opposition, Boko Haram now faces a fight. This change is well timed for the government, since it faced the prospect of electoral defeat before the poll was postponed, not least because of its failure to provide better security.

Locals wonder why it has taken so long. Army spokesmen say better arms have arrived. Many are said to have come from Russia after America blocked the

to create a "politically motivated disruption", reports Malte Liewerscheidt of Verisk Maplecroft, a risk consultancy.

Ghana is another country in the region that has been hurt by Nigeria's shortcomings—in the supply of gas. Nigeria has consistently failed to fulfil a contract to supply its neighbour with 120m cubic feet a day. In fact, it has recently been providing as little as half that amount, causing Ghana to fall short by as much as a third of peak demand for electricity every day.

Fuel-smuggling and gas hold-ups are

sale of sophisticated weapons, such as attack helicopters, because of human-rights abuses by Nigerian soldiers.

New tactics are helping. Demoralised battalions have been replaced and new generals have taken command on the front line, says Mike Omeri, an army spokesman. British-trained units have been praised for advances in Adamawa, one of the three most afflicted states.

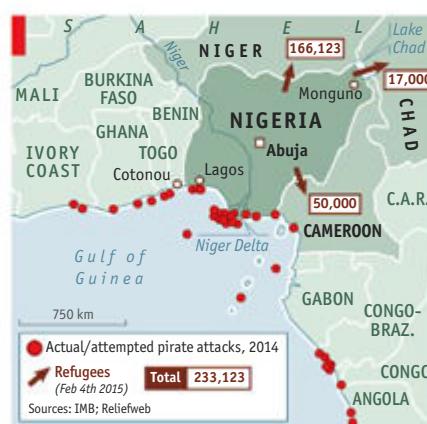
The army also cites better co-operation with neighbouring countries, which are gathering an 8,700-strong force to fight the rebels. Troops stationed along the borders with Cameroon and Niger are trying to block escape routes. Chadian forces, which entered Nigeria in January, have reclaimed territory. (They helped defeat fighters linked to al-Qaeda in Mali in 2013, and reckon they could end this insurgency on their own.)

But regional relations are still tense. Chad does not take part in joint operations with Nigeria, whose government wants to claim victories for itself. And far from being defeated, Boko Haram has responded with a string of suicide-bombings and attacks on countries that have joined the fray. One of its recent videos shows two victims being beheaded.

not the only way in which Nigeria affects its region. Since its population, of 170m or so, and its economy are both by far the biggest in Africa, it has a huge influence in almost all spheres. Some of it is beneficial. With annual growth of over 6% in the past decade, it lifts the economy of the entire region. The Economic Community of West African States (ECOWAS), which embraces 15 countries, relies on Nigeria for the lion's share of its money. In the past decade or so Nigeria's armed forces and its diplomatic muscle have helped end wars in Liberia, Ivory Coast and Sierra Leone.

Yet Nigeria is also an exporter of insecurity, much of which can be traced to dizzying levels of corruption and political inertia. "Corruption is so pervasive in Nigeria," said a report in 2011 by Human Rights Watch, a New York-based watchdog, that "it has turned public service...into a kind of criminal enterprise"—with spillover effects across the region.

The inability of Nigeria's army to defeat or even contain Boko Haram, a violent Islamist group that has been trying to set up a caliphate from its base in the north-east, has also hurt the region, by letting the rebellion seep into Chad, Niger and Cameroon (see box). This, too, is partly down to ►



► corruption. While Nigerian generals have pocketed vast chunks of the military budget, ill-paid, poorly equipped and demoralised soldiers have been either unable or unwilling to fight the enemy.

Piracy is another growing regional problem that can be blamed largely on Nigeria's inability to police its oily creeks in the Niger delta. Since 2012 the Gulf of Guinea has replaced the waters off Somalia as the world's piracy hotspot. Ships along the coast between Ivory Coast and Angola have been attacked. Ghana's offshore stretch is now particularly exposed, says Harry Pearce of Ambrey Risk, a British consultancy. Piracy may cost the region as much as \$2 billion a year.

Nigeria also hurts the region with its protectionist trade policy. It bans the im-

port of hundreds of goods, from cement to noodles. Yet Nigeria has failed to industrialise. The biggest beneficiaries may well be businessmen (often politicians) with ties to government. With friends in the right places, Nigerian supermarkets and posh shops can stock up with prohibited imports such as exotic beer and shoes.

Meanwhile a new regional tariff system, altered at Nigeria's insistence, levies 35% on certain imported goods, almost twice the highest level proposed by other west African countries. The International Growth Centre, part of the London School of Economics, reckons this trade policy could mean that the average level of tariffs on goods imported into Liberia, for instance, could double. Not a good way to make other west Africans love Nigeria. ■

ues destroyed by Muhammad, the artefacts destroyed by is "are nothing but stone and no one believes they are gods," says Abbas Shouman, under-secretary of the influential al-Azhar University in Egypt. Mullah Muhammad Omar, the Taliban leader, said much the same about the Bamiyan Buddhas, which he once favoured preserving, since there were no Buddhists left in Afghanistan.

The destruction in Mosul should be seen in a political context, says Bernard Haykel of Princeton University. The show of hyper-piety is "part of a publicity campaign" to grab the mantle of the original Muslims. Others see it as an attempt to provoke America into a holy war. But the motivation for ransacking museums, even for fundamentalists, is sometimes simpler. In the past militants from is and al-Qaeda have sold looted artefacts to finance their activities. In Afghanistan, Mullah Omar saw the Bamiyan Buddhas as "a potential major source of income for Afghanistan from international visitors". A representative of the group said they were destroyed in a fit of pique after the West offered money to preserve the statues, but no other aid.

Wars, looting and neglect have left the region's antiquities in a sorry state. Authoritarian regimes tend to promote themselves, not the national heritage. But the threat of is is causing some governments to act. Last month Turkish soldiers entered Syria to move the tomb of Suleyman Shah, grandfather of the founder of the Ottoman empire, to a more secure spot.

In Baghdad the national museum has just reopened, 12 years after it closed during the American invasion. The ceremony was brought forward in response to the destruction in Mosul, where the vandals may be wearing out their welcome. Last year residents confronted is members when an ancient leaning minaret was targeted. It is still standing, but much of the city's culture and history has now been erased. ■

Iconoclasm and Islamic State

Destroying history's treasures

CAIRO

The jihadists are attacking more than the region's people

THE beheadings, this time, were performed with hammer and drill, not sword or knife—for the victims were made of stone, not flesh. The destruction of ancient statues (some replicas) at the Mosul museum in Iraq, a video of which was released on February 26th, is far from the most heinous crime committed by Islamic State (is). The jihadists have killed thousands of people, often in grisly fashion. But the group's sacking of holy sites and libraries are elements of a broader attack, perpetrated in the name of Islam, on the Middle East's rich cultural and religious heritage.

Although its actions are abhorrent, is poses a dilemma for Muslims. Many of the group's beliefs are not disconnected from Islam, as some claim, but rather the product of an extreme interpretation of the faith. is supporters justify their actions with verses taken from the Koran or examples from the life of the Prophet Muhammad. In Mosul the militants said they were shattering "idols", the worship of which is forbidden in Islam. Muhammad himself cleared idolatrous statues from the Kaaba, the centrepiece of Mecca's Sacred Mosque. This was in keeping with the tradition of Abraham, another prophet (sacred to several faiths) who destroyed the wooden gods being worshipped by his people.

Idolatry is taboo in many faiths, so the history of iconoclasm is multi-denominational. King Hezekiah purged idols from Solomon's temple in Jerusalem, according to the Old Testament. Protestant reformers destroyed religious images in the 16th century. But the most ardent recent iconoclasts

have been Muslims. In 2001 the Taliban, then rulers of Afghanistan, blew up two giant Buddha statues in Bamiyan that dated from the 6th century. The Saudi government has destroyed historic sites in Mecca, ostensibly to pursue development but also to prevent idolatry, say some. Abdel Monem el-Shahat, a prominent Salafist in Egypt, has suggested covering the heads of ancient statues in wax.

Most Muslims find the destruction absurd. Islam says nothing about smashing statues that are not harming anyone, says Ahmed Hassan, a 33-year-old Cairene. This opinion is shared by Islamic scholars, and even some of the Taliban. Unlike the stat-



To the dustbin of history

Technology Quarterly

March 7th 2015

Green food from Silicon Valley

Tech firms start cooking up
sustainable produce



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How to back up a country

Internet security: To protect itself from attack, Estonia is finding ways to back up its data

WIPING a country off the map is one thing. Wiping its data is another. Estonians know what the former is like. They are determined to avoid the latter. Just as computer users back up their laptops in case they break or are lost, Estonia is working out how to back up the country, in case it is attacked by Russia.

Estonia has already shown notable prowess in putting government services online. It has pioneered the use of strong digital identities for every resident, enabling them to sign and encrypt documents, access government services, and conduct e-commerce.

But the latest project, termed “digital continuity”, is the most ambitious yet. It aims to ensure that even if Estonia’s government is sabotaged it will continue to function over the internet, providing services and enabling payments. The lessons will be valuable to any organisation concerned about disaster recovery.

Estonia, which regained independence in 1991 after being occupied by the Soviet Union, was the target of what many regard as the first instance of cyber-warfare. In 2007 its main websites were overwhelmed with traffic from multiple sources in a distributed denial of service attack during a row with Russia over a war memorial. The episode crippled the country’s online banking system and came within a whisker of disabling emergency services. Lately Russian airspace intru-

sions and propaganda attacks are a constant headache.

Estonia’s first dry run of digital continuity, carried out in September last year in conjunction with Microsoft, had several elements. One was to maintain e-government services by using back-up computers within Estonia. If that became impossible, the services migrated abroad.

One part of the experiment involved the website of the president, Toomas Hendrik Ilves. A digital-savvy, American-educated advocate for e-government—and a hate figure for the Kremlin—his website is a likely target for Russian attack. During the war in Georgia in 2008, unknown hackers defaced the website of that country’s president, Mikheil Saakashvili. Mr Ilves’s website was moved fairly smoothly to the “cloud”—networks of third-party computers—in this case Microsoft data centres in Dublin and Amsterdam.

The load and the stress

A more complicated effort involved the State Gazette—the official repository of all Estonian laws. These do not exist in paper form. As well as backing up the data, the experiment tried to see how accessible it would be in an emergency. It applied two tests: one of load (if an unusually large number of people were trying to access the sites); and the other of stress (if outsiders were, for instance, swamping the system with bogus requests for information). ►

► The result was broadly a success—the experimenters even succeeded, for a brief planned period, to run services from outside Estonia. But it also highlighted numerous obstacles. “It became clear that no matter how ready you think you are, you are never ready enough,” notes a draft report jointly compiled by the Estonian authorities and Microsoft.

One set of issues is legal. Laws on personal data, and public expectations of privacy, are strict in European countries; just as with back-up services for computers, users need to be sure that their data will be properly safeguarded if they are sent abroad. Storing such personal information in “digital embassies”—computers in Estonian diplomatic missions abroad—helps as they are Estonian sovereign territory. But internet law is still unclear.

Technical problems included the way the internet deals with addresses—the Domain Name System (DNS). How would the Estonian authorities ensure that people trying to reach president.ee, for example, would actually get there in an emergency—particularly if a massive cyber-attack were under way? Sorting this out required “extensive manual operations”, the report notes dryly.

Digital continuity would become even trickier if the back-up operation were to include more complex services. Estonia’s public and private databases exchange information over a peer-to-peer network called the x-Road, a kind of information federation. Users give their digital consent, by using their ID card and PIN, to allow one database to get information from another (for example, if a hospital needs to check a patient’s status with a health insurer). So it is not just the data, but also the software that deals with them, that would need to be exported.

The experiment’s designers soon spotted several snags. One was that Estonia’s system uses lots of different software, in multiple versions, some of them out of date. That works fine when they just need to exchange data, but makes it hard to replicate the system in the cloud.

Another was that the architecture of Estonia’s system is poorly documented, and that rules for classification of data as sensitive, personal, secret or public were not suitable for digital continuity: “frequently only a small number of experts understand the workings of the system,” the report notes.

The main conclusion of the exercise is both simple to articulate and difficult to achieve: the better data and networks are organised, the better the system is documented, and the more standardised and up-to-date the software, the easier it is to back up and restore. That may be no surprise to any computer user, but it will be a spur to improvement on top of Estonia’s already impressive efforts. ■

DIY telecoms

Mobile networks: Fed up with the failings of the big operators, remote Mexican communities are acting for themselves

IN THE cloud forests of the Sierra de Juárez mountains in southern Mexico, a new kind of tree is springing up: the mobile telephone mast. Unlike most phone masts in the world these are installed, owned and operated by small, mostly indigenous communities. Providing a mobile service in these villages was not profitable enough for big telecoms companies to bother with, unless the locals stumped up \$50,000. But improvements in software and the falling price of hardware has made it possible to build a local mobile-phone base station for around \$7,500, which non-profit operators and small communities can muster.

Sixteen communities in this remote corner of Mexico now count on local mobile services which cost much less than that of Mexico’s dominant operator, América Móvil, or its nearest rival, Movistar. Eiel López, a motorcycle-taxi driver, says the business he gets using the community-owned network in Villa Talea de Castro in the state of Oaxaca more than pays his monthly fee of 40 pesos (\$2.71), which covers local calls, and per-minute call costs of 0.82 pesos to mobiles on other networks in Mexico. The big networks charge around 3 pesos a minute.

Calls to mobiles on other networks can be dialled using pre-paid credit. But ring-

ing someone in the United States might actually be cheaper. This is thanks to a series of repeater antennae scattered through the mountains and providing a connection to Oaxaca city, the state capital. It allows voice-over-internet calls.

The cost of mobile equipment is falling thanks to open-source systems and a new generation of base stations that make use of a process called software-defined radio. As its name suggests, this uses software to manage the network instead of lots of dedicated hardware. Such kit is now available to groups such as Rhizomatica, a non-profit operating from the state capital. Peter Bloom, its founder, has been installing the equipment aided by a bevy of Italian, Spanish and other engineers.

They have been able to do this because Mexico’s constitution gives indigenous community radio stations the right to use radio spectrum in places neglected by national concession-holders. Rhizomatica teamed up with a lawyer to persuade regulators that the principle also applies to wireless telephony. “Communication is an essential human right,” says Mr Bloom. In the spring of 2014 the national telecom regulator awarded Rhizomatica a two-year experimental, non-profit licence to operate in the region. It also helps that this area of Oaxaca has long governed itself under Mexico’s so-called indigenous customary practices, which include communal land and labour-sharing.

Now that Rhizomatica’s network is sprouting new nodes, the communities are encountering some of the same difficulties faced by larger operations, such as people from one local network wanting to use their mobiles in another area. The local networks do not use SIM cards to identify users, who must register their phones with the local network’s administrator. When someone registered in one community visits another they can automatically use the network there, too. At present they are not charged, but roaming fees could be introduced.

In December Mexico’s regulator issued a plan to reserve some of the radio spectrum for indigenous and community use under 15-year non-profit licences. This could encourage more communities to set up their own mobile services. But the non-profit requirement might dissuade outside investors from putting money into such schemes, making it difficult for them to scale up.

In some countries community-based networks form partnerships with incumbent telecoms firms to provide services at a profit. Endaga, an American firm spun out of the University of California, Berkeley, set up such a network in Indonesia in 2013. In Mexico a similar partnership would probably require a change in the rules. As is often the case, technology moves faster than regulators. ■



Local networking



Smartphone diagnosis

Medical apps: From exposure to HIV to a nasty throat infection or confirmation of a heart attack, the phone will know

BY SOME accounts, one in five Americans use health apps on their smartphones. The apps can also connect to sensors worn on the body to monitor vital signs, such as a runner's heart rate. Others assist with diagnostics, for instance by using the phone's camera to analyse the colour of test strips dipped in samples. Plug-in devices are also appearing to enable phones to take biological measurements directly. Two of the latest can detect exposure to HIV, the virus which causes AIDS, and diagnose other conditions.

Samuel Sia and his colleagues at Columbia University in New York have miniaturised a laboratory-based blood test called an ELISA (for enzyme-linked immunosorbent assay). It detects biological markers, such as antibodies made in response to an infection. A sample of blood from a finger prick is placed in a small disposable plastic cassette that contains reagents necessary for an ELISA. The cassette is inserted into the test-device itself, which is small enough to fit into the hand of the user and contains what is known as a "lab-on-a-chip". This, in turn, is plugged into the phone. An app manages the test and after 15 minutes a negative or positive result is displayed on the phone's screen.

Rounding up oil slicks

Pollution: a quick way to contain oil spills with lightweight booms

SINCE the disaster in the Gulf of Mexico in 2010 after the Deepwater Horizon drilling rig exploded, there has been a flurry of ideas on how to clear up oil spills. Various machines called "skimmers" have been developed to recover oil from the surface. New chemical methods have been tried to disperse oil and biological ones to digest it. An Italian project even found that coarse wool is particularly good at mopping up oil. But much depends on how quickly an oil slick can be prevented from spreading with floating booms. Now an Israeli startup reckons it has come up with the quickest way to do that.

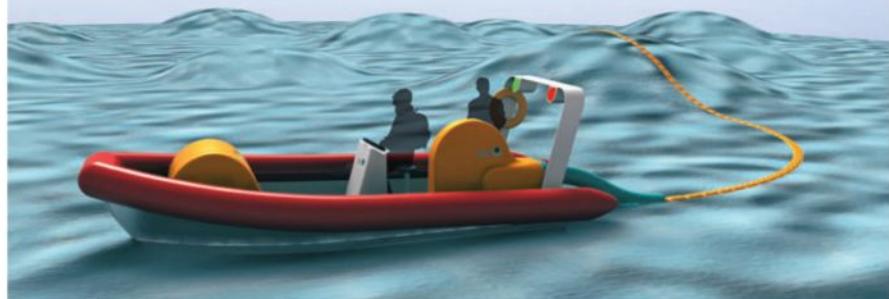
There are a wide variety of booms which can be used as a physical barrier to contain an oil spill. The booms can be made of plastic, metal and other materials. They typically consist of a solid or inflatable floating section with a "skirt" hanging below and weighed down with a chain. Such booms are bulky and heavy. They also have to be transported by boat or barge to the site of the spill, where a specialist crew is required to launch the boom into the water. All this takes time—sometimes days—which gives oil a chance to spread further and break up into smaller slicks, making the eventual clean-up harder.

The idea which Boaz Ur, the chief executive of HARBO Technologies, and his colleagues came up with is an ex-

tremely lightweight plastic boom which can be deployed rapidly from a small craft. It is so compact that an experimental version was delivered in a suitcase to Ohmsett, America's testing facility for oil-spill response equipment in New Jersey. The booms tested there usually arrive in shipping containers.

A lightweight boom can be easily upset by wind and waves, allowing oil to spill over the top or seep out from below. The HARBO system overcomes this in a number of clever ways. As it is deployed the top is filled with air for flotation while the bottom is filled with water for ballast. To prevent the boom tipping over its cross section is T-shaped. The wings on each arm of the T are designed in such a way to provide stability in winds, currents and waves. In the trials at Ohmsett a 30-metre-long prototype boom managed to successfully contain around three tonnes of oil.

The company is now developing a way to deploy the boom rapidly. As the boom weighs just 300 grammes a metre, the operation could be carried out by a small boat with just two operators (as illustrated below). Mr Ur says it would take no more than a day to train the crew. As both the boom and the vessel are small and lightweight, the complete system could be installed close to where oil spills are likely, such as ports, and carried on oil rigs and tankers. Being near to hand, a rapid-response boom team might prevent an oil spill from becoming a nightmare to clean up.



The equipment was recently tried out by health-care workers in Rwanda testing pregnant women, from a single sample of blood, for HIV and syphilis. The results were encouraging and the team are now exploring how to bring their smartphone test to market. Dr Sia says he estimates the device itself would cost about \$35 to manufacture. An ELISA machine in a laboratory could cost more than \$18,000.

The other idea is from Descue Medical, a Salt Lake City-based startup founded by two brothers, Christopher and Andrew Pagels. They have come up with a product called iTest. The pair, both biomedical-engineering students, hope to have their first test-kit on sale in 2016 after obtaining clearance from America's Food and Drug Administration. It can diagnose "strep throat", a nasty infection by Streptococcus

► *pyogenes*, a bacterium. The condition needs treatment with antibiotics. It is most common in children and young teenagers and can cause complications, such as inflamed kidneys and rheumatic fever.

Their kit includes a swab that is rubbed against an infected patch of throat. This is placed into a vial containing a liquid, which washes the sample into solution. The vial is then fitted into the iTest device, which in turn is plugged into a phone. The brothers say the device uses a technique called voltammetry, which measures the current in a sample as a function of the voltage applied to it. Rapid strep tests are not new, but usually involve mixing solutions and looking for a visible reaction.

The strep test, though, is only the beginning of the brothers' ambitions. The idea is to offer a variety of different test kits that can be used by the same iTest device to

diagnose a range of conditions, says Andrew Pagels. The brothers say they have already developed tests for HIV and MRSA, a bacterial infection which is particularly difficult to treat, and are working on tests for the flu, sexually transmitted diseases and a combination test for dengue fever and malaria. Another test would allow a smartphone to detect troponin. Elevated levels of this protein in the blood can verify that someone has had a heart attack. The brothers anticipate the main iTest device would sell for about \$150 with the test kits available separately.

By offering lab-type diagnostics to almost any population with access to a smartphone, such devices would be particularly useful in remote and resource-poor areas. But they are bound to give hypochondriacs yet another reason to fiddle with their handsets. ■

looking for specialist gear he was unable to find any easily transportable treatment units able to contain the virus. In July last year he asked Odulair, an American company based in Cheyenne, Wyoming, if they could help. The firm makes mobile medical clinics.

Two months later Odulair put a modular Ebola-isolation unit on the market. The firm says it can be manufactured, air-freighted and set up within a month. The unit maintains a differential air pressure between rooms to help prevent the virus from spreading; although not an airborne disease it can attach to particles which drift in the air. A higher pressure is maintained in areas reserved for medical staff and those awaiting diagnosis. The air in each room is purified up to 36 times an hour with filters that trap almost all particles larger than a third of a micron, or three millionths of a metre, which is smaller than the Ebola virus. Air is also zapped with germ-killing ultraviolet light.

The video doctor

The doors in the unit can open automatically, allowing a "telepresence" robot to patrol. It displays live video of a doctor or nurse, allowing them to speak to a patient. The RP-VITA, as the robot is called, greatly reduces the number of times staff must put on protective suits and step inside, says Anita Chambers, Odulair's boss.

All fluid and solid waste, including things like needles and mattresses, is fed into a cylindrical chamber housed in a shipping container. This grinds it up with a macerator and then cooks it with scalding steam under high pressure until all that is left is a sterile greyish powder. Odulair's isolation unit also incorporates a fogging system that sterilises unoccupied rooms with hydrogen-peroxide vapour. Some hospitals disinfect rooms with remote-controlled machines, such as the Q-10 made by Bioquell, a British manufacturer, or a robot produced by Xenex Disinfection Services in Texas, which can sterilise a room in ten minutes.

Last autumn the UN Office for Project Services in Abidjan, Ivory Coast, suggested some governments in Africa might invest in such kit. But only two Odulair isolation units have been sold. Neither was for Africa or even a country that has an Ebola patient. One unit was delivered to a contractor working for America's Department of Homeland Security and the other will soon be sent to Trinidad and Tobago. For poor countries such equipment is unaffordable, says Ghana's Dr Gebe. An Odulair unit to house ten confirmed and eight suspected patients costs about \$900,000—robot not included. A Q-10 comes in at around \$53,000 and a Xenex robot at some \$100,000.

Cost is not the only reason high-tech solutions are failing to be deployed in



Ebola's low-down on high tech

Disease control: Advanced equipment has been developed to help protect health-care workers, but the gear may not be helpful in poor countries

DELIRIOUS and occasionally thrashing around, an Ebola patient wracked with acute symptoms may shed as much as ten litres a day of highly infectious blood and other body fluids, faeces and decomposing tissue. It makes caring for patients suffering from this dreadful disease difficult and dangerous—so much so that some health-care workers quit their jobs rather than face another stressful day. As in all Ebola episodes, preventing infection in west Africa during what has been the worst outbreak in history has placed a lot of effort on looking after those

dealing with the victims. New high-tech equipment is now available for use by health-care workers, but in some countries it may be inappropriate.

The Ebola virus is spread by direct contact, which can be through the tiniest piece of broken skin or via mucous membranes in, for instance, the eyes, nose or mouth. The source can be contaminated blood or other body materials and objects like needles and syringes. Protective equipment is needed. But when Nichodemus Gebe, head of biomedical engineering at Ghana's Ministry of Health, started

► **Ebola hotspots.** Repairing and servicing mechanical and electronic systems is tricky. Sharp metal parts and tools can slice through protective clothing and into skin, increasing infection risks. Local staff, unfamiliar with such technology, are sometimes less keen to maintain it, says Agnès Lamaure, a logistics expert with Médecins Sans Frontières (MSF), a French charity which has led much of the international response to Ebola.

Another difficulty is that Ebola field clinics typically must generate their own electricity. Assessing the value of a system or device therefore involves taking into account not just its cost, but also the precious power it will consume, Ms Lamaure adds. The most practical way to vaporise disinfectants at Ebola centres in Africa is with hand-pumped sprayers typically used for garden pesticides. And rather than import a machine to destroy infected material, which could cost \$300,000, Ebola centres burn their waste in pits which are sealed and covered in concrete.

On with the scrubs

Nevertheless, some new technology is helping in west Africa, where the number of cases has fallen, but the disease is hanging on. The bible on stopping transmission in poor countries was for many years a 1998 report by the World Health Organisation and America's Centres for Disease Control and Prevention (CDC) entitled "Infection Control for Viral Haemorrhagic Fevers in the African Health Care Setting". It enshrined a "sort of lowest common denominator" realism based on what was widely available rather than most appropriate, says Armand Sprecher, an MSF epidemiologist. It helped to establish surgical garb as the thing to wear.

But clothing designed for operating theatres is not the best for, say, collecting corpses lying in infectious body fluids. Aprons and surgical gowns leave the wearer's back mostly unprotected so, when squatting to lift a body, material on their boots is likely to wet the cotton surgical scrubs on their buttocks and thighs. "That's an uncomfortable feeling," says Dr Sprecher. He began working on Ebola outbreaks with MSF in 2000 several years before coveralls made with a DuPont synthetic fibre called Tyvek became widely available.

Tyvek is produced from high-density polyethylene fibres. These are not woven, as most fabrics are, but "flashspun" in a process which involves the evaporation of a solvent. Although tear-resistant and waterproof, Tyvek does allow air molecules under high pressure to pass through. This has now led to the wide adoption of a more impermeable laminated DuPont fabric called Tychem.

Coveralls made with Tychem, however, have a big drawback. The material

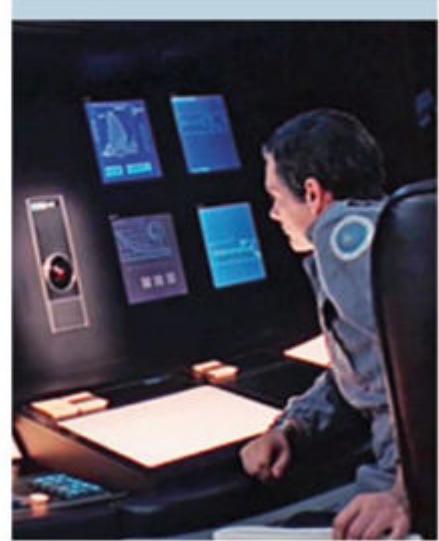
restricts gas exchange enough to prevent evaporative cooling, so wearers in hot weather may quickly overheat, becoming confused or even suffering a heat stroke. Sweat and fatigue build so fast that staff in west Africa are limited to two or sometimes three 45-minute sessions in coveralls a day, says Hélène Esnault, a MSF nurse now working in the Democratic Republic of Congo. Dr Sprecher hopes that research by CDC will lead to a more breathable Ebola-resistant fabric.

In the past decade latex gloves have largely been replaced by those made with nitrile, a synthetic rubber that better resists disintegrating in chlorine disinfectants. Goggles are increasingly designed with ventilation slits not placed on the top, lest sweat or rain wash contaminants into the eyes. And surgical masks are now more widely used in Africa's poorest countries because their cost has dropped some 75% in the past 15 years, says Juan Martínez Hernández, an epidemiologist and Ebola expert based in Madrid.

Surgical masks, however, lose effectiveness when soaked with sweat. More expensive "duckbill" designs that protrude from the face work better. MSF is field testing a handful of respirators, which are powered by a battery pack worn on the belt. Filtered air is supplied via a rubber hose into a hood with a plastic visor. More air is delivered than can be inhaled, so pressure under the hood is slightly higher than that outside, which helps to keep particles out.

At about \$1,600 apiece, few "positive-air-pressure respirators" are used in west Africa. And wearing them can have consequences, says Dr Martínez Hernández. He was one of the authors of a letter discouraging their use which was published in the *Lancet*. Health-care workers who see colleagues using the respirators are less willing to settle for a traditional passive face-mask even though, used with care, it is good enough, he says. Many African health ministries do not want to see protection standards "get dialled up" to unaffordable levels, adds MSF's Dr Sprecher.

One practical way to prevent infection and lessen the risk to health-care workers is to educate the general population about the disease, says Khadija Sesay, head of the Open Government Initiative in Sierra Leone. With help from IBM, the group uses software to analyse text messages and phone calls to government hotlines. This allows maps to be generated showing the prevalence of people whose actions risk spreading infection. Eating bushmeat, for instance, can transmit Ebola. It is unlikely, then, that the most sophisticated technologies will play much of a role in containing Ebola in Africa, especially if the number of infected remain high. Ebola has come and gone before, but if it abates, one day it will be back. ■



Watch what you say

Speech recognition: Better automated acquisition of speech may be more about seeing than it is about hearing

"IF HE were proven to be malfunctioning, I wouldn't see how we'd have any choice but disconnection." In the film "2001" (pictured above), Frank Poole, an astronaut played by Gary Lockwood, considers what should be done with HAL, the homicidal computer in charge of the ship. HAL learns of his human masters' plan to unplug him by lip-reading their conversation through a window—an idea that researchers and companies are getting closer to realising. Their goal is less about spaceship-driving robots and more about improving voice-controlled helpers such as Apple's Siri and Microsoft's Cortana.

No matter how good voice-recognition software becomes, it will always be hostage to its sonic environment. Ask your digital assistant to dial a number in a quiet office and it might hear the right numbers. Try again near a busy road or at a noisy party and you will probably be disappointed. If only your phone could read your lips.

Ahmad Hassanat, a researcher in artificial intelligence at Mu'tah University, in Jordan, has been trying to teach a computer program to do just that. Previous attempts to get computers to lip-read have focused, understandably enough, on the shape and movement of the lips as they produce phonemes (individual sounds like "b", "ng" or "th"). Such shapes-of-sounds are called visemes. The problem is that there are just a dozen visemes for the ➤

► 40 to 50 phonemes in English; "pan" and "ban", for example, look remarkably similar to a lip-reader. That makes it rather taxing to reconstruct words from visemes alone. Instead, Dr Hassanat has been trying for the past few years to detect the visual signature of entire words, using the appearance of the tongue and teeth as well as the lips.

His method has had some success. In a paper published late last year, Dr Hassanat described how he had trained his system by filming ten women and 16 men of different ethnicities as they read passages of text. The computer first compared these recordings with a text it knew, then tried to guess what they were saying in a second video. When the computer was allowed to use the same person's training speech, it was fairly accurate—around 75% of words spoken for all subjects and up to 97% for one speaker. But when the person's own training video was excluded from the analysis—just like untrained digital assistants—the program's accuracy plunged to 33% on average and as poor as 15% in some cases (moustaches and beards, it seems, are particularly confusing to the system).

Another idea is not to focus on the mouth. In 2013 Yasuhiro Oikawa, an engineer at Waseda University in Japan, used a high-speed camera capable of shooting 10,000 frames a second of a speaker's throat. This measures tiny, fleeting vibrations in the skin caused by the act of speaking. The precise frequencies present in the vibrations can then, in principle, be used to reconstruct the word being spoken. So far, however, Dr Oikawa's team has managed to map the visual vibrations of just a single Japanese word.

The best results come when a system does more than just passively watch. VocalZoom is an Israeli startup whose idea is to point a low-power laser beam at a speaker's cheek to measure vibrations, and use those to infer the frequencies of speech. The system combines those results with ordinary speech audio from a microphone, subtracting unwanted ambient noise or other talkers and leaving just the cheek-wobble frequencies.

In January the firm took its technology to CES, a giant technology trade show in Las Vegas and a notoriously ear-splitting environment, and impressed the tech press. But the system is not yet ready for the mass market. The prototype is still larger than the smartphones it is intended to be built into, and tempting manufacturers into adding components to ever-slimmer, ever-sleeker handsets will not be easy. The company may have more luck getting its technology into cars, another industry increasingly reliant on voice control; VocalZoom claims to be in early talks with a big carmaker. Perhaps the company will, one day, even get its kit into space-faring vehicles. ■

Out of the groove

Materials science: A simple treatment using a laser can produce surfaces with the ability to clean themselves

ALIGHTNING strike lasting just a few tens of millionths of a second might seem, well, lightning-fast. Elsewhere, though, nature often gets its work done in periods far shorter than that. In recent years, scientists' attention has been caught by lasers that produce pulses lasting just femtoseconds—that is, millionths of a billionth of a second—which can act as flashbulbs that illuminate the fastest processes in biology and physics. Now femtosecond pulses have shown off their abilities in a more quotidian task: making surfaces water-repellent.

Nature has plenty of examples of hydrophobicity, as water-shedding is known, not least the duck's idiomatic back. But a superlative degree of it is of particular interest, because superhydrophobic surfaces are also, in effect, self-cleaning. As they shed water, any dust or dirt on them sticks better to the passing water beads than to the surface. Exposed to the elements, such surfaces stay clean, dry and free of rust or ice (water does not stick around long enough to make either).

There are myriad applications that could make use of such properties: aircraft or power lines that never get icy, and ships or toilets that never get dirty. The idea is already employed by industry, typically by covering surfaces with polymers to achieve hydrophobic effects. But even the best of these do not perform as well as nature's superstars, such as the Morpho butterfly, the leaves of the lotus plant or the garden nasturtium.

Scientists investigating such natural surfaces have found they exhibit patterns and structures on more than one scale—what is known as hierarchical structuring. Morpho wings, for example, are made of tile-like structures about a millionth of a metre long. On each, however, lies a series of grooves measuring just nanometres, or billionths of a metre. In some configurations, hierarchical structuring leads to a reverse effect: an extreme water-loving property called superhydrophilicity.

Chunlei Guo and Anatoliy Vorobyev, physicists at the University of Rochester, in New York, have become experts in using femtosecond lasers to make surfaces with hierarchical structuring. Unlike industrial lasers, femtosecond lasers release their energy in pulses leaving no time for a material to heat up appreciably. As that energy dissipates, single atoms and clusters of varying sizes evaporate off the surface, leaving nanometre-scale bumps and valleys where the laser has removed differing amounts of material.

By scanning a laser beam repeatedly across samples of metal, the researchers are able to cut arrays of grooves about 100 millionths of a metre wide (the width of a human hair). Within each of the grooves, though, lies structure at the nanometre scale. That arrangement, as the pair have shown in a paper in the *Journal of Applied Physics*, results in an astonishing level of superhydrophobicity on platinum, brass and titanium. It is not just that water dropped onto the surfaces does not stick; it actually bounces.

Dr Guo admits, however, that the team have an incomplete understanding of why it works so well. A great many physical mechanisms may be involved, and these need to be unravelled. But making the surfaces is simple, so applications may not be long coming. The pair believe it will work on any metal and, with some tweaking, on materials such as plastics, semiconductors and ceramics. So perhaps a self-cleaning toilet that sparkles after every flush is not far in the future. ■



The little engine that could



Car engines: Downsizing to a car with a smaller engine is being made easier by the latest turbochargers. They can transform a standard four-cylinder engine into a much more powerful motor

FUGAL four-cylinder engines used to be found only in the cheapest cars. But today they are being fitted to even luxury models. What has made them more acceptable—indeed, desirable—is the development of advanced turbochargers that cram more air than normal into the fixed volume of their cylinders, allowing the engines to burn proportionally more fuel. The result is a compact unit that punches way above its weight in terms of power and torque, a turning force which makes that power available at lower revs. These engines also provide better fuel economy and emit less pollution.

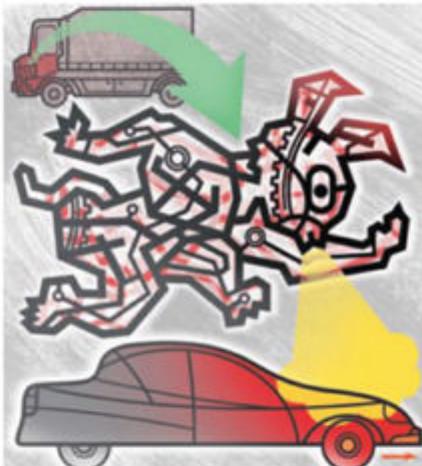
A turbocharger works by tapping the hot exhaust gas from the engine to spin a small turbine which, in turn, drives an equally small air compressor. For higher performance, an intercooler is sometimes placed between the compressor and the engine's inlet manifold. This lowers the temperature of the compressed air and raises its density still further. In general, a turbocharged 1.8-litre four-cylinder petrol engine can deliver the power and torque of a naturally aspirated 3-litre six-cylinder unit. By the same token, a turbocharged v6 can be more than a match for a conventional v8.

Turbochargers are not to be confused with superchargers, made famous by the 4.5-litre Blower Bentleys of the 1920s. While they serve broadly the same purpose—to squeeze more air into an engine—they function differently. A supercharger does not rely on an exhaust-driven turbine but is driven directly by the engine. Superchargers are better in one respect: they do not suffer from “turbo lag” (the time taken for a turbocharger to spool up to speed). The disadvantage is that a supercharger robs the engine of power and, thermodynamically, it is nowhere near as efficient.

Carmakers started to take turbocharging more seriously in 2010, after the American government announced that its CAFE (corporate average fuel economy) target would rise to 35.5 miles per US gallon (6.63 litres/100km) by the 2016 model year. Turbocharged four-cylinder engines typically use 15% less fuel than larger, naturally aspirated, motors of comparable output. Also, with an abundant supply of oxygen to support combustion, the mixture in the cylinders gets burned more thoroughly. The result is a cleaner exhaust all around.

In Europe, where half of all cars and light trucks sold are diesel models, the benefits of turbocharging are well understood. Because diesels ignite their fuel using the heat of compression (rather than spark plugs), they need much higher compression ratios to function. To cope with the greater internal pressure, a diesel's engine block and cylinder head, as well as all its reciprocating and rotating parts, are made much stronger, and thus are heavier.

Unfortunately, heavy rotating masses do not like being spun rapidly. As a result, diesels tend to operate in a lower, more narrow band of engine speeds. And because they spin relatively slowly, they never get enough air needed to fill the cylinders properly during intake strokes, which is why diesel engines have long used turbochargers to overcome their inherent shortness of breath.



The modern turbocharged petrol engine owes much to its diesel equivalent. But there are significant differences that require design changes. For instance, petrol is more volatile than diesel—igniting faster, burning hotter and requiring a lower air/fuel ratio. Petrol engines are also expected to operate over a much wider range of crank speeds, and to respond much more rapidly when called upon by the driver to do so. If turbo lag is longer than a few seconds, the vehicle can be tricky to drive—with nothing happening initially, and then the boost suddenly arriving with a wallop.

The reverse is also true. If the turbocharger does not come off boost quickly enough when the driver lifts his foot from the accelerator pedal—which causes the throttle to shut off the air flow to the engine—pressure waves can surge back to the turbocharger and damage the compressor. To prevent that a “blow-off” valve, which dumps surplus compressed air into the atmosphere, is fitted between the turbocharger and the inlet manifold.

On the exhaust side, a “wastegate” regulates the turbocharger's output by bleeding off some of the hot exhaust gas so that it bypasses the turbine. This makes it possible to match the amount of energy the turbine receives to the amount the compressor needs, so only as much boost is produced as is required. With their more sedentary nature, diesels avoid much of this complexity.

Numerous other tricks have been tried to make turbochargers more responsive. Obviously, the smaller and lighter the rotating parts in a turbocharger are, the faster it can respond to changes in the throttle setting. Unfortunately, small turbochargers quickly run out of puff. Bigger ones produce all the boost required, but are slow to spool up to speed. A number of hybrid designs have emerged that combine the best of both worlds.

Two are better than one

The most popular type today is the “twin-scroll” turbocharger. This works like a pair of turbochargers connected in parallel, one for each of two separate exhaust manifolds. However, while using a pair of turbochargers reduces turbo lag, it doubles the cost and complexity of the installation. The twin-scroll design gets around this by having two exhaust-gas inlets and two nozzles feeding a single turbocharger. One nozzle injects exhaust gas at a steeper angle to the turbine blades, for quick response, while the other injects the exhaust gas at a shallower angle, for peak performance.

Having two exhaust manifolds on a four-cylinder engine adds, of course, to the cost. But by pairing cylinders so their power strokes do not interfere with one another, the two exhaust streams can be injected into separate spirals in the turbocharger, causing it to spin more smoothly. Apart from making the turbine more efficient, this helps to improve the scavenging of burned gases from the cylinders, lowers the exhaust temperature (and thus emissions of nitrogen oxides) and reduces the turbo lag still further. Small turbocharged engines mean that far from fearing the deprivations of downsizing, motorists could be pleasantly surprised. ■



A lightness of being

Microgravity rovers: Space vehicles that can operate in the ultra low-gravity on asteroids and comets are having to employ novel locomotive systems

After hurtling more than 6 billion kilometres through space for over a decade, the European Space Agency's (ESA) probe Rosetta began orbiting comet 67P/Churyumov-Gerasimenko last year. In November the mother ship released its lander, Philae, which appeared to descend to the surface successfully. But elation at the European mission-control centres soon turned to concern. Philae had bounced back up again due to a failure of the explosives-powered harpoons that were supposed to anchor it to the surface. The harpoons were necessary because a small body like a comet generates little gravity. So little, in fact, that if Philae bounced faster than 44cm per second it was in danger of exceeding the comet's escape velocity, the speed that an object needs to be travelling to break free of a body's gravity.

As luck would have it, Philae fell back to the surface and eventually came to a stop where insufficient sunlight could reach its solar panels. The craft managed to deliver some data until its batteries ran out of power 64 hours later. One day Philae might be revived if 67P happens to move into more sunlight. Even so, the difficulties the mission encountered help to explain why space agencies are putting so much effort into designing machines which are capable of not only landing on bodies with microgravity but also travelling around them without flying off in all directions.

Wheeled rovers have long trundled across the Moon and Mars, but their gravities are merely low—a sixth and a third, respectively, of that on Earth, which has an escape velocity of 11km per second. Wheeled and tracked rovers could proba-

bly be made to work in gravity as low as a hundredth of that on Earth, says Issa Nesnas, head of the Robotic Mobility Group at NASA's Jet Propulsion Laboratory in Pasadena, California. But in the far weaker microgravity of small bodies like asteroids and comets, they would fail to get a grip in fine regolith. Wheels might also hover above the ground, spinning hopelessly and using up power. So an entirely different system of locomotion is needed for rovers operating in a microgravity.

Surprising as it may seem, one promising form of transportation in microgravity is a space hopper. These machines are nothing like the bouncy toys made popular in the 1970s-1980s. But they share the same idea, because bouncing from one place to another has its advantages.

The first hop

No one has yet demonstrated if a space hopper will work in space. But in a few years that opportunity will arise. A spacecraft loaded with four robotic hopping rovers blasted off from Japan's Tanegashima Space Centre on December 3rd. The mission, called Hayabusa 2, is being run by the Japan Aerospace Exploration Agency (JAXA). The aim is to collect samples from an asteroid called 1999 JU3 and return them to Earth. The spacecraft will arrive at ►

Until they are tested in a real microgravity no one can be sure these rovers will work

► the asteroid in the summer of 2018 and spend about a year surveying it. It will then move in extremely close to fire projectiles into the asteroid's surface. This will throw up material which the spacecraft will suck in with a suction nozzle.

With a diameter of only about 1km, 1999 JU3 has an escape velocity of just 32cm per second. To hop across its surface the rovers will use a moving internal mass. The largest rover on board the Hayabusa 2 spacecraft is a 10kg cube-shaped machine called MASCOT (for Mobile Asteroid Surface Scout, and illustrated on the previous page with its mother ship). MASCOT employs a weighted internal swing-arm, a bit like a pendulum. An electric motor swings the arm around and then suddenly brakes the movement. This jolt transfers inertia to the body of the rover, pushing it down into the surface, which results in the machine bouncing up. To ensure that the rover drops back down again and does not drift off into space, its hopping speed will be capped at about two-thirds of the asteroid's escape velocity.

MASCOT was built by DLR, Germany's aerospace centre. Besides hopping it can use its swing-arm to tumble over if it lands the wrong way up. This is to ensure that its instruments—a camera, magnetometer (to measure magnetic fields), radiometer (to measure temperature and radiation), and an infra-red microscope (to study minerals)—are all pointed in the right direction.

Hopping mechanisms such as these are lighter and less intricate than wheeled and tracked systems. And by hopping the rovers do not require detailed information about the terrain to ensure safe routes. Even if a space hopper lands on a sharp rock it is unlikely to damage itself, because in microgravity objects are a fraction of their weight on Earth. Hopping also requires less energy than turning wheels. The equivalent amount of power required to run an iPad for not much more than 30 seconds will toss MASCOT 70 metres or so, reckons Tra-Mi Ho, who leads the project at DLR.

To keep the €28m (\$32m) rover small and light enough to be carried by the mother ship MASCOT does not have solar panels to recharge its batteries. These will last for just 16 hours, the equivalent of two of the asteroid's days and nights. So the rover has to pack in a lot of work between its hops.

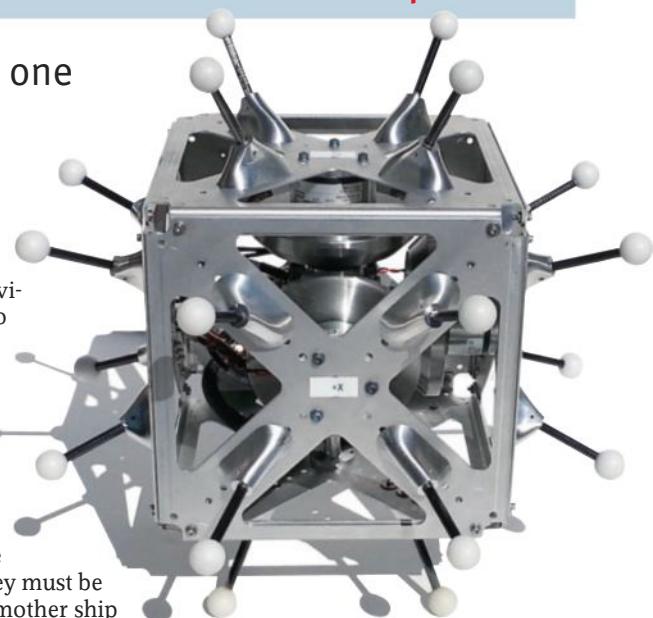
CNES, the French space agency, is analysing data on Philae's ill-fated bounces to better calibrate the hops which MASCOT

will undertake. CNES will use information from the Hayabusa 2 survey of 1999 JU3's gravity and surface composition to calculate the swing-arm velocities needed for the most efficient hops, says Pierre Bousquet, head of microgravity projects.

In free fall

The biggest challenge will be getting the four rovers onto the asteroid, says DLR's Dr Ho. They must be ejected from the Hayabusa 2 mother ship at precise velocities and locations to free fall to the surface from about 100 metres, she adds. Such separations are tricky, as the first Hayabusa mission showed. In 2005 its mother ship released a space hopper named MINERVA 200 metres above an asteroid called Itokawa. That was 130 metres too far. MINERVA was not captured by the asteroid's gravity and floated off into space. The three MINERVA-II Japanese space hoppers on the current Hayabusa 2 mission are improved variations of the lost original.

If Hayabusa 2's space hoppers work well such rovers would help to broaden extraterrestrial exploration, particularly on asteroids and comets. Scientists are interested in these bodies because they are the purest remnants of the early solar system, unadulterated by many of the chemical and geological transformations that have taken place on planets. Some may contain matter that predates the formation of stars. Many appear rich in complex organic molecules containing carbon, hydrogen, oxy-



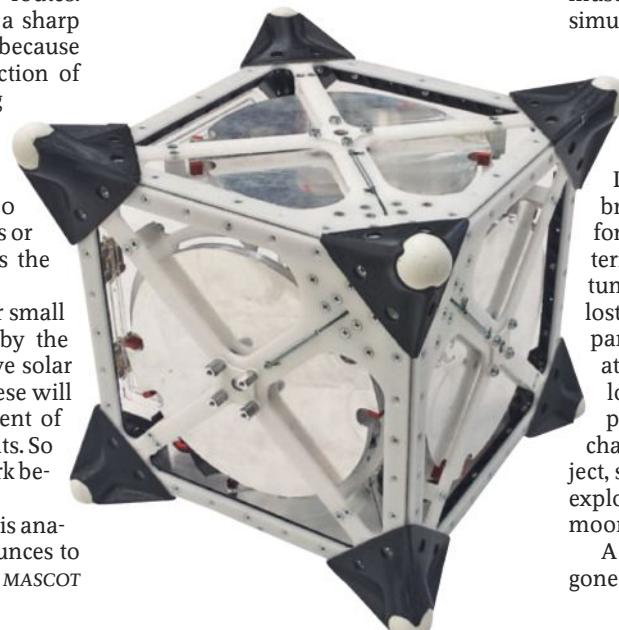
gen and nitrogen—elements that were needed for life to begin on Earth.

Asteroids that orbit near Earth can be easier and cheaper to reach than many planets or moons. And because the escape velocities of small bodies are so slow, only a little fuel needs to be carried for a space vehicle to take off from one. Asteroids could therefore serve as stepping stones to get astronauts into deep space, says Marco Pavone, a Stanford University roboticist who is designing a microgravity space hopper for NASA. The rocks could also be mined for elements such as oxygen and hydrogen to replenish supplies of water, breathable air and fuel.

The space hopper which Dr Pavone and his colleagues are working on (pictured below) sports three internal flywheels, one for each axis of motion. Each flywheel is powered with an electric motor, so they can reach different speeds. In order to hop, the inertial energy from each flywheel must be transferred to the robot's frame simultaneously.

Some microgravity space hoppers using a similar system are known as "hedgehogs" because of their protective spikes. Once such prototype built at the Jet Propulsion Laboratory (pictured above) uses brakes to stop the flywheels. The Stanford team are experimenting with an alternative method that delivers momentum more suddenly and with less energy lost as braking heat. It uses a small metal part to snag each flywheel to an immediate halt. Having multiple flywheels allows hops to be more steerable and precise. Benjamin Hockman, a mechanical engineer working on the project, says hedgehogs could also be used to explore moons, such as Phobos, a Martian moon with a tiny microgravity.

A team at the University of Tokyo has gone about things in a different way. They ►





Digging its claws in

► have built a spherical space hopper that generates motion with electromagnets. Four electromagnets are fixed to the sphere's inner wall and a small iron ball is suspended in the centre. Using battery power to activate one or more electromagnets results in the ball being pulled across to the side of the sphere. This imparts momentum to the robot's frame and thus initiates a hop. If more precision in hopping is required then two additional electromagnets could be used. Such a set-up would also allow the rover to roll along, says its designer, Yoshihiko Nakamura.

Rolling is another option for a rover operating in low gravity. One type, known as "structurally compliant" rovers, are designed specifically to roll along. These are constructed from a latticework of rigid rods connected with elastic cables. Mechanical actuators are used to shorten and lengthen the cables, so that the rovers change shape as they repeatedly tip over in the direction they want to go. Although more jerky than graceful, little traction is needed resulting in a "punctuated rolling motion", says Alice Agogino, a NASA-funded researcher working on such a project at the University of California, Berkeley. The rovers' instruments and power supply would be suspended in the centre of the structure.

A partner team at NASA's Ames Research Centre is developing structurally compliant rovers they call Super Ball Bots (one of which is pictured right). The researchers hope their robots could be used on Phobos or Titan, one of Saturn's moons. The two moons differ greatly. With a seventh of Earth's gravity, Titan could be traversed with a conventional wheeled rover. A Super Ball Bot, however, makes sense for

such a place because it could double as both the locomotion system and a landing mechanism, says Vytas SunSpiral, an Ames roboticist. The structures, lacking rigid joints, are able to absorb large shocks without damage. Conventional rovers dropped on Mars are cushioned with expensive, elaborate and heavy airbag systems. A Super Ball Bot could fall from orbit or roll off a cliff and become its own airbag, says Dr SunSpiral.

Yet mobility in a microgravity will only take a rover so far. Sometimes they must stop and analyse samples. The reason the Hayabusa 2 spacecraft will fire projectiles into the surface of 1999 JU3 to kick up samples is that drilling is not much of an option. No robotic microgravity anchoring system has yet been successfully used, and without one it is the spacecraft or the rover, rather than the drill bit, that would spin. Giving rovers claws might be a solution. Aaron Parness, who works in the Jet Propulsion Laboratory's "extreme environment" robotics lab has developed a machine which uses hundreds of tiny claws to grip the rough surfaces often found on bodies like asteroids. The machine (pictured left) is still under development but it has the potential to climb vertical rock faces and even creep along upside down on overhead formations.

Until they are tested in a real microgravity no one can be sure these rovers will work. There is no practical way to fully replicate a mission in a simulated micrograv-

ity on Earth. Some components of the MASCOT system have been tested in a 146-metre drop tower in Bremen, Germany, which uses a catapult to produce 9.3 seconds of near weightlessness. The Draper Laboratory, an independent research centre in Cambridge, Massachusetts, tested the guidance and control systems on a space hopper which it has developed during a reduced-gravity flight on board a NASA aeroplane known as a "vomit comet". But it will be one of Hayabusa 2's space hoppers that may be the first to complete such a mission, although which rover that will be has yet to be decided.

Saving the planet

The importance of a successful deployment is higher than you might imagine. For although they are designed for exploration, microgravity rovers might one day save Earth from a catastrophic collision with an asteroid. Many asteroids are composed of loosely coalesced rocks and would be hard to push or pull into a safe orbit. A paint job, however, might do the trick, reckons CNES's Mr Bousquet. Just as space hoppers rely on every action having an equal and opposite reaction, light and heat reflected off an asteroid's surface exerts a tiny pressure. So increasing the reflectivity of the rocks would alter this gentle pushback and, over time, the asteroid's trajectory. However they move, rovers that can operate in extremely low gravity may one day have a very important job to do. ■



Rocking and rolling along

Silicon Valley gets a taste for food



A PLANT-BASED hamburger patty that bleeds. Meatless chicken strips with the same fleshy and fibrous texture as cooked poultry. Mayonnaise made without eggs that is creamy and smooth. And a vegan beverage that contains all the ingredients for human sustenance, making it unnecessary to bother eating ordinary food every again. Hungry yet?

These are the offerings from a recent crop of Silicon Valley-funded startups which are trying to change the way people eat. The idea of making such products is attracting entrepreneurs and venture-capital firms who think that the traditional food industry is ripe for disruption because it is inefficient, inhumane and in need of an overhaul. The companies have different approaches, but they share the ambition of creating new plant-based food that they say will be healthier, cheaper and just as satisfying as meat, egg, dairy and other animal-based products—but with a much lower environmental impact.

"Animal farming is absurdly destructive and completely unsustainable. Yet the demand for meat and dairy products is going up," says Patrick Brown, founder of one

Green food: Tech startups are moving into the food business to make sustainable versions of meat and dairy products from plants

such startup, Impossible Foods, based in Redwood City in the heart of Silicon Valley. It has raised \$75m to develop plant-based meat and cheese imitations.

According to the United Nations, livestock uses around 30% of the world's ice-free landmass and produces 14.5% of all greenhouse-gas emissions. Making meat also requires supplying animals with vast amounts of water and food: in the United States producing 1kg of live animal weight typically requires 10kg of feed for beef, 5kg for pork and 2.5kg for poultry. Yet between now and 2050, the world's population is expected to rise from 7.2 billion to over 9 billion people—and the appetite for meat to grow along with it. To keep up with demand, food production will need to increase significantly.

It is a big challenge, but also an economic opportunity. "Anytime you can find

a way to use plant protein instead of animal protein there's an enormous efficiency in terms of the energy, water and all sorts of other inputs involved—which translates at the end of the day to saving money," says Ali Partovi, a San Francisco-based entrepreneur and investor in tech startups, such as Dropbox and Airbnb, as well as half-a-dozen sustainable-food companies.

The problem is many people shun vegetables and prefer to eat meat or dairy products. Dr Brown and others think the solution is to mimic the taste of meat and other animal-derived foods with plants and take the animal out of the equation. In theory at least, there would be plenty of food for everyone and fewer resources needed to produce it. "We're reinventing the entire system of transforming plants into meat and milk," he says. Other startups have similar aspirations. Beyond Meat, which makes plant-based chicken strips and beef "crumbles", is already selling its products in stores. As is Hampton Creek, whose eggless mayonnaise has become a bestseller at Whole Foods Market, a big American chain.

Beyond vegetarianism

Of course, the food giants already offer a variety of meat and dairy alternatives that many vegetarians and vegans buy. What is different with this new approach is that the startups are not targeting the small percentage of the population who largely live on a plant-based diet already. They are after people who love meat and dairy products, and that means replicating the meaty, cheesy or creamy flavours and textures that so many people crave. "We want to have a product that a burger lover would say is better than any burger they've ever had," says Dr Brown.

This is also different from "growing" meat in a laboratory using tissue engineering, which involves culturing cells taken from live animals. Modern Meadow, a New York company, is working on this technology, although its more immediate aim is to grow unmarked cultured leather.

Introducing a new food category is risky as it takes a lot of time and money. Big food firms prefer to acquire innovative products rather than develop them internally, explains Barb Stuckey, chief innovation officer at Mattson, a California-based food and beverage consultancy which has developed many new products. "It may take someone from outside the food industry to really disrupt it," reckons Ms Stuckey. And Silicon Valley has enough hubris to do so.

The business has already attracted a fair ➤

"Change happens by making something so delicious and so affordable, everyone chooses it"

► share of famous venture-capital firms and investors, including Kleiner Perkins, Google Ventures, Andreessen Horowitz, Khosla Ventures, Bill Gates and others. "If we can provide [plant-based] food that's healthier, tastes equal to better, at an equal to lower cost, it'll go everywhere," says Khosla's Samir Kaul. If the companies they are backing succeed, the returns could be massive. The US beef industry alone is worth \$88 billion. And even for condiments, such as mayonnaise, the market totals \$2 billion. Still, not everyone is bullish on the prospects. These are high-risk endeavours and some of them might fail, cautions Michael Burgmaier of Silverwood Partners, an investment bank involved in dozens of food and beverage deals. The question is, he says: "Is the consumer ready for some of these products?"

Impossible Foods' Dr Brown thinks they are. The inventor of a DNA chip now widely used in gene-expression analysis, his firm has been developing meat and cheese imitations from plants for three years. For meat, the aim is to recreate its key components—muscle, connective and fat tissue—using suitable plant materials. The company's first product, a hamburger patty, already looks and cooks like meat, and will taste as good or better by the time it reaches the shops, Dr Brown promises.

To do this he has assembled a team comparable to one at a biotech or pharma company. It is largely made up of molecular biologists and biochemists, as well as some physicists; only a few members of his staff have a background in food science or have culinary training. In the company's laboratory scientists break down plant materials and extract individual proteins with functional properties that can, for example, make foods firm up or melt down during cooking or baking.

The company has also spent a lot of time working out what gives meat its unique flavour. According to Dr Brown, the secret to a burger's taste is haem, a compound found in all living cells, including plants. It is especially abundant in haemoglobin in blood, and in muscle tissues as myoglobin. It also gives a burger its red colour. During the cooking process haem acts as a catalyst that helps transform the amino acids, vitamins and sugars in muscle tissue into numerous volatile and flavourful molecules, he explains. To create the meaty flavour in its burger patties, the company uses a heme protein equivalent to one found in the roots of legumes.

Development of the burger has come a long way. Dr Brown says one person de-



scribed the taste of the very first prototype as "rancid polenta". Recent versions have been reviewed much more favourably as "better than a turkey burger". In terms of nutrition, the patty's protein content may be slightly higher than that of a conventional burger and have at least as many micronutrients. Because it is made from plants, it will not contain any traces of antibiotics, hormones or cholesterol. The company hopes to start selling the burger before the end of this year.

Getting the flavour

Beyond Meat, based in Southern California, has also been studying the components of meat to emulate its texture and flavour. "We're smart enough now to understand the architecture and the composition of a piece of muscle," says Ethan Brown (no relation to Dr Brown), the company's CEO. The firm's flagship product, Beyond Chicken Strips, has been on sale since 2012, and has a surprisingly authentic feel when eaten. When several Whole Foods Markets accidentally sold mislabelled chicken salads with the company's plant-based strips there were no complaints. Only when an employee discovered the mix-up after two days were the salads officially recalled. The product's texture is based on years of research at the University of Missouri, and it can now be created in a process that takes less than two minutes. An extruder rapidly heats, cools and pressurises a mixture of proteins and other ingredients into a structure that mimics the fibrous tissue of muscle.

The company's most recent product, the Beast Burger, was released last month. It has more protein, more iron and is overall more nutritious than actual meat burgers. "The entire quest for meat in human evolution is really about a nutrient-dense source of food," explains Mr Brown. "I wanted to build on that theme."

But marketing plant-based burgers to carnivores is not easy. "My view is that

meat has a masculine bent to it. You can't sell it the same way you sell lettuce," says Mr Brown. Hence the company is building the brand with images of vitality, fitness and health. In promotions it is using athletes. David Wright, captain of the New York Mets baseball team, has already signed up. In return, he is getting a small stake in the company.

Still under development is what may be Beyond Meat's most ambitious product to date—a raw ground beef equivalent which it hopes will be offered in supermarkets' meat sections right next to actual beef. Due for release later this year, it can be cooked and moulded into a meatloaf or meatballs—or, as Mr Brown hopes, even supplied to a fast-food chain to make burgers.

San Francisco-based Hampton Creek has replaced eggs with plant proteins in the products it has released so far. Its Just Mayo and Just Cookie Dough are now distributed in 30,000 stores, including Kroger and Walmart. Other items in the works include a ranch salad dressing, a scrambled-egg alternative and pasta. The goal is to create products that make it easy for people to choose sustainable plant-based foods over conventional items. "Change happens by making something so delicious and so affordable, everyone chooses it," says the firm's boss, Josh Tetrick.

To accomplish this, Hampton Creek has assembled a team that includes experts in biochemistry, bioinformatics and food science along with a number of chefs. Scientists extract and isolate proteins from plant materials and conduct basic biochemical studies to understand their characteristics and possible applications for a variety of foods. The promising ones are tested in recipes in the company's bakery and culinary sections to see how they perform.

So far, Hampton Creek has analysed more than 7,000 plant samples and identified 16 proteins that might prove useful in food applications. Several are already being used in its commercial food products, ►

"It's much easier to make a cookie dough without egg than it is to create a scrambled egg without egg"

► including a type of Canadian yellow pea in its mayonnaise. The team are looking for proteins with functional properties such as foaming, gelling and moisture retention. Mayonnaise, for example, requires a substance that binds the right amount of oil with water to create a stable emulsion. For its version in stores the company tested more than 1,500 different formulations.

Dan Zigmund, the former lead data scientist for Google Maps and now Hampton Creek's vice-president of data, is in charge of simplifying the process of finding useful proteins. There are an estimated 400,000 plant species in the world, each of which may have tens of thousands of proteins. To search this vast number more efficiently, his team are feeding data the company has already gathered into machine-learning models, which are designed to predict which types of proteins could be useful in specific food applications without having to go through all the biochemical tests.

Last October Unilever, a consumer-goods giant, sued Hampton Creek for false advertising, saying its product should not be called "mayo" because it does not contain eggs. (Based on food standards from America's Food and Drug Administration that date back to 1938, mayonnaise includes eggs.) Unilever also complained that the plant-based product had taken market share away from its well-known brand Hellmann's, which is made with eggs. Some people saw the lawsuit as a frivolous food fight in which a big company tries to bully a fledgling one. Andrew Zimmern, a celebrity chef who had preferred Just Mayo over Hellmann's in a blind taste-test, even started an online petition to urge Unilever to drop the lawsuit. It gathered over 100,000 signatures.

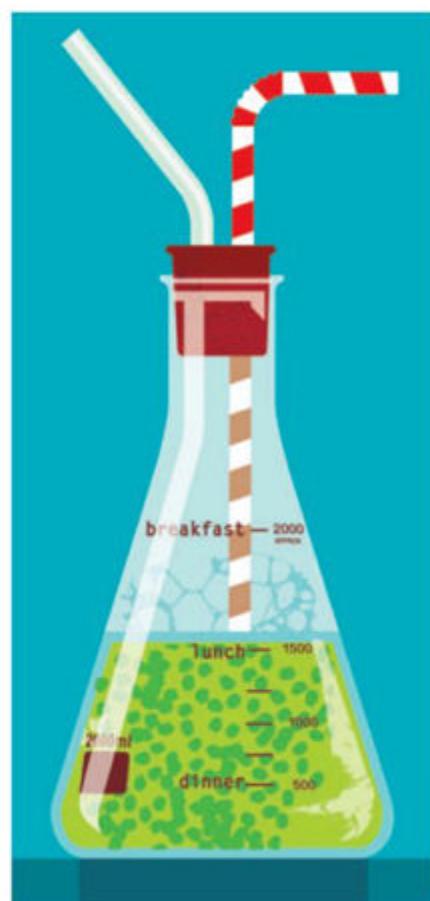
"This was great for Hampton Creek because it got their name out there and people on their side," says Matthew Wong, a research analyst at CB Insights, an analytics firm. Initially Unilever demanded that Hampton Creek rename its product, take existing inventory off the shelves and pay damages. But in December, the company suddenly dropped its lawsuit. It was on the same day that Hampton Creek announced its latest funding round of \$90m, bringing its total raised to \$120m.

Hampton Creek has been successful with the products it already sells. However, it is not trying to build a burger patty from scratch with plants, as Impossible Foods is trying to do, and it has not yet released its scrambled-egg replacement. "It's much easier to make a cookie dough without egg than it is to create a scrambled egg without

egg," says Mattson's Ms Stuckey. In a cookie dough or mayonnaise there are plenty of other ingredients to work with. But in creating an egg or meat analogue there is a higher bar in the consumer's mind, she adds, because the product is not combined with other ingredients it can hide behind.

Perhaps the most radical approach to disrupting the food industry comes from Soylent, whose beverage is designed to be a complete substitute for food and not just one of the many diet drinks or nutritional supplements. Sold as a powder to be mixed with water, it contains all the ingredients needed for sustenance, says Rob Rhinehart, Soylent's founder. It also eliminates the need to plan meals, cook and clean up afterward. "I see it as a life-simplification tool," he says.

The name originates from the sci-fi novel "Make Room! Make Room!" in which people in an overcrowded, apocalyptic world live on foods made of soy and lentils. (A twist in the movie version "Soylent Green" is that its secret ingredient is human flesh.) The company moved from the San Francisco area to Los Angeles in late 2013 in



search of cheaper office space.

Some users of the first version of the beverage complained of flatulence because of the high fibre content. That problem has now largely been solved by changing the carbohydrate blend and adding some digestive enzymes. Mr Rhinehart likens the improvements to the continuous updates to software that tech companies make. Soylent 1.3, the most recent version, has a smoother texture than the original, a more neutral taste and its omega-3s now come from algae as opposed to fish oil.

Out with the dishes

Mr Rhinehart himself uses Soylent for about 80% of his dietary needs. As a result he has not made a trip to the grocery store in years. He owns neither a fridge nor dishes. And he has turned his kitchen into a library. "I've also been able to separate the feeling of biological hunger from the craving of food from an experiential aspect," explains Mr Rhinehart, who still enjoys "recreational food" on occasion.

As of mid-February his firm had a four-to-five-month backlog for new orders. Customers subscribe online to receive monthly shipments with a "meal" costing roughly \$3. According to Mr Rhinehart, his company is already profitable and will use a recent \$20m cash infusion to expand production and sales.

Mr Rhinehart is, to put it mildly, a little extreme. Not everyone may want to separate eating into utility versus pleasure. Impossible Foods' Dr Brown does not believe such a compromise is necessary. "I don't see any reason why you can't have it all—the best tasting food, healthiest, best for the planet and most affordable."

But even if the scientific hurdles of making plants taste like meat and other animal-based products are overcome, the bigger obstacle these companies face may be cultural. People have been eating meat and having meals together for thousands of years. Meat in particular is not only prized for its taste but also perceived as a force of vitality, strength and health.

A recent study by the Humane Research Council, an animal advocacy group, says most vegetarians and vegans, about 2% of America's population, go back to eating meat eventually. In the future that may not be an option. "We can't sustain the number of people that we're going to need to feed over the next couple of decades with the current way that we're eating," says Ms Stuckey. Whether out of necessity or choice, Silicon Valley's vision of a big shift to plant-based foods may be inevitable. ■



Hacking your brain

Neurostimulation: With a DIY bundle of electronics or a ready-made device it is possible to stimulate the brain. But does it work and is it safe?

“IT’S like coffee times ten,” raves one enthusiast. “I use it a couple of times a week and problems solve themselves. At the end of the day, I haven’t wasted hours on frivolous websites. At the end of the week, my apartment is clean.” This marvel of productivity is not a new energy drink or an experimental wonder drug but a simple electrical device that he built at home for less than \$10. Whenever this physicist feels like an extra burst of motivation, he places electrodes on his skull and sends a jolt of electricity into his brain.

The currents, which are typically applied for ten to 20 minutes, are hundreds of times smaller than the seizure-inducing shocks used in electroconvulsive therapy. Plans to make such transcranial direct current stimulation (tDCS) machines are freely available online and their components can be bought at hobbyist stores. Kits cater to those lacking soldering skills, and now companies are emerging offering nicely designed and packaged brain zappers for mainstream consumers.

Not everyone using tDCS is seeking to become more efficient in their daily life. Some hope to enhance their concentration for study or video gaming; others want to

boost their memory, speed up learning or induce meditative calm. Yet more are trying to self-medicate for conditions such as depression, chronic pain and motor, sensory or neurological disorders. The benefits might sound implausible, but there is some science to support them. The idea goes back a long way. Scribonius Largus, a first-century Roman physician, prescribed the shock of an electric ray for headaches, and in the 19th century electrical pioneers such as Luigi Galvani and Alessandro Volta toyed with crude bioelectric experiments. It was not until the 1960s, however, that the first rigorous studies of electrical brain stimulation took place.

Directing the flow

The theory behind tDCS is that a weak direct current alters the electric potential of nerve membranes within the brain. Depending on the direction of the current, it is said to make it easier or more difficult for neurons in a brain circuit to fire. Position the electrodes correctly and choose the right current, so the idea goes, and you can boost or suppress all kinds of things. Some researchers have reported that tDCS can reduce pain, ease depression, treat autism

and Parkinson’s disease, control cravings for alcohol and drugs, repair stroke damage, and accelerate recovery from brain injuries, to say nothing of improving memory, reasoning and fluency. Remarkably, some effects seem to persist for days or even months. And the closer that scientists look at tDCS, the more they seem to find. Scientific papers about the technology appear at an ever-faster rate.

Hardly surprising, then, that DIY brain hackers want in on the action. Christopher Zobrist, a 36-year-old entrepreneur based in Vietnam, is one of them. With little vision he has been registered as blind since birth due to an hereditary condition of his optic nerve that has no established medical treatment. Mr Zobrist read a study of a different kind of transcranial stimulation (using alternating current) that had helped some glaucoma patients in Germany recover part of their vision. Despite neither the condition nor the treatment matching his own situation, Mr Zobrist decided to try tDCS in combination with a visual training app on his tablet computer. He quickly noticed improvements in his distance vision and perception of contrast. “After six months, I can see oncoming traffic two to three times farther away than before, which is very helpful when crossing busy streets,” he says.

Online communities dedicated to tDCS are full of similar stories. More still claim to have gained cognitive enhancements that give them an edge at work or play. Users follow the latest scientific papers avidly and attempt to replicate the results at home, discussing the merits of different currents, waveforms and “montages” (arrangements of the electrodes on the skull).

Dissenting voices are rare. Here and there are tales of people who experienced headaches, nausea, confusion or sleeplessness after tDCS, while temporary visual effects and mild skin burns are fairly common. There have been no reports of seizures, serious injuries or deaths. But that does not mean it is without risk, says Peter Reiner, co-founder of the National Core for Neuroethics at the University of British Columbia. He says DIY users may place electrodes incorrectly, thus stimulating the wrong part of their brain, or reverse the polarity of current, potentially impairing the very things they are trying to improve. No one really knows how tDCS interacts with chemical stimulants or recreational drugs like marijuana, or with pre-existing conditions like epilepsy. Even something as fundamental as being left-handed can alter the functional organisation of the brain. ►

Happiness and health may always be more than just a 9-volt battery away

► And if the benefits of tDCS can persist for weeks, perhaps its side-effects can linger, too. Many neuroscientists are particularly worried that the use of tDCS by children and young adults could affect their long-term neural development.

Some of these concerns can be addressed by manufacturing tDCS devices to make it difficult, or impossible, to exceed recommended currents or to apply the electrodes incorrectly. One such product already exists. The Foc.us v2, made by Transcranial, a London company, is advertised as a \$199 pocket-sized controller that pairs with a \$99 headset intended to help with concentration and reaction speed while videogaming. Donning the headset automatically positions the electrodes on the left and right temples, and both the duration and maximum current are capped. A second headset provides a different montage aimed at improving performance and motivation while exercising.

In reality, however, there is no guarantee that even slick products are any safer than a pocket-money brain stimulator assembled at home from a 9-volt battery, electrodes, a few wires and other components. Unlike the tDCS machines used for medical trials and clinical research, consumer versions may not have been assessed by any official body for safety or effectiveness. If the maker insists they are for use only by healthy adults to enhance cognition or leisure activities and make no diagnostic or therapeutic claims, such "wellness" devices have slipped under the regulatory radar of both the Medical Devices Directive in Europe and the Food and Drug Administration (FDA) in America.

That worries some experts. A recent paper from the Institute for Science and Ethics at the University of Oxford points out that consumer tDCS products are mechanically and functionally equivalent to medical neurostimulation devices that require licensing. Why regulate the version that is likely to be operated responsibly by health professionals, and not the one freely available to unskilled and inexperienced users? The Nuffield Council on Bioethics agrees, recommending in 2013 that the European Commission should consider regulating all such gadgets under its medical devices regime, regardless of the purposes for which they are marketed.

The Institute for Science and Ethics proposes a graded regulation system that errs on the side of consumer choice for tDCS devices, requiring comprehensive, objective information about risks and benefits to allow users to make informed decisions.

But it wants supplying brain zappers to children to be made illegal. Last year the FDA allowed transcutaneous electrical nerve stimulator (TENS) machines for headache relief as it rated them as low-to moderate-risk devices. TENS devices use a different waveform to tDCS and target cranial nerves rather than the brain itself, but they rely on a similar controller and head-mounted electrodes. Before allowing new TENS products to be sold, the FDA now wants to see evidence that the components are not likely to cause injury, that the controller can reliably provide the correct output, that there are no thermal or mechanical hazards, and that clinical data demonstrate the device is safe and effective as a headache treatment. Recent draft FDA guidelines for wellness devices suggest tDCS machines may eventually be regulated in a similar way.

Going underground

The University of British Columbia's Dr Reiner doubts that any manufacturer today can provide such information for tDCS. Even if they could, the cost of gathering it would make consumer devices more expensive. "When you can make a tDCS device yourself for less than \$20, we would advise strongly against heavy regulation because it will only drive the technology underground," he says.

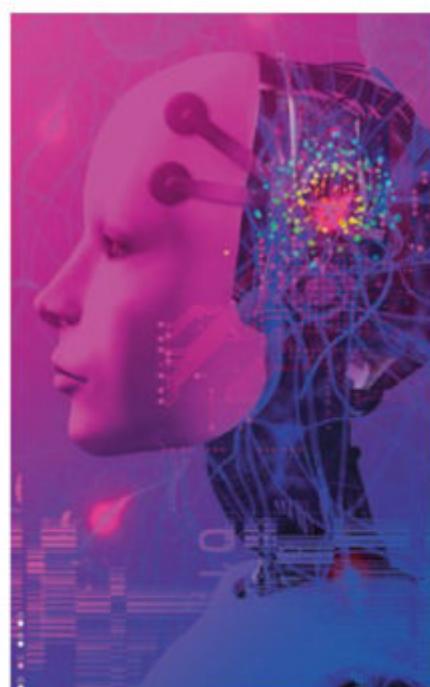
Proving the effectiveness of brain stimulation will be difficult. Although it may

well do something, exactly what is open to question. As the hype around tDCS grows, some neuroscientists are starting to question whether the technology really is the panacea it appears to be.

In 2013 Teresa Iuculano and Roi Cohen Kadosh of the Department of Experimental Psychology at the University of Oxford split volunteers up into three groups and asked them to learn a made-up mathematical notation system. The first two groups received tDCS to different parts of the brain previously associated with numerical understanding and learning, while a non-functional "sham" device was used on the third group as a control. After a week, all three groups were tested on how well they had learned the new notation system, and whether they could use it in practice. The first group showed an improvement in learning compared with the control group, but a decrease in their ability to apply their knowledge, while the second group experienced the opposite result. This suggests that the brain is actually rather well balanced: boost performance in one cognitive realm through stimulation, and aptitude in another will naturally diminish.

There is also the possibility that a variation in individual responses to tDCS will overshadow any general effects. In a study published last year, Dr Cohen Kadosh set up two groups: one of people who were anxious when presented with mathematical problems, and another who had confidence in their ability to breeze through numerical quizzes. When treated with tDCS to their prefrontal cortices, the nervous individuals improved their reaction time on simple arithmetical problems and showed reduced levels of stress. Given the same treatment, the confident group had longer reaction times and no less stress. "If you can get exactly the opposite results with a different population, that shows DIY brain hackers and companies marketing stimulation to improve gaming or other abilities are not on the right track," says Dr Cohen Kadosh. "We need to understand how the brain works in different people."

Felipe Fregni, director of the Laboratory of Neuromodulation at Harvard Medical School, says tDCS has been shown to accelerate the learning of new skills. But he agrees that individual variation is important, noting that younger people sometimes do not improve as much as older subjects, and that people at later stages of learning may even experience detrimental effects. "The more science you know, the more confused you can become of what really is the effect of tDCS," says Dr Fregni. ►



► One advantage of the deluge of scientific papers is that they can be subjected to meta-analysis, whereby studies can be statistically combined to tease out new discoveries. Last year, Jared Horvath, a neuroscientist at the University of Melbourne in Australia, published a meta-analysis of 30 measurements taken during tDCS studies, including neural responses, oxygen levels and electrical activity in the brain. Surprisingly, he found that tDCS had a reliable effect on only one: the electrical response of muscles to stimulus, and even that has steadily declined in studies over the last 14 years. Mr Horvath believes this indicates that the response has historically been measured poorly and that it too will eventually disappear as techniques mature.

Equally troublesome is a meta-analysis of the cognitive and behavioural effects on healthy adults that Mr Horvath subsequently carried out. As before, he included only the most reliable studies: those with a sham control group and replicated by other researchers. It left 200 studies claiming to have discovered beneficial effects on over 100 activities such as problem solving, learning, mental arithmetic, working memory and motor tasks. After his meta-analysis, however, tDCS was found to have had no significant effect on any of them.

If tDCS alters neither the physiology of the brain nor how it performs, thinks Mr Horvath, then evidence suggests it is not doing anything at all. Marom Bikson, a professor of biomedical engineering at City University of New York, disagrees. "I can literally make you fall on your butt using the 'wrong' type of tDCS," he says. Dr Bikson thinks the biggest challenge for tDCS is optimising techniques, such as the dose.

Mr Horvath notes that many papers measure 20 or more outcomes, with brain stimulation showing a weak effect on one or two. "But in the title and abstract, that's all they talk about," he says. "No one mentions the tons of effects that tDCS didn't have an impact on but that technically it should have if it is doing what the researcher thinks it is."

Another problem might be the small sample size, sometimes as few as ten or 15 people. Mr Horvath says future studies should use at least 150 subjects. There is, of course, the possibility that Mr Horvath's analyses are flawed. His paper included only one-off sessions, while many scientists believe the effects of tDCS accumulate with repetition. However, too few multiple-session studies exist for a valid meta-analysis. Dr Cohen Kadosh points out that individual variations could make the tech-



nology look as though it is doing nothing when in fact it has real but opposing effects in different people. Mr Horvath insists that his analysis allows for this possibility.

Critics might also wonder why Mr Horvath omitted tests where tDCS seems to have been most effective, in alleviating, for instance, clinical conditions such as depression. He admits that would be useful but says, "If something doesn't demonstrate any type of effect in healthy people, it becomes incredibly difficult, if not impossible, to argue why it would work with in a clinical population."

Not all neuroscientists are defending the status quo. "I'm not surprised that he found no effect from conventionally applied tDCS," says Jamie Tyler, a professor at Arizona State University and one of the founders of Thync, a Silicon Valley startup that recently unveiled a smartphone-controlled tDCS device. Thync tried to replicate some basic tDCS findings on cognition but could not do so. Dr Tyler now believes that tDCS may not directly stimulate the brain at all but instead modulates cranial nerves in the skull, like the headache-busting TENS technology. He designed the Thync device, a pocket-sized unit with disposable pre-shaped electrodes, to target these nerves with the aim of generating either relaxed or energetic mental states.

A shot of caffeine

Dr Tyler recently published a study of 82 people with a control. Its results suggest that Thync's device can reduce psychophysiological stress by altering skin conductivity (a measure used in pseudoscientific lie detectors), stress enzymes and heart rate variability. He likens Thync's "modified tDCS" programs to ingesting either a third of a cup of coffee or a glass of wine, and says no effect has been found on cog-

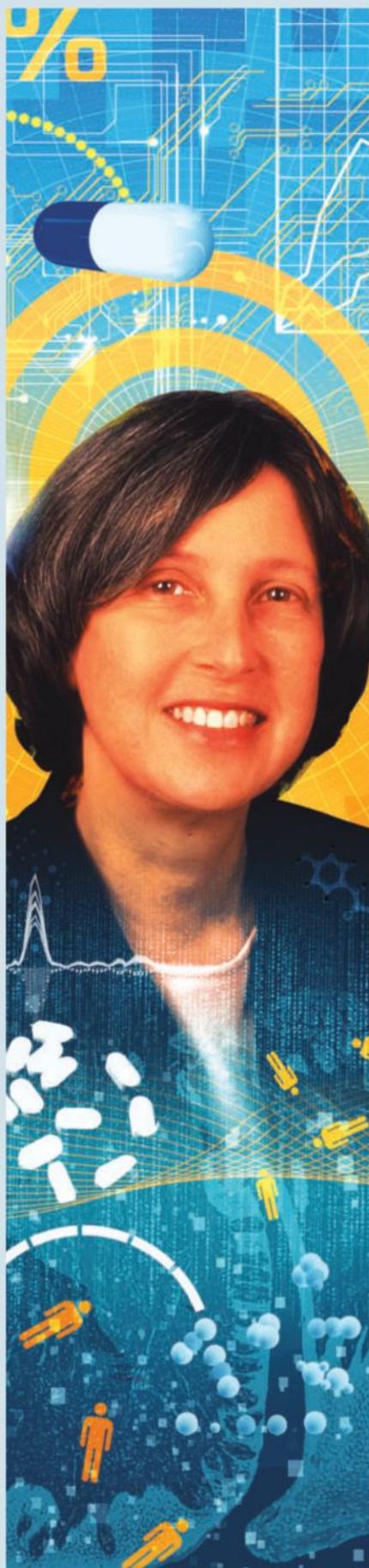
nitive processes like working memory. While Thync's stimulator is not yet available to the public, the firm was willing to give your correspondent a pre-launch trial.

The Thync device attaches with one sticky electrode on the right temple and one behind the right ear. The unit is controlled via a smartphone app, with the user able to adjust the intensity but not the duration of the session. At first, the unit generated a barely perceptible crawling feeling on the skin near the electrodes, building gradually to a pronounced tingling sensation. Over the 20-minute session, the strength of the signal varied up and down according to a preset routine. It felt itchy at times and, at its most powerful, caused muscles in the forehead to spasm alarmingly. Although the experience was not altogether unpleasant, any extra energy or focus proved, alas, elusive. Dr Tyler acknowledged that perhaps one in four people do not perceive any immediate benefit from the device.

Even for those who find themselves susceptible to its charms, the challenges for a product like Thync are formidable. The cognitive enhancements of a strong cup of tea or a glass of vintage Burgundy are well established. And partaking of them can be socially acceptable, deliciously enjoyable and rapidly achieved. None of these can be said of a disconcerting gizmo that needs half an hour to work and causes eyebrows to raise, both literally and socially.

Regardless of their questionable utility and effectiveness, tDCS gadgets are too novel, cheap and alluring to simply dismiss. Consumer-wellness devices like Thync may appeal to those who cannot use caffeine or alcohol for medical or religious reasons, and there will always be healthy overachievers seeking to supercharge their cognition for study or work. More importantly, tDCS presents the tantalising promise of relief from some medical conditions for which traditional therapies are either ineffective or unaffordable. As the University of Melbourne's Mr Horvath says, "If there are ten percent of people who are feeling a huge effect, even if that's placebo, who are we to say no to them?"

If people want to experiment with tDCS, there seems to be no reason to prevent them, provided it is done in the safest way possible. Devices could be regulated lightly with a view to safety rather than effectiveness, and neuroscientists encouraged to design future studies with more rigour. Happiness and health may always be more than just a 9-volt battery away, but brain hacking looks like it is here to stay. ■



Medicine by numbers

Susan Ellenberg is a biostatistician trying to avoid mistakes in an era of Big Data and high-tech personalised medicine

IF WE didn't take any risks, we wouldn't approve any drugs," says Susan Ellenberg, a professor of biostatistics at the University of Pennsylvania. "Some people will always want a new drug sooner and say they're willing to take a chance. Others will ask, why didn't you study it longer and find out about this horrible side-effect?"

During her long career, Dr Ellenberg has used data to quantify and communicate those risks. Along the way she has helped to shape a discipline that owes as much to ethics and philosophy as it does to pure mathematics. Now medicine is entering a new digital age, one of Big Data and high-tech personalised treatments that are tailored to an individual's genetic make-up. But more data does not necessarily mean better data, so amid the increasing complexity it will be as important as ever to measure correctly which treatments work and which do not.

It is a job Dr Ellenberg is well suited to. She has already played a big part in improving the data-monitoring committees that now oversee virtually all clinical trials; she has helped establish standard practices for tracking dangerous treatments; and she has encouraged patient lobbies to find a voice in clinical testing.

But Dr Ellenberg nearly missed becoming a statistician at all. As a high-school maths teacher in the 1970s, she took a summer job analysing clinical trial data. Luckily, she became so engrossed that she quit her job and returned to graduate school for a doctorate in statistics. The basics of randomising subjects into different groups and leaving the patient (and ideally health-care workers as well) unaware of the treatment each was receiving were well known. However, there were still plenty of mistakes being made.

"In the old days, people used to throw out some of their data," says Dr Ellenberg. "If a patient didn't comply with their treatment, the researchers would say, how can they possibly contribute to the question of how that treatment works? So they just dropped them." In one case Dr Ellenberg worked on in the 1970s, doctors wanted to test whether chemotherapy could help people recovering from colon cancer surgery. The study required patients to

start chemotherapy within six weeks of their operation for the best chance of catching any remaining cancer cells. Those who missed the deadline were automatically excluded from the analysis.

Dr Ellenberg realised that most reasons for starting treatment late, such as a slower recovery from surgery because of old age or a particularly large tumour, would probably mean a poorer prognosis regardless of any subsequent treatment. Excluding those people would leave the chemotherapy group with healthier members on average, making a drug look beneficial even if it did nothing. Dr Ellenberg insisted that the investigators track everyone who had been randomised into the study, even if they were treated late or not at all.

In 1988, Dr Ellenberg became the first chief of biostatistics for AIDS at the US National Institute of Allergy and Infectious Diseases. She arrived at a desperate time. HIV appeared to be a death sentence, patients were demanding treatments, however unproven, and doctors were struggling to catch up. With most infectious diseases, patients could be treated and followed up within weeks to see whether the pathogen had disappeared. With HIV/AIDS, they might have to monitor trial members for years to see who lived and who died.

Measuring surrogates

Dr Ellenberg championed a concept called surrogate endpoints that she had pioneered in cancer trials. These are biochemical measures that can indicate quickly whether a patient in a trial is likely to improve, remain stable or deteriorate in the long-term. For example, blood pressure can be a surrogate endpoint for cardiovascular mortality. The challenge with AIDS was working out which of dozens of biological markers had the best predictive value. Dr Ellenberg helped narrow these down to ones that were strongly associated with long-term survival, such as CD4 white-blood-cell counts. "I wish I could tell you that led to wonderful results and now we know how to do it," she says, "But we're still limping along."

The problem is that a surrogate for one treatment may not work with another, either because the second treatment functions differently or has side-effects. But it was still a step forward, allowing investigators to screen potential drugs more quickly. Nothing could be fast enough for some activists, however, who wanted early access to anything that might slow the progression of AIDS. "The clinical

Without the right analytical methods, more data just gives a more precise estimate of the wrong thing

leadership was unwilling to talk with activists at that point," says Dr Ellenberg. "But I saw that the Act Up group in New York had a very carefully thought-out set of principles for doing AIDS trials."

Dr Ellenberg welcomed Act Up to her statistical working group on AIDS, and changes began to trickle through. Until then, some studies had not allowed trial patients to take drugs other than the one being tested, even though many AIDS sufferers needed a cocktail of medications to fight opportunistic infections. Dr Ellenberg showed that a study could deliver useful results while allowing its members to continue with life-saving medicines. Patient groups are now routinely involved in planning clinical trials.

The role of placebos in clinical testing was a thornier problem. The most reliable results can always be obtained by comparing two identical groups, one of which receives a treatment and the other an inert placebo. Ethically, however, doctors are loth to withhold an effective treatment where one exists, so many trials simply compared a new drug to an existing one. In 1993 Dr Ellenberg moved to the US Food and Drug Administration (FDA). In a series of scientific papers, she and a colleague demonstrated that such trials can often fail to demonstrate the effectiveness of new treatments. In 2002, the World Medical Association changed its recommendations to permit placebo-controlled trials explicitly where patients would not suffer serious or irreversible harm.

The same year, Dr Ellenberg wrote a book about the importance (and the dangers) of analysing data as it accumulates during a clinical trial. Her ideas of how data-monitoring committees should function quickly became standard practice. It had long been realised, for example, that a trial might reveal one treatment to be much better than another. The only ethical thing to do in that case would be to stop the trial and give everyone the superior drug. In the past, statisticians keen to find such magic bullets would crunch their data every few weeks or months. "But if you look at your data often enough, sooner or later you'll observe by chance that one arm of the test looks better," says Dr Ellenberg. "There is now a mistrust of the whole concept of early termination."

She also cautions against the temptation to set statistics aside when faced with something that appears to be urgent: "There are groups saying they would be opposed to doing randomised trials for drugs or vaccines for Ebola because it's so

serious. But we're not doing anybody any favours if we don't find out whether these drugs or vaccines actually work."

Much of Dr Ellenberg's work at the FDA focused on the safety of medicines, particularly vaccines, once they were on the market. No clinical trial can ever catch the rarest side-effects but tracking those down from sporadic reports, anecdotes and coincidences is incredibly difficult. She notes that most infants are vaccinated and sometimes children get very sick. But is it the vaccine or just coincidence? "I was trying to make something out of the worst, dirtiest kind of data that you could possibly imagine," adds Dr Ellenberg.

The arrival of electronic medical records and the advent of Big Data promises massive statistical analyses that can uncover everything from uncommon side-effects to how peoples' genes might affect their future well-being. The technology is likely to be particularly useful in detecting bad treatments, thinks Dr Ellenberg. While most reported problems may continue to be coincidences, at least biostatisticians will be able to compare reliable lists of who took a drug and who experienced unpleasant reactions. The problem, says Dr Ellenberg, is detecting the signal from the noise. "The more people you have the richer your database will be but also the more ways there are to be misled by the data." Without the right analytical methods, she believes, more data just gives a more precise estimate of the wrong thing.

From the genes

Dr Ellenberg points out that services like 23andMe, which provide ancestral and medical interpretations of individuals' genetic information, have not yet delivered the revolution in health that many had expected. In the early days of genomics, excited mathematicians thought they had discovered thousands of correlations, most of which were chance findings. Dr Ellenberg also worries that presenting people with links between particular genes and health outcomes might lead them to worry needlessly or seek out potentially harmful treatments for conditions they do not yet suffer from.

In his state-of-the-union address, Barack Obama lauded personalised medicines. But these are tricky to approve. When a disease affects millions, large clinical trials can reliably spot even small differences between drugs. But for personalised treatments, or ones targeting rare "orphan diseases" that affect only a few people, those differences become much



harder to spot. Nevertheless, Dr Ellenberg believes statistics can help by integrating evidence from other trials.

Dr Ellenberg continues to work on surrogate endpoints and clinical trials, including a new study testing an innovative approach to attacking HIV. She also recently travelled to Botswana to help statisticians and clinicians there develop their own biostatistics programmes. Like most medical academics, Dr Ellenberg would like to see an end to the practice of some pharmaceutical companies quietly burying trial data that is inconvenient to them. Thousands of clinical trials have never been registered with oversight agencies and results from around half of all clinical trials (often those with unfavourable results) remain unpublished. Making that data available to statisticians would almost certainly lead to new discoveries and clinically useful findings.

However there could also be negative consequences. "Sharing raw data could promote inappropriate re-analyses," warns Dr Ellenberg. She says there are many who would be ready to believe any analysis claiming to prove that vaccines caused harm.

That the dry world of statistics is becoming a battleground of ideas and commercial interests, affecting the future of medical care and the lives of people around the world, may shock some. For Dr Ellenberg, who has spent her professional life emphasising the life-saving importance of accuracy, it is no surprise at all. "We've got all this data," she says. "The answer isn't to ignore it. The answer is to figure out how to limit the number of mistakes we make." ■

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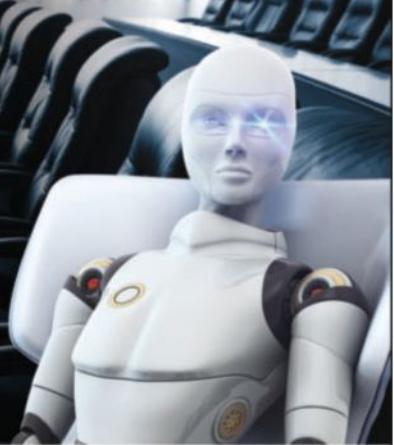
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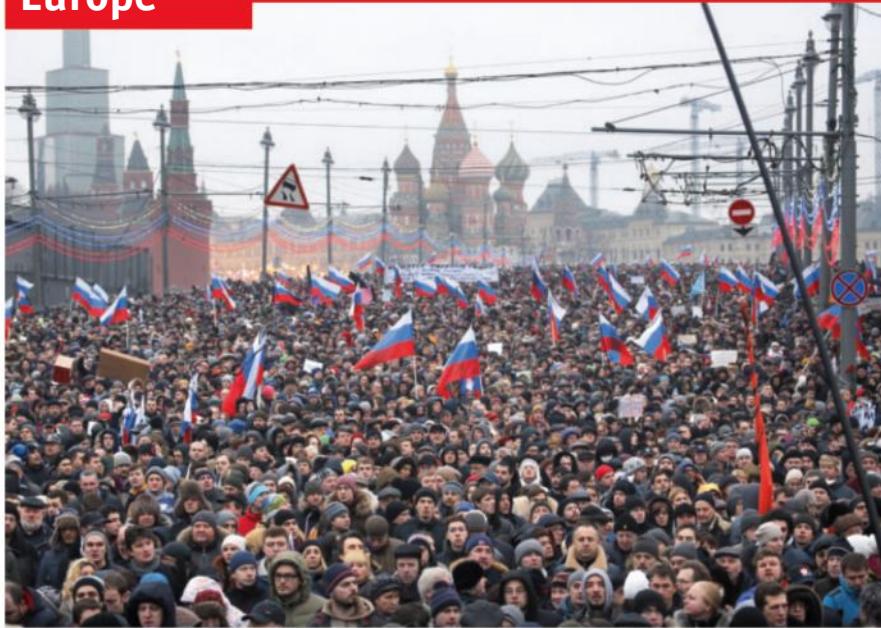
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Russia after Nemtsov

Uncontrolled violence

MOSCOW

The assassination of Boris Nemtsov leaves liberal Russians in fear of a new wave of violent repression

ON THE night of February 27th 2014, Russian soldiers without insignias—soon to be known as “little green men”—seized the parliament of Crimea. It was the start of Russia’s annexation of Crimea and its war against Ukraine. Exactly a year later, Boris Nemtsov, a leader of Russia’s liberal opposition, was shot dead on a bridge by the walls of the Kremlin. A few days earlier Mr Nemtsov had been handing out leaflets for a March 1st anti-war rally. The march turned into his memorial procession.

Mr Nemtsov’s postcard murder, with the cupolas of St Basil’s church in the background, marks the return of Russia’s campaign of political violence from Ukraine to the homeland. Russian aggression abroad and repression at home are intimately connected. State propaganda has portrayed Kiev’s Maidan revolution as a “fascist coup” and the democratic Ukrainian government as a Western-backed “junta”, with the Russian-backed rebels in the east of Ukraine as its victims. The media have called on Russian patriots to fight the “fascists” at home, identifying pro-Western liberals as a traitorous “fifth column”, and Mr Nemtsov as one of their leaders.

Prompted by the far-fetched fear that the Maidan revolution could be replicated in Russia, the Kremlin has re-imported the violence it deployed in Ukraine. Six days before Mr Nemtsov’s death, the Kremlin organised an “anti-Maidan” protest that drew thousands of marchers to the heart

of Moscow, bearing slogans denouncing Ukraine, the West and Russian liberals. Muscle-bound toughs representing Chechnya’s Ramzan Kadyrov, a warlord installed by Mr Putin to keep the territory under his thumb, bore signs proclaiming “Putin and Kadyrov will prevent Maidan in Russia”, alongside photographs of Mr Nemtsov labelled as “the organiser of Maidan”.

The anti-Maidan march was the culmination of a long campaign of hatred and intolerance. As Mr Nemtsov said in an interview recorded hours before his death, “Russia is quickly turning into a fascist state. We already have propaganda modelled on Nazi Germany’s. We also have a nucleus of assault brigades, like the [Nazis] SA.” Alexei Navalny, a blogger and opposition leader who was jailed to stop him attending the planned anti-war rally, underlined the emergence of reactionary gangs, “pro-government extremists and terrorist groups which openly declare that their aim is to fight the opposition where the police cannot.”

Such groups are not grass-roots amateurs who have sprung up on a wave of nationalism, but organisations seeded and financed by the Kremlin. The anti-Maidan activists include the leather-clad “Night Wolves” biker gang, who played an active role in the annexation of Crimea and have been patronised by Mr Putin. More alarming are Mr Kadyrov and his well-trained, heavily armed private militia of 15,000

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men, who several months ago swore a public oath to defend Mr Putin. “Tens of thousands of us, who have been through special training, ask the Russian national leader to consider us his voluntary detachment,” said Mr Kadyrov. America and Europe have declared economic war on Russia. Although Russia has regular forces, “there are special tasks which can only be solved by volunteers, and we will solve them.” Mr Kadyrov’s men have long roamed Moscow with arms and special security passes.

This is only the most brazen example of the Russian state outsourcing repression to non-state groups, thus losing its monopoly on violence. Far from being a sign of strength, this is an indication of state weakness. But it is precisely a state’s weakness that often leads it to engage in violent repression. None of Russia’s security experts or former KGB officers believe that the murder of Mr Nemtsov could have been carried out so close to Mr Putin’s office in the Kremlin without the complicity of state security. “It is the territory of the secret service, where every metre is under surveillance,” one former KGB officer explains.

Mr Putin’s initial response was to call the murder a “provocation”. He did not attend Mr Nemtsov’s funeral, although he sent a wreath of flowers. The state media that once hounded Mr Nemtsov began speaking of him in neutral terms. Mr Putin’s propagandists blamed the killing on foreign security services and liberals who wanted a “sacrificial” murder to mobilise their supporters. Ominously, this same scenario was originally floated by Mr Putin three years ago, on the eve of his accession to a third presidential term. The opposition, he said, would sacrifice one of their own and blame the Kremlin.

Many Russian liberals fear that the killing of Mr Nemtsov will be used to unleash ➤



▶ a new bout of political repression, as happened in 1934 after the murder of Sergei Kirov, a charismatic Bolshevik leader. Stalin, who is generally believed to have ordered that killing, blamed it on "enemies of the people". The state information agency, Russia Today, headlined its press conference on Mr Nemtsov's killing as "Murders of Politicians: the Methods of Maidan".

Other analysts say a better parallel is not the Kirov murder, but the waves of political killings that swept through Latin American political dictatorships in the 1960s, or Italy in the late 1970s. Such decentralised violence carried out by militant groups in the name of the Kremlin may prove impossible to control. "Even if the Kremlin decides this is enough of hatred, it will be all but impossible to defuse it peacefully," said Sergei Parkhomenko, a liberal Russian journalist. Given the likely complicity of the Russian security services, few people believe that the assassination will ever be solved. Mr Putin will simply have to cover up for whoever killed Mr Nemtsov.

Russian liberals, including Mr Nemtsov himself, had long worried that Mr Putin's regime would have no choice but to escalate repression and violence as the only way of consolidating its rule. Over the past year, physical violence has been mainly directed against Ukraine. If Mr Putin has now decided that he has reached the limit of his adventurism in that country, he is likely to try to compensate with more repression at home.

The assassination of Mr Nemtsov, who had served in the government of Boris Yeltsin and even been groomed as his potential successor (see our obituary), has shaken many members of the political elite. It breaks an unwritten pact, agreed after Stalin's death, that conflicts at the top should be resolved by non-violent means. Those who are still close to the Kremlin and consider themselves liberals now choose their words carefully. Alexei Kudrin, a former finance minister who sponsors civic projects, told TV Rain, a liberal internet-based television channel, that this was a "dramatic page in Russia's history...in modern, po-

litical Russia we see an opponent being stopped by a bullet. This is a new and inadmissible reality and it concerns all of us." No government officials, including Dmitry Medvedev, the prime minister, spoke out.

Most liberal voices have been drowned in the din of war. The dominant feeling among liberal Russians in the wake of Mr Nemtsov's murder has been of despondency and emptiness. Grigory Revzin, a columnist, compared the murder of Mr Nemtsov to the killing of Jean Jaurès, a French Socialist leader and pacifist who was assassinated just before the outbreak of the first world war. Mr Nemtsov's murder, he wrote, was a point of no return.

On March 1st, in place of the planned anti-war rally, tens of thousands of Muscovites marched in complete silence towards the bridge where Mr Nemtsov was killed. The next day, a meeting was held inside the Kremlin. In order to stop the bridge where Mr Nemtsov was killed from turning into a memorial to him, it was decided to use it later this month as the site for a celebration of Russia's annexation of Crimea. ■

Estonia's election

On the border

NARVA

How nervousness over Russia affects daily life and politics

NARVA, an Estonian town on the Russian border, is tired of hearing it is next. "There simply couldn't be a repeat of Crimea here," says Vladislav Ponjatovsky, head of a local trade union. Mr Ponjatovsky, an ethnic Russian, helped launch a Narva autonomy referendum in 1993. Now he would never consider it. Today's Estonia offers higher living standards and membership of NATO and the European Union. Nobody in Narva longs to be in Ivangorod, the Russian town over the river.

The fear that the Kremlin may test NATO by stirring up trouble in the Baltics haunts the West. Britain's defence secretary, Michael Fallon, says there is already a "real and present danger". Russia has violated Baltic airspace and harassed ships in the Baltic Sea. Russian agents crossed the border and kidnapped an Estonian intelligence officer last autumn. The new security environment is "not just bad weather, it's climate change," says General Riho Terras, head of the Estonian Defence Force.

As one of the five NATO members with a land border with Russia, Estonia must prepare for the storm. NATO has pitched in with "Operation Atlantic Resolve", sending 150 American troops to each of the three Baltic states and Poland. Air policing missions in the region have been beefed

up. A rapid response force is in the works.

National security loomed over Estonia's general election on March 1st, when the ruling Reform Party beat its pro-Russian rival. The Centre Party, which has close ties to Vladimir Putin's United Russia party and relies on the ethnic Russians who make up a quarter of Estonia's population, came second. Taavi Roivas, the prime minister, has ruled out co-operating with it, and will instead form a coalition with his current partner, the Social Democrats, and another party.

Since 1991 Estonia has struggled to integrate a chunk of its Russian-speakers, some of whom are still stateless (knowledge of Estonian is usually a condition for citizenship). Though integrated Russians fare well, the rest earn less, and are more likely to be unemployed than the average. The Centre Party runs Tallinn, but its political isolation at national level fuels alienation.

But what divides Estonians and Russians most is their media. Those whose mother tongue is Russian rely largely on news from Russian state media. Its world view has rubbed off. Researchers at the Sinu Riigi Kaitse programme, who study young ethnic Russians, find a sharp worsening of attitudes to America and NATO. The government plans to launch a Russian-language station this autumn. But Roman Vikulov, a correspondent for *Viru Prospekt*, a weekly, says the problem is not lack of alternative sources, but that "local Russians don't trust the Estonian authorities."

For many Estonians, the mistrust is mutual. The wounds of the Soviet occupation still ache; most Estonian families have personal tales of repression under Stalin. The anti-Russian atmosphere "may be alienating, but that's just a fact of life," says Estonia's president, Toomas Hendrik Ilves. Yet Estonian politicians are reaching out to Russian compatriots. Those born in Estonia can now receive citizenship, regardless of parental status. Last year Mr Roivas's government appointed the first ethnic Russian minister since Soviet days. The American embassy has taken special note of Narva, expanding cultural outreach and arranging for a group of cadets to study Russian there last summer.

The situation crystallises in a warehouse outside Tallinn, where a volunteer group called Dobrosvet is collecting humanitarian aid for civilians in rebel-held eastern Ukraine. Boxes stuffed with food and clothes lean in precarious stacks, waiting to be sent to hospitals, schools and villages throughout the Donbas. The boxes will travel through Russia with the help of the Night Wolves, a Kremlin-endorsed nationalist biker gang. Yet even these activists, like Mr Ponjatovsky in Narva, call Estonia home. Russians in Estonia "already have a different mentality," says Alina Esakova, Dobrosvet's leader. Her son serves in Estonia's army. ■

Turkey's Kurds

Put the weapon down

ANKARA AND DIYARBAKIR

A call for peace by the PKK's leader could mean a new deal for Turkey

FOR decades Turkish warplanes rained F bombs on the snow-capped Qandil mountains in northern Iraq to flush out rebels from the Kurdistan Workers' Party (PKK), who have been fighting for Kurdish self-rule inside Turkey since 1984. Now Turkey is pondering operations of a different kind. "If all goes to plan we will explore for oil in Qandil," declares Taner Yildiz, the country's oil minister.

Mr Yildiz's plans are part of a sea change in Turkey's relations with the PKK. On February 28th the party's imprisoned leader, Abdullah Ocalan, called on his men to convene a congress this spring to declare an end to their armed campaign. Years of secret haggling between Mr Ocalan and his captors may be bearing fruit. "We are closer than ever to achieving peace," beamed Sirri Sureyya Onder of the Peoples' Democracy Party (HDP), the biggest legal Kurdish party, as he read out Mr Ocalan's statement on television.

Turkey's president, Recep Tayyip Erdogan, has done more than any of his predecessors to improve the Kurds' lot. A Kurdish shift to peaceful politics would reverberate not just in Turkey but in Iraq and Syria, where the PKK and its Syrian affiliate have been receiving American aerial support in battling the jihadists of Islamic State. "Once the PKK stops targeting Turkey, it will be easier for America to justify its support for the PKK," reckons a Western diplomat.

Mr Erdogan's magnanimity to the Kurds may come at a price. He wants to alter the constitution to turn the presidency, which has limited powers, into a true executive presidency. His Justice and Development (AK) party needs to win two-thirds of the seats in the parliamentary election due on June 7th to make such changes on its own. Polls suggest it will fall short, leaving Mr Erdogan dependent on support from

another party, probably the HDP.

The main secular opposition party, the Republican People's Party (CHP), says AK and the HDP have already struck a secret deal. (Selahattin Demirtas, the HDP's co-chair, calls such claims "lies.") The allegation may be linked to the fact that the Kurdish party is eyeing CHP voters in hopes of winning the minimum 10% share needed to secure seats in parliament. Should the HDP fail to clear this hurdle, AK will snatch most of the seats in its region, perhaps giving Mr Erdogan his supermajority.

Some HDP officials privately gripe that Mr Ocalan has weakened their hand: he ought to have made his peace call conditional on the government shelving a controversial public-order bill. The bill's measures, mostly already approved by the

AK-dominated parliament, grant the police sweeping new powers, including the right to shoot demonstrators. This will give the government greater leeway to suppress any street violence that may erupt if the Kurds are shut out of parliament.

But the bigger challenge to Mr Erdogan's ambitions may come from within his own party. A growing number of AK insiders, including the prime minister, Ahmet Davutoglu, are said to be wary of their increasingly unpredictable president gathering more power to himself. A battle is looming over who will draw up candidates' lists for the elections. Mr Erdogan is likely to prevail. Yet there are no guarantees that his handpicked deputies will remain loyal, so the executive presidency he yearns for is not yet in the bag. ■

Kurdish football

Scoring the equaliser

DIYARBAKIR AND SIRNAK

In a conservative culture, a women's football team breaks barriers

NURESA AKA scored her tenth goal of the season on a sunny afternoon last week in Diyarbakir, the unofficial capital of Turkey's mainly Kurdish south-east. Ms Aka's strike helped to clinch a 4-1 victory for the Diyarbakir Women's Football Club over a rival team, Kahramanmaraş. "They call me Ronaldo," boasts the lanky 17-year-old forward, referring to the Portuguese football star Cristiano Ronaldo. "People tell me I play like him."

Ms Aka is one of the reasons why Diyarbakir is at the top of Turkish women's professional football's third division. She began dribbling as a child in the alleyways of the shantytown where she and her six siblings live. "Most of my girls are from poor, religiously conservative families," explains the team's coach, Melek Akgol Karakoc. "It's a miracle that they are here at all."

Women's football is, in itself, nothing new in Turkey. The officially secular country prides itself on treating women better than its Muslim peers. Turkish women gained the right to vote earlier than French women, and females are common in all professions, including sports. But patriarchal attitudes remain ingrained, and so-called "honour killings" of women deemed immodest by family members are especially high among Kurds. Persuading families in Diyarbakir to let their girls wear shorts in public is "a near-impossible task," says Semra Budak, a club official.

Unsurprisingly, much of the resistance comes from Islamic clerics who hold sway in the region. "It is utterly disgraceful. This is not how our holy prophet



Kicking it

wanted his sisters to behave," complains a prominent sheikh in the neighbouring province of Sırnak. But attitudes are softening. Mothers who once forbade their daughters to play are now flocking to their games.

Many credit the imprisoned Kurdish PKK leader, Abdullah Ocalan, an ardent promoter of gender equality. One of the 40 books Mr Ocalan has written, entitled "To Kill a Man", is something of a feminist bible. Around a third of PKK guerrillas are thought to be women. Their bravery in recent battles against Islamic State militants in northern Syria has made them the darlings of the global media.

Kurdish nationalism burns bright in Diyarbakir, and the football club is hardly immune. It calls itself "Amed", the Kurdish name for Diyarbakir. Hevidar Odungit, a left-winger who scored the third goal in the day's match, reveals that one of her brothers has joined the PKK. "And here's where I fight," she says, gesturing at the pitch.



Macedonia's scandal

Getting it on tape

SKOPJE

If you speak to a big shot in Macedonia, you may be recorded

MACEDONIA suffers a lack of international attention partly because, unlike its neighbours, it emerged from Yugoslavia's disintegration without fighting a big war. The European Commission supports the country's desire to open talks on joining the European Union, but this has been stymied by Greece's objections to Macedonia's name, which it shares with a Greek province. Now a snooping scandal threatens to undermine even the commission's support. For the past month, Zoran Zaev, leader of the opposition Social Democrats, has been leaking tapes of alleged conversations gathered for Nikola Gruevski, the prime minister, and his spy chief, who happens to be his cousin.

Mr Zaev claims that the pair have listened in on 20,000 people. This would mean that almost every bigwig in politics, business and the media has been spied on—including Mr Gruevski's ministers. In one tape, the interior minister tells the finance minister that she has talked to the chief prosecutor about dismissing criminal charges against him. In another, the finance minister calls Mr Gruevski's economic policies "insane".

Macedonians might have guessed that their government was spying, but many are stunned by the extent. Mr Zaev has been charged with trying to "overthrow the constitutional order". Mr Gruevski says that the wiretapping was organised by a former secret-police chief close to the Social Democrats, at the behest of foreign spooks. He has accused Mr Zaev of trying to blackmail him into forming an interim government and calling an election. The Social Democrats have shunned parliament since last April's election, which they say was fraudulent.

Mr Gruevski's power base seems solid. He has been in office since 2006. But his main coalition partner, an ethnic Albanian party, has called for the EU to mediate an end to the political logjam. Veton Latifi, a political scientist, says democracy is "unravelling", and that the scandal reveals a retrograde political culture. The main media outlets toe the government line, and are used to smear opposition politicians. This may be related to the scandal: one tape released by Mr Zaev appears to record a minister and the secret-police chief giving instructions to editors. Mr Zaev claims that over 100 journalists were bugged.

The Social Democrats have been struggling for years. Nenad Markovikj, a politi-

cal analyst, says that, if the tapes scandal fails to revive their fortunes, they are "done". A good sign is that civil society is waking from years of slumber. There have been demonstrations against pollution. Protests by students and those hurt by a new tax law have forced the government into concessions. But Fatmir Besimi, a deputy prime minister, says the scandal has hurt Macedonia's reputation and may threaten its hopes of EU accession.

The economy has been doing better than most neighbours': this year could see GDP growth of 3.7%. But official unemployment remains at 28% and wages are low. With no census since 2002, nobody knows if the official population estimate of 2.1m is correct. In 2010 the World Bank reckoned 447,000 people from Macedonia were living abroad. Anecdotal evidence suggests that more are packing their bags. ■

Media in Italy

Sliced RAI

ROME

The bloated state-run broadcaster just may undergo reform

SELDOM has an organisational chart prompted a defamation trial. Yet judges in Milan recently heard a case involving a colour-coded table published by *Libero*, a newspaper. The chart listed 900 executives of Italy's public television and radio network, RAI, and the political parties to which they supposedly owed their appointment. Dismissing charges of libel, the judges said it was well known that, in RAI,



Slimming down patronage

"even the most meritorious individuals are favoured by their acquaintanceships in political circles".

Italian commentators call RAI the "mirror of the nation": an institution so permeated by competing interests that it sometimes anticipates political shifts even before they surface. Once, this was not unhealthy. Instead of being in thrall to the government of the day, RAI offered contrasting viewpoints. The Christian Democrats controlled the first television channel, the Socialists the second and, from 1979, the Communists a third. All three parties disintegrated in the 1990s, but the idea that politicians were entitled to meddle in RAI survived. The number of newsrooms grew to 11, as did a spirit of fierce internal rivalry.

"Our channels were born to compete with each other, not to co-operate," says the director-general, Luigi Gubitosi. He produces a photograph of the prime minister, Matteo Renzi, being buttonholed by four camera teams, three of them from rival RAI channels. In 2012, the then prime minister, Mario Monti, plucked Mr Gubitosi from an investment bank and asked him to turn RAI into a normal company. "I replied that I would try to upset everyone in equal measure, and I think I have been quite effective at that," says Mr Gubitosi.

Nevertheless, in recent weeks, he has won approval for a blueprint that would give RAI's news and current affairs operations a structure closer to that of Britain's state broadcaster, the BBC. On February 26th, it was narrowly approved by RAI's politically appointed board, two weeks after winning a parliamentary commission's approval. The plan would slash the number of newsrooms to two, saving an estimated €17m (\$19m). But it is anathema to many RAI journalists, especially senior ones; the number of deputy editorships, for example, would fall from 32 to at most 12. The plan also worries politicians who fear it will reduce their powers of patronage. The parliamentary commission that approved the plan inserted a demand to preserve "the editorial identity of the individual newsrooms".

The plan's fiercest parliamentary critics have been the representatives of Silvio Berlusconi's party, Forza Italia. The push for an overhaul of RAI has revived the old issue of the conflict between Mr Berlusconi's interests as a television magnate and as a politician. His followers say they are defending RAI's traditional "pluralism". But suspicions persist that they are acting on behalf of their leader's three-channel Mediaset network, for which a more credible and efficient RAI would pose a challenge.

With Mr Gubitosi's mandate due to expire before the summer, much depends on the government's commitment to his plan. Mr Renzi has said he wants the "[political] parties out of RAI". Now is his chance to show he means it. ■

Charlemagne | Power up

Europe's energy plans are a cautious step in the right direction



BY TRADITION European countries club together when the benefits of doing so exceed the costs in lost sovereignty. Energy looks like a classic candidate: a single market should smooth supply and demand fluctuations, facilitate economies of scale and check the divide-and-rule tactics of exporters. Yet Europeans have proved oddly resistant to this logic. Governments hug energy policy close, calling it "strategic". Big companies, often state-owned, have been loth to lose influence over politicians and domestic markets. The nationalisation of energy policy has, if anything, accelerated. Germany's *Energiewende* lavishes subsidies on renewables, for instance, while Britain continues to finance nuclear power and Poland to prop up inefficient coal mines.

It is therefore brave of Maros Sefcovic, the European commissioner in charge of energy, to call his mooted "energy union" the most ambitious such plan since the creation in 1951 of the European Coal and Steel Community—the six-country body that was the forerunner of the European Union. Launched recently with all the glitz Brussels can muster, Mr Sefcovic's proposal, a grab-bag of policies, promises and compromises, is a political confection as much as anything. Much of it simply aims to press governments to implement agreements that they have already accepted.

Some ambitions have been lowered: a Polish idea to create a single European buyer for Russian gas has been downgraded, as has a plan for a new EU regulator with teeth. But there is new wine in the bottles, too. Among other things, the energy union proposes to stop governments from capping prices below cost; energy-poor consumers should instead be helped via the welfare state. Regional plans to cope with supply shocks will be drawn up, after energy "stress tests" last year exposed vulnerabilities in eastern countries. More cross-border electricity interconnectors will be built, to help "energy islands" like Iberia and the Baltics.

The most contentious idea is to inject the commission into talks between governments and third-party suppliers to guarantee that contracts meet EU law. The energy-union document coquettishly avoids almost all mention of Russia, but the target is clear. Gazprom, the Russian gas giant, exploits its position in east European countries that struggle to find alternative suppliers; Poland pays 40% more than Germany for gas, for example.

Hungary, which enjoys cosy energy relations with Russia,

hates the plan. Britain and France back it, but want to restrict the grounds on which the commission can get involved. But Germany and others that have alternatives to Gazprom, and therefore enjoy lower prices, are sceptical. Asked why such countries should support proposals that could cost them more, diplomats speak solemnly of "solidarity", which in Europe is usually code for redistribution. If there is hope, reckon EU officials, it is that heads of government used to horse-trading may be better placed to pull off a deal than their energy ministers, who tend to be bound by old thinking (or too close to their national champions).

The EU's climate-change goals, particularly a pledge to reduce greenhouse-gas emissions by 40% from 1990 levels, show ambition. Yet Mr Sefcovic's confidence rests not on such promises, but on two looming concerns. First, the shale revolution in America has turned the transatlantic gap in energy prices into a chasm, deterring investors and riling European consumers (who pay twice as much on average for electricity as Americans do). Second, Russia accounts for one-third of the EU's imports, around half of which are piped through Ukraine; its meddling in Ukraine has increased European concerns over the reliability of its main gas supplier. The energy weapon is less potent these days: the EU improved storage and internal distribution after the Kremlin turned off the taps to Ukraine in 2006 and 2009. But Russia's geopolitical antics leave some keen to seek alternative suppliers.

All this lends a defensive flavour to Mr Sefcovic's proposal. In their brighter moments EU officials liken it to another ambitious (if half-finished) project: the banking union, which is today often credited with protecting the euro zone against the contagion that was such a damaging feature of previous crises. But it took something close to economic catastrophe to galvanise the euro zone into action. The EU's hope is that it will not take a crisis of similar magnitude to concentrate minds on energy.

Great news for Turkmenistan

A unified internal market is all well and good, but it will not lead to energy self-sufficiency. Thanks to dwindling domestic production, the EU now imports over half the energy it consumes, a share that is set to rise considerably. But the mix of suppliers could start to look very different. New pipelines and facilities (such as import terminals for liquefied natural gas) will increase opportunities for Central Asian and African exporters, among others.

Infrastructure horizons are long, and many of Gazprom's European contracts last for well over ten years, so new transparency rules will take a while to kick in. But it all adds up to a gloomy picture for Gazprom. Russia has found it harder to twist the knife ever since the EU's "third energy package" barred suppliers from owning both pipelines and the gas that passes through them. And the commission is breathing new life into an antitrust case against Gazprom for market abuse.

That should free the EU to pursue what ought to be its first aim: a fully functional internal energy market. Mr Sefcovic speaks of energy as the EU's "fifth freedom", flowing across borders as easily as goods, services, capital and people are supposed to. That is a long way off: Europe's patchwork of subsidies and regulations will not soon be undone, and its infrastructure needs are daunting. It is also not obvious that Europeans are in the mood for a grand centralising project. So it is unsurprising that Mr Sefcovic's proposal falls some way short of his rhetoric. But it is a start. ■

Dated: January 30, 2015

NOTICE REGARDING COMMENCEMENT OF A JUDICIAL INSTRUCTION PROCEEDING IN CONNECTION WITH THE ACCEPTANCE OF THE SETTLEMENT AGREEMENT DATED AS OF APRIL 7, 2014, AS MODIFIED (THE "SETTLEMENT AGREEMENT"), FROM CITIGROUP INC. AND ITS DIRECT AND INDIRECT SUBSIDIARIES ("CITIGROUP").

NOTICE IS HEREBY GIVEN BY:

**Deutsche Bank National Trust Company
HSBC Bank USA, National Association
Law Debenture Trust Company of New York
U.S. Bank National Association**

**EACH, IN ITS CAPACITY AS TRUSTEE, INDENTURE TRUSTEE, SEPARATE TRUSTEE, AND/OR SUCCESSOR TRUSTEE OF THE
ACCEPTING TRUSTS AND LOAN GROUPS (DEFINED BELOW) (COLLECTIVELY, THE "RMBS TRUSTEES" AND EACH AN "RMBS
TRUSTEE"), TO THE HOLDERS OF CERTIFICATES, NOTES OR OTHER SECURITIES (THE "CERTIFICATEHOLDERS") OF THE RESIDENTIAL
MORTGAGE-BACKED SECURITIZATION TRUSTS AND LOAN GROUPS IDENTIFIED IN EXHIBIT A HERETO (THE "ACCEPTING TRUSTS
AND LOAN GROUPS," WHICH ARE FURTHER IDENTIFIED BY CUSIP NUMBERS ON THE RMBS TRUSTEES' WEBSITE)¹ AND OTHER
PERSONS POTENTIALLY INTERESTED IN THE ACCEPTING TRUSTS AND LOAN GROUPS.**

**THE ACCEPTANCE OF THE SETTLEMENT AGREEMENT COULD MATERIALLY AFFECT THE INTERESTS OF THE CERTIFICATEHOLDERS.
CERTIFICATEHOLDERS AND OTHER NOTICE RECIPIENTS SHOULD READ THIS NOTICE AND THE MATERIALS REFERENCED HEREIN
CAREFULLY IN CONSULTATION WITH THEIR LEGAL AND FINANCIAL ADVISORS.**

**THIS NOTICE CONTAINS IMPORTANT INFORMATION FOR THE CERTIFICATEHOLDERS AND OTHER PERSONS POTENTIALLY
INTERESTED IN THE RMBS TRUSTS. ALL DEPOSITORYES, CUSTODIANS AND OTHER INTERMEDIARIES RECEIVING THIS NOTICE,
AS APPLICABLE, ARE REQUESTED TO EXPEDITE THE RE-TRANSMITTAL OF THIS NOTICE TO CERTIFICATEHOLDERS IN A
TIMELY MANNER.**

This notice is given to you by the RMBS Trustees under certain applicable Pooling and Servicing Agreements or other similar agreements governing the Accepting Trusts and Loan Groups (the "Governing Agreements"). Capitalized terms used in this notice and not otherwise defined have the meanings assigned to them in the Settlement Agreement.

ACCEPTANCE OF THE SETTLEMENT AGREEMENT

In notices to Certificateholders dated December 19, 2014 and December 31, 2014 (the "Notices"), the RMBS Trustees informed Certificateholders that they had notified Citigroup that, following an evaluation process in which the RMBS Trustees, among other things, considered reports prepared by expert advisors, the RMBS Trustees each accepted the Settlement Agreement with respect to the Accepting Trusts and Loan Groups within such trusts, subject to Final Court Approval through a judicial instruction proceeding as set forth in Section 2.03(c) of the Settlement Agreement. The RMBS Trustees' acceptance of the Settlement Agreement extended the Tolling Period for the Accepting Trusts and Loan Groups as set forth in Section 2.04 of the Settlement Agreement.

The execution version of the Settlement Agreement is available on the RMBS Trustees' Website within the tab entitled "Certain Relevant Documents" (available at: http://www.citigrouprmbssettlement.com/pdflib/Citigroup_RMBSTrust_Settlement_Agreement_EXECUTION_VER.pdf). Copies of the Notices are posted on the RMBS Trustees' Website within the tab entitled "Notices" (available at <http://www.citigrouprmbssettlement.com/notice.php>).

ARTICLE 77 PROCEEDING AND IMPLICATIONS UPON THE EFFECTIVE DATE OF THE SETTLEMENT AGREEMENT

The RMBS Trustees have commenced a judicial instruction proceeding pursuant to CPLR § 7701, *In the Matter of the Application of U.S. Bank National Association, et al.*, (Index No. 653902/2014) (the "Article 77 Proceeding"), in the Supreme Court of the State of New York, County of New York (the "Court"). In the Article 77 Proceeding, the RMBS Trustees are seeking a judgment that (i) the RMBS Trustees' acceptance of the Settlement Agreement on behalf of the Accepting Trusts and Loan Groups was a reasonable and good faith exercise of the RMBS Trustees' authority under the applicable Governing Agreements, and (ii) barring Certificateholders from asserting claims against the RMBS Trustees with respect to the RMBS Trustees' evaluation and acceptance of the Settlement Agreement and implementation of the Settlement Agreement in accordance with its terms. Such a judgment, if granted, would constitute, after becoming final and non-appealable (including the expiration of any time to apply for discretionary review), "Final Court Approval" under and as defined in the Settlement Agreement.

On January 28, 2015, the Court entered an Order to Show Cause (available at http://www.citigrouprmbssettlement.com/pdflib/41_Order_to_Show_Cause.pdf) approving a notice program and directing that, among other things:

- a hearing (the "Article 77 Hearing") will be held on May 19, 2015 at 10 a.m. at the Supreme Court of the State of New York, County of New York, 60 Centre Street, New York, New York 10007;
- any Certificateholder or other person potentially interested in the Accepting Trusts and Loan Groups may object to or support any aspect of the Settlement Agreement and request to be heard at the Article 77 Hearing by submitting a written notice prior to the Article 77 Hearing in the manner required by the Court;
- any objections to, or submissions in favor of, the Settlement Agreement must be filed with the Court and served upon the RMBS Trustees' counsel by April 17, 2015;
- any responses to objections or submissions in favor of, or with respect to, the Settlement Agreement, must be filed and served by May 4, 2015;
- any Certificateholder who fails to object in the manner required by the Court shall be deemed to have waived the right to object (including any right of appeal) and shall be forever barred from raising such objection before the Court or in any other action or proceeding, unless the Court orders otherwise; and
- the Court retains jurisdiction over the RMBS Trustees, the Accepting Trusts and Loan Groups and all Certificateholders (and their successors-in-interests, assigns or transferees) for all matters related to the Settlement Agreement and the Article 77 Proceeding.

Following the Article 77 Hearing, the Court will determine, among other things, whether to grant the requested judgment and will consider other important matters described in the Settlement Agreement. If the Court grants the requested judgment, and such judgment becomes final and non-appealable (including the expiration of any time to apply for discretionary review), and if the other conditions to Final Court Approval and the effectiveness of the Settlement Agreement are satisfied, (i) the Settlement Agreement will become effective and (ii) all Certificateholders will be bound by the Settlement Agreement regardless of whether they appeared in the Article 77 Proceeding or submitted any objection to the Settlement Agreement. On its Effective Date, the Settlement Agreement will affect the rights and interests of all Certificateholders (and their successors-in-interests, assigns or transferees) in the Accepting Trusts and Loan Groups, including by, among other things, releasing claims against Citigroup on behalf of the Accepting Trusts and Loan Groups arising out of or relating to the Rep and Warranty Claims. Please refer to the Settlement Agreement for a complete description of the releases provided for therein.

All papers filed on the public docket for the Article 77 Proceeding have been made available on the RMBS Trustees' Website within the tab entitled "Court Documents - New York State Court Proceeding" (available at <http://www.citigrouprmbssettlement.com/NYcourt.php>), which will be updated periodically to include any new filings. You should

also be able to obtain any documents filed with the Court by visiting the e-Courts tab within the Court's website (available at: <http://www.nycourts.gov/>).

Certificateholders should NOT direct inquiries to the Court or the Clerk of the Court. If you have any questions, you may call (855) 382-6442 (toll-free) or (614) 779-0359, or send an email to Questions@citigrouprbstrueesettlement.com.

OTHER MATTERS

This notice references certain terms of the Settlement Agreement and the Article 77 Proceeding and is not a complete summary or statement of the material terms thereof, of relevant law or of relevant legal procedures. Certificateholders and other potentially interested persons are urged to review carefully the Settlement Agreement and to consider its implications, including the releases of the Rep and Warranty Claims.

Certificateholders and other persons interested in the Accepting Trusts and Loan Groups should not rely on the RMBS Trustees, their counsel, experts or other advisors retained by the RMBS Trustees, as their sole source of information. Certificateholders and other potentially interested persons are urged to consult with their own legal and financial advisors.

Please note that this notice is not intended and should not be construed as investment, accounting, financial, legal, tax or other advice by or on behalf of the RMBS Trustees, or their directors, officers, affiliates, agents, attorneys or employees. Each person or entity receiving this notice should seek the advice of its own advisors in respect of all matters set forth herein.

Please be further advised that each of the RMBS Trustees reserves all of the rights, powers, claims and remedies available to it under the Governing Agreements and applicable law. No delay or forbearance by an RMBS Trustee to exercise any right or remedy accruing upon the occurrence of a default, or otherwise under the terms of the Governing Agreements,

other documentation relating thereto or under applicable law, shall impair any such right or remedy or constitute a waiver thereof or an acquiescence therein.

Each of the RMBS Trustees expressly reserves all rights in respect of each applicable Governing Agreement, including without limitation its right to recover in full its fees and costs (including, without limitation, fees and costs incurred or to be incurred by such RMBS Trustee in performing its duties, indemnities owing or to become owing to such RMBS Trustee, compensation for such RMBS Trustee's time spent and reimbursement for fees and costs of counsel and other agents it employs in performing its duties or to pursue remedies) and its right, prior to exercising any rights or powers in connection with any applicable Governing Agreement at the request or direction of any Certificateholder, to receive security or indemnity satisfactory to it against all costs, expenses and liabilities that might be incurred in compliance therewith, and all rights that may be available to it under applicable law or otherwise.

Deutsche Bank National Trust Company

HSBC Bank USA, National Association
Law Debenture Trust Company of New York
U.S. Bank National Association

each acting in its capacity as trustee, separate trustee, successor trustee, or other similar capacities of the RMBS Trusts

¹ CUSIP numbers appearing on the website maintained by the RMBS Trustees located at <http://www.citigrouprbstrueesettlement.com> (the "RMBS Trustees' Website") at the tab entitled "List of RMBS Trusts" (available at http://www.citigrouprbstrueesettlement.com/pdflib/CGU%20Citigroup%20RMBS%20Trusts_6.13.14%20302pm.pdf) have been included solely for the convenience of the Certificateholders and pertain to trusts in addition to the Accepting Trusts and Loan Groups. The RMBS Trustees assume no responsibility for the selection or use of such CUSIP numbers and make no representations as to their correctness.

EXHIBIT A

List of Accepting Trusts and Loan Groups

Accepted subject to Final Court Approval through a judicial instruction proceeding as set forth in Section 2.03(c) of the Modified Proposed Settlement Agreement

| | | | | |
|---|---------------------------|---------------------------|----------------------------|----------------------------|
| U.S. Bank National Association, as Trustee | CMLTI 2005-6 Group I | CMLTI 2006-AR3 Group 1-1 | CMLTI 2006-NCB1 Group I | CMLTI 2007-AR4 Group 1 |
| CMLTI 2005-1 Group I | CMLTI 2005-6 Group II | CMLTI 2006-AR3 Group 1-2 | CMLTI 2006-NCB1 Group II | CMLTI 2007-AR4 Group 2-1 |
| CMLTI 2005-1 Group II-1 | CMLTI 2005-6 Group III | CMLTI 2006-AR3 Group 2-1 | CMLTI 2006-WF1 Group I | CMLTI 2007-AR4 Group 2-2 |
| CMLTI 2005-1 Group II-2 | CMLTI 2005-7 Group 1-1 | CMLTI 2006-AR3 Group 2-2 | CMLTI 2006-WF1 Group II | CMLTI 2007-AR4 Group 2-3 |
| CMLTI 2005-1 Group III | CMLTI 2005-7 Group 1-2 | CMLTI 2006-AR3 Group 2-3 | CMLTI 2006-WF2 Group I | CMLTI 2007-AR5 Group 1-1 |
| CMLTI 2005-10 Group I-1 | CMLTI 2005-7 Group 1-3 | CMLTI 2006-AR3 Group 2-4 | CMLTI 2006-WF2 Group II | CMLTI 2007-AR5 Group 1-2 |
| CMLTI 2005-10 Group I-2 | CMLTI 2005-7 Group 1-4 | CMLTI 2006-AR5 Group 1-1 | CMLTI 2006-WFH1 Total Pool | CMLTI 2007-AR5 Group 1-3 |
| CMLTI 2005-10 Group I-3 | CMLTI 2005-7 Group II-1 | CMLTI 2006-AR5 Group 1-2 | CMLTI 2006-WFH2 Total Pool | CMLTI 2007-AR5 Group 2-1 |
| CMLTI 2005-10 Group I-4 | CMLTI 2005-7 Group II-2 | CMLTI 2006-AR5 Group 1-3 | CMLTI 2006-WFH3 Total Pool | CMLTI 2007-AR5 Group 2-2 |
| CMLTI 2005-10 Group I-5 | CMLTI 2005-7 Group II-3 | CMLTI 2006-AR5 Group 1-4 | CMLTI 2006-WFH4 Total Pool | CMLTI 2007-AR7 Group 1 |
| CMLTI 2005-10 Group II | CMLTI 2005-7 Group II-4 | CMLTI 2006-AR5 Group 1-5 | CMLTI 2006-WMC1 Group I | CMLTI 2007-AR7 Group 5 |
| CMLTI 2005-11 Group I | CMLTI 2005-7 Group II-5 | CMLTI 2006-AR5 Group 1-6 | CMLTI 2006-WMC1 Group II | CMLTI 2007-AR8 Group 1-1 |
| CMLTI 2005-11 Group II | CMLTI 2005-8 Group I-1 | CMLTI 2006-AR5 Group 1-7 | CMLTI 2007-10 Group 1 | CMLTI 2007-AR8 Group 1-2 |
| CMLTI 2005-11 Group III | CMLTI 2005-8 Group I-2 | CMLTI 2006-AR5 Group 2-1 | CMLTI 2007-10 Group 2-1 | CMLTI 2007-AR8 Group 1-3 |
| CMLTI 2005-2 Group I-1 | CMLTI 2005-8 Group I-3 | CMLTI 2006-AR5 Group 2-2 | CMLTI 2007-10 Group 2-2 | CMLTI 2007-AR8 Group 2 |
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| CMLTI 2005-2 Group I-5 | CMLTI 2005-9 Group I | CMLTI 2006-AR5 Group 2-6 | CMLTI 2007-10 Group 3-1 | CMLTI 2007-WFH1 Total Pool |
| CMLTI 2005-2 Group I-6 | CMLTI 2005-9 Group II-1 | CMLTI 2006-AR5 Group 2-7 | CMLTI 2007-10 Group 3-2 | CMLTI 2007-WFH2 Total Pool |
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| CMLTI 2005-2 Group II-2 | CMLTI 2005-9 Group II-3 | CMLTI 2006-AR6 Group 2 | CMLTI 2007-2 Group 1 | CMLTI 2007-WFH4 Group I |
| CMLTI 2005-3 Group I | CMLTI 2005-HE1 Group I | CMLTI 2006-AR7 Group 1-1 | CMLTI 2007-2 Group 2 | CMLTI 2007-WFH4 Group II |
| CMLTI 2005-3 Group II-1 | CMLTI 2005-HE1 Group II | CMLTI 2006-AR7 Group 1-2 | CMLTI 2007-6 Group 1-1 | CMLTI 2008-2 Group I |
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| CMLTI 2005-3 Group III | CMLTI 2005-HE4 Group I | CMLTI 2006-AR7 Group 2-2 | CMLTI 2007-6 Group 2 | |
| CMLTI 2005-4 Total Pool | CMLTI 2005-HE4 Group II | CMLTI 2006-AR7 Group 2-3 | CMLTI 2007-AHL1 Group I | |
| CMLTI 2005-5 Group I-1 | CMLTI 2005-WF1 Total Pool | CMLTI 2006-AR7 Group 2-4 | CMLTI 2007-AHL1 Group II | |
| CMLTI 2005-5 Group I-2 | CMLTI 2005-WF2 Group I | CMLTI 2006-AR9 Group 1 | CMLTI 2007-AHL2 Group II | |
| CMLTI 2005-5 Group I-3 | CMLTI 2005-WF2 Group II | CMLTI 2006-AR9 Group 2 | CMLTI 2007-AHL3 Group I | |
| CMLTI 2005-5 Group I-4 | CMLTI 2006-4 Group II | CMLTI 2006-FX1 Total Pool | CMLTI 2007-AHL3 Group II | |
| CMLTI 2005-5 Group I-5 | CMLTI 2006-4 Group I | CMLTI 2006-HE1 Total Pool | CMLTI 2007-AHL3 Group III | |
| CMLTI 2005-5 Group II-1 | CMLTI 2006-AMC1 Group I | CMLTI 2006-HE2 Group I | CMLTI 2007-AMC1 Group I | |
| CMLTI 2005-5 Group II-2 | CMLTI 2006-AMC1 Group II | CMLTI 2006-HE2 Group II | CMLTI 2007-AMC1 Group II | |
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| CMLTI 2005-5 Group III-1 | CMLTI 2006-AR1 Group II | CMLTI 2006-HE3 Group II | CMLTI 2007-AMC2 Group III | |
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| CMLTI 2005-5 Group III-3 | CMLTI 2006-AR2 Group I-1 | CMLTI 2006-NC1 Group II | CMLTI 2007-AMC4 Group I | |
| CMLTI 2005-5 Group III-4 | CMLTI 2006-AR2 Group I-2 | CMLTI 2006-NC2 Group I | CMLTI 2007-AMC4 Group II | |
| CMLTI 2005-5 Group III-5 | CMLTI 2006-AR2 Group II | CMLTI 2006-NC2 Group II | CMLTI 2007-AR1 Total Pool | |
| Deutsche Bank National Trust Company, as Trustee | | | | |
| CMLTI 2005-OPT1 Total Pool | | | | |
| CMLTI 2005-OPT3 Total Pool | | | | |
| HSBC Bank USA, National Association as Trustee | | | | |
| CMLTI 2005-HE2 Total Pool | | | | |
| CMLTI 2005-SHL1 Total Pool | | | | |
| CMLTI 2007-SHL1 Total Pool | | | | |
| Law Debenture Trust Company of New York, as Separate Trustee | | | | |
| CMLTI 2005-OPT4 Group I | | | | |
| CMLTI 2005-OPT4 Group II | | | | |
| CMLTI 2006-SHL1 Total Pool | | | | |



The Liberal Democrats

A cold shower

CHELTENHAM

To survive as a party of government, the Lib Dems must hold south-west England. They probably won't

IN OTHERWISE sedate Cheltenham, a Regency spa town known chiefly for horse-racing, a girls boarding school and Britain's signals intelligence agency, one subject boils the blood: the A417. The single-lane road leading into the Cotswold hills is almost always jammed. "It's a huge issue locally. Huge. Huge," proclaims one Cheltonian in the Air Balloon pub. "We had five accidents up there on race day," sighs another. Improbably enough, the politics of such a banal local issue could determine who runs Britain.

No party emerged from the 2010 election with a majority, so the largest, the Conservatives, had to form a coalition with the third-largest, the centrist Liberal Democrats. The result of the general election on May 7th could be even more finely balanced. The Tories and the Labour Party are neck-and-neck in polls. The Liberal Democrats have been badly burned by the compromises they have had to make as a junior coalition partner: after winning 23% of the overall vote in 2010, the party reached a new low of 5% in a YouGov poll published on March 4th (see chart).

The Lib Dems are bracing themselves for the loss of many of their 56 seats in the House of Commons. The party's footholds in the north of England and Scotland will probably crumble, so unpopular is its deal with the Conservatives in those left-leaning parts. But it is fighting hard in southern England, knowing there is a big difference

between holding on to, say, 30 seats and salvaging half that number. The more seats the party holds, the more useful it is as a coalition partner for Labour or the Tories.

Its fate will be decided largely among the rolling hills of south-west England. The Lib Dems have 15 seats there, more than in any other region. The lack of heavy industry (and thus of a Labour Party with deep roots) has long made them the main alternative to the Conservatives. They control comfortable settlements like Cheltenham and Bath as well as farming areas (see map on next page).

Liberal Democrats and Tories both reckon that the kind of battle that takes place in these seats will determine who wins them. Campaigns defined by local politics will

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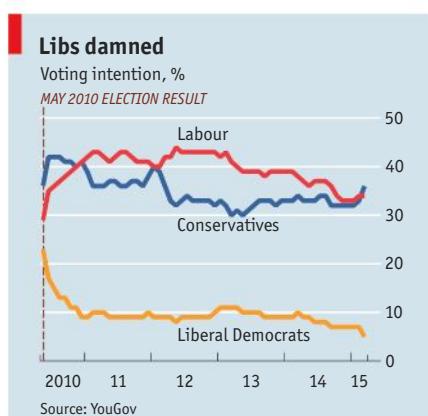
probably return Lib Dem MPs. Those defined by the choice between a Tory-led government and a Labour-led one will probably see the Conservatives prevail.

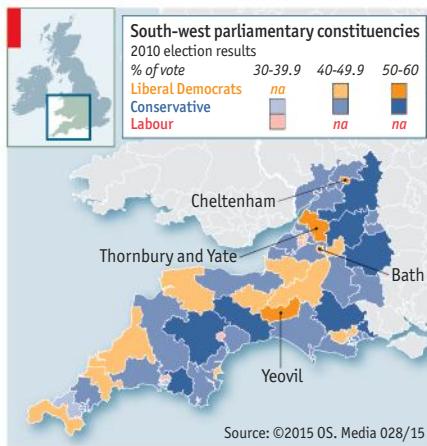
Hence the importance of the A417. Martin Horwood, Cheltenham's Lib Dem MP, is fighting hard on the issue of roads: pictures of rain-flooded potholes (complete with rubber ducks, for scale) dominate his electoral literature. His newsletter to residents hails the good news that the coalition government will widen the A417. Lib Dems reckon that even if voters loathe the party's leaders in Westminster, they will back local champions like Mr Horwood. Polling bears this out: support for a Lib Dem MP typically jumps by around eight percentage points when respondents are reminded of his or her name.

To dislodge these street fighters, the Conservatives are attempting to do two things. Their first task is to neutralise the Lib Dems' local advantages. Thus the local Tory candidate, Alex Chalk, also claims credit for the A417 expansion: his leaflets describe how he personally lobbied the prime minister for the £255m (\$390m) of funding subsequently released. He talks of using Cheltenham's spook credentials to attract cyber-security jobs.

The Tories' second task is to convince voters that the battle is not entirely parochial, but is also about the government of Britain. David Cameron, much the most popular of the party leaders, will tour the region in the run-up to the election. Pictures of Nick Clegg, the Liberal Democrats' unpopular chief, are splattered across Conservative leaflets. Surveying focus-group results, one Tory strategist cannot believe his party's luck in having Mr Clegg for a rival: "Voters hate him so, so much."

The Liberal Democrats are confident that they can hang on in the south-west nonetheless. Britain's first-past-the-post ➤





► electoral system has long punished them for having geographically dispersed voters. But their popularity has fallen disproportionately in seats they did not win in 2010, so their support—though much smaller—is now more efficiently distributed. In short, the picture in their constitu-

uencies is less gloomy than the national one. Lib Dem activists also speak in reverential tones of Connect, the snazzy American software programme, based on one used by Barack Obama, which enables the party to pinpoint voters' concerns and target its campaigning accordingly.

Still, the Tories will probably win most of the 15 seats. A study by YouGov for the Times newspaper in January found that the Lib Dems' support in the region had fallen from 35% in 2010 to 16%. Even factoring in their ability to cling on in places they hold, they would require "a heck of an incumbency bonus", says Peter Kellner, YouGov's president. He reckons that the Lib Dem could lose all but their three strongest seats (Thornbury & Yate, Bath and Yeovil) in the region, including Cheltenham. In most, they have a fairly small majority. Combined with a hated leader and dynamic Tory challengers like Mr Chalk, that will prove Mr Kellner more right than wrong. Lib Dems are excellent campaigners. But they cannot defy gravity. ■

"defensive jihad" is "not antithetical to human rights".

Ms Sahgal, who later co-founded a group called the Centre for Secular Space, returned to the fray this month after the revelation of Cage's connection to Mr Emwazi and its blaming of MI5 for his radicalisation and brutality. She also chided Amnesty International for letting Cage (along with seven other human-rights groups) co-sign a letter in December to David Cameron, the prime minister, calling for a judge-led inquiry into Britain's alleged involvement in the rendition and torture of Islamist terrorist suspects.

Far from being a genuine human-rights group, says Ms Sahgal, Cage is "completely poisonous", promoting an ideology that mocks the values of tolerance, especially towards women. "Immense damage has been done to Amnesty," she says, "not least because they won't come clean about their association with Cage." Yet Amnesty has "taken their research from them, they have shared logos with them, they have produced briefing papers together, signed letters to the government together."

Amnesty hotly denies it is too close to Cage or endorses its ideology, though a spokesman says it is "highly unlikely" it would now sign a joint letter with it. Still, Amnesty may need to ponder the scope of its advocacy and the sort of allies with whom it is willing to team up. Some "agonising" is said to be taking place. Lord (Alex) Carlile, a long-term Amnesty supporter who for more than nine years was Britain's Independent Reviewer of Terrorism Legislation, said the organisation had been "extremely unwise and lacking in critical faculty" by associating itself with Cage, whose reputation had been "damaged beyond repair". Amnesty's, he reckons, could be rescued, but it must hurry. ■

Amnesty International and jihad

A reputation at risk

The weightiest human-rights outfit has waded into a moral quagmire

REPORTS that "Jihadi John", a particularly ghastly member of the Islamic State who has been identified as the beheader of at least five Western hostages in Syria, is a Briton named Mohammed Emwazi embarrassed several outfits. One of them was MI5, Britain's domestic security service, which had apparently interviewed him but then let him slip out of Britain. Another was Cage, a British Islamist outfit which had warm relations with Mr Emwazi. But the twitchiest reaction was at Amnesty International.

Cage caused the rumpus after one of its leading lights described Mr Emwazi as "kind", "gentle" and "a beautiful young man". Mr Emwazi's crimes, he explained, were partly due to harassment by MI5, which got onto Mr Emwazi in 2009 after he had been arrested in Tanzania, probably on his way to wage jihad in Somalia. Cage was widely barracked for that insinuation. And then so was Amnesty, because of its links to Cage.

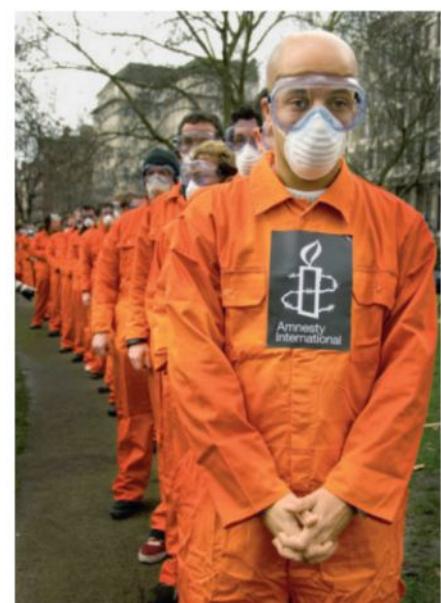
Amnesty was founded in 1961 with a mission to campaign for "prisoners of conscience", defined as those who have been locked up for expressing their views—emphatically without advocating violence. Since then it has grown into a huge organisation with more than 70 national chapters. Many thousands of prisoners and

people persecuted for their beliefs have benefited from Amnesty's courageous moral and practical support over the years. In 1977 it won the Nobel peace prize.

In the past decade or so Amnesty has widened its brief from human rights and torture into such matters as how to reduce poverty and limit the arms trade. (By contrast, Human Rights Watch, a pre-eminent New York-based monitoring group, has stuck closely to the mission for which it is named.) Amnesty has forged alliances and shared platforms with groups which do not necessarily share its original aims.

Controversy over Amnesty's relations with Cage goes back five years, when Gita Sahgal, a senior figure in Amnesty, was sacked for criticising her organisation's close ties to Moazzam Begg, a British former detainee of the Americans in Afghanistan and then in Guantánamo, and a director of Cage (formerly Cageprisoners).

Cage describes itself as "an independent advocacy organisation working to empower communities impacted by the war on terror." Ms Sahgal, however, has long argued that Cage is by no means a human-rights group but a promoter of violent jihad against the West and against non-Islamists in general. She has derided a claim by another former senior Amnesty figure a few years ago that Cage's promotion of



Speak no evil

Bagehot | The hunter and the hapless

The decade-old fox-hunting ban has irked countryfolk, spared few foxes and damaged politics



RISING on his stirrups, somewhere in the west of England, the huntsman issued the same statement he, impeccable in red coat and white stock, gives every Saturday morning of the season. "We will hunt today within the law," he told the assembled riders, who were sipping from tiny port glasses astride their champing steeds, with hounds boiling beneath them. He said it with a straight face, too, and no hint of a blush.

A decade after the 400-year-old pursuit of hunting foxes with dogs was outlawed by a Labour government, it continues remarkably unchanged. None of England's and Wales's 175 fox-hound packs has been disbanded because of the ban; just as many people ride to them; and they probably still kill thousands of foxes a year. The hunt Bagehot visited had killed three in mid-week, two the previous Saturday, and, by the time the season ends later this month, expects to have dispatched its customary tally of around 140 foxes. Only Prince Charles and the Tory prime minister, David Cameron, they like to josh, have actually been forced to give up hunting because of the 2004 Hunting Act.

This is not a good advertisement for legislation. Yet, to appreciate the full force of the sham, recall, in wonder, the great ruptures between town and country, left and right, liberals and animal-welfare nuts, that preceded the ban. The march of 400,000 wax-jacketed pro-hunt protesters through London, the 700 hours of parliamentary debates devoted to the issue, the threat from Labour backbenchers to oppose all government business unless the ban was brought—it was madness. Even at the time, it seemed so: a dilettantish, illiberal, class-infused blot on what was otherwise a British golden age, for politics and the economy—as even the ban's reluctant main architect, Tony Blair, later admitted. A man not given to regrets, the then prime minister considered the ban one of his biggest. "God only knows," he reflected, what the point of it was.

Foxes are considered vermin by landowners, have a population inflated by modern farming techniques, and may be shot or snared by anyone—which is not clearly less cruel than hunting them with dogs. Nor was the ban a blow for class warfare, contrary to the belief of many Labour antis, who considered the "so-called sport" an exclusive preserve of cruel toffs. It never was. And by then fox-hunting, with village cricket and the Sunday ser-

vice, was a fading vestige of the class-based, yet not wholly class-bound way of much of British rural society for centuries.

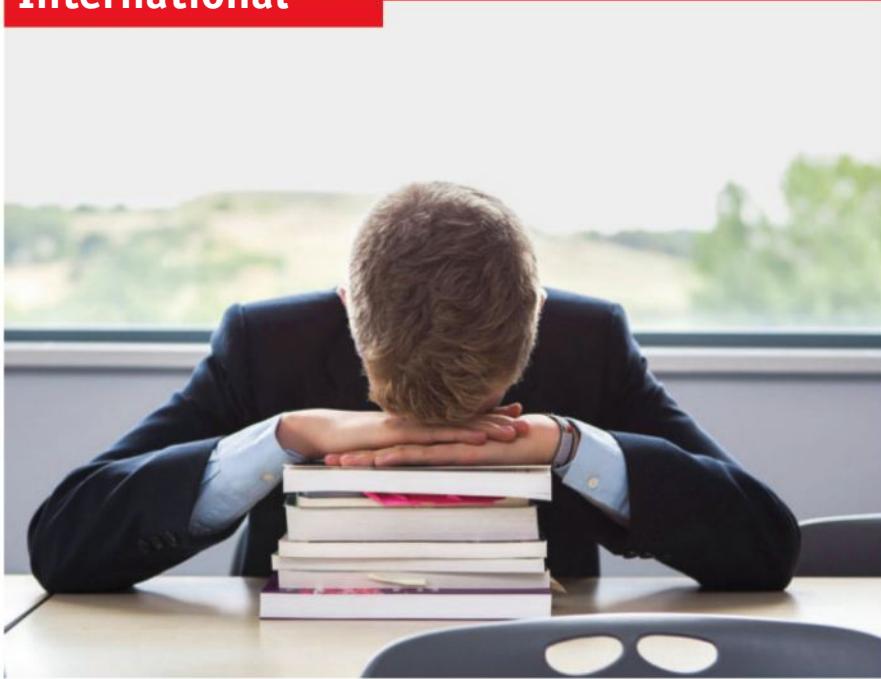
"If the French nobility had been capable of playing cricket with their peasants, their chateaux would never have been burnt," the historian G.M. Trevelyan wrote. Had they ridden to hounds with their tenants, as 19th-century English gentlemen huntsmen did, then cheered them as they sent in the terriers, it might also have helped their cause. Perhaps it is a sign of how eternal Britons once considered their absurd class distinctions that they were comfortable with such mixing. Nonetheless, it was positive—as that devotee of the Cheshire Hounds, Friedrich Engels, appreciated. The author of the "Communist Manifesto" of 1848 considered fox-hunting "the greatest physical pleasure I know", the apogee of English culture and, less convincingly, a source of useful ideas for managing the revolution.

What lessons should be drawn from this farrago? The obvious one is that politicians make the laws they deserve. Ill-conceived and illogical, the ban is unworkable. It allows hunts to follow an artificial scent-trail—because an outright ban could criminalise anyone taking his pet dog for a walk in the country. And because it would not be illegal for that pooh to kill, peradventure, a fox, it follows that if the hounds veer onto a real scent and make a kill, no law has been broken. The huntsman who welcomed your columnist explained that, in practice, this means that before a hunt one of his helpers films himself laying a pretend scent-trail—by dragging a rag theoretically, but not actually, soaked in fox scent, from a quad bike—to provide evidence for a possible defence in court. Then the hunt goes out and hunts as it always has, but illegally. The police—one of whose officers was riding with the hounds that wintry day—understand this, but do not much care. Animal rights activists know it, and it makes them mad, but it is so hard to collect evidence of lawbreaking, in the form of video footage showing a huntsman urging hounds on to a fox, that prosecutions are rare. Only a couple of dozen huntsmen have been convicted for contravening the ban, for which they mostly received small fines.

Going to ground

Your columnist, though he has never wanted to kill a fox, is cheered by this. It suggests the resilience of an interesting aspect of English culture, whatever social change and meddlers throw at it, for the good reasons that it is successful and loved. That is also why Steve, a well-built yokel who lays the fraudulent scent-trails, refers to the huntsman as "Sir". It is his culture he respects; not, as Labour's class-warriors might assume, a poshly spoken superior. As an expression of a similar commitment, Bagehot also enjoyed, he confesses, the explanation John, a retired terrierman, gave for there being no antis about that day. Was it because the country was remote? "No," he said. "It's cause we bashed 'em."

But it won't do. The cost of the ban, one of Mr Blair's best-remembered legacies, goes beyond the trouble and money wasted on it. The disdain Britons reserve for politicians is fuelled by doubts about their efficacy as well as their motives, and the ban invites both. Many rural folk consider it malicious; semi-interested townies tend to approve of it, which is why it may never be repealed, but must also note the ineptitude it represents. That is bad for politicians of all stripes; and the Labour crusaders responsible for the mess should reflect on it. In banning hunting they thought to weaken a reviled establishment, and so they have; but the establishment in question, it turns out, includes themselves. ■



Gender, education and work

The weaker sex

Boys are being outclassed by girls at both school and university, and the gap is widening

“IT’S all to do with their brains and bodies and chemicals,” says Sir Anthony Seldon, the master of Wellington College, a posh English boarding school. “There’s a mentality that it’s not cool for them to perform, that it’s not cool to be smart,” suggests Ivan Yip, principal of the Bronx Leadership Academy in New York. One school charges £25,000 (\$38,000) a year and has a scuba-diving club; the other serves subsidised lunches to most of its pupils, a quarter of whom have special needs. Yet both are grappling with the same problem: teenage boys are being left behind by girls.

It is a problem that would have been unimaginable a few decades ago. Until the 1960s boys spent longer and went further in school than girls, and were more likely to graduate from university. Now, across the rich world and in a growing number of poor countries, the balance has tilted the other way. Policymakers who once fretted about girls’ lack of confidence in science now spend their time dangling copies of “Harry Potter” before surly boys. Sweden has commissioned research into its “boy crisis”. Australia has devised a reading pro-

gramme called “Boys, Blokes, Books & Bytes”. In just a couple of generations, one gender gap has closed, only for another to open up.

The reversal is laid out in a report published on March 5th by the OECD, a Paris-based rich-country think-tank. Boys’ dominance just about endures in maths: at age 15 they are, on average, the equivalent of three months’ schooling ahead of girls. In science the results are fairly even. But in reading, where girls have been ahead for some time, a gulf has appeared. In all 64 countries and economies in the study, girls outperform boys. The average gap is equivalent to an extra year of schooling.

xx>xy?

The OECD deems literacy to be the most important skill that it assesses, since further learning depends on it. Sure enough, teenage boys are 50% more likely than girls to fail to achieve basic proficiency in any of maths, reading and science (see chart 1). Youngsters in this group, with nothing to build on or shine at, are prone to drop out of school altogether.

To see why boys and girls fare so differently in the classroom, first look at what they do outside it. The average 15-year-old girl devotes five-and-a-half hours a week to homework, an hour more than the average boy, who spends more time playing

video games and trawling the internet. Three-quarters of girls read for pleasure, compared with little more than half of boys. Reading rates are falling everywhere as screens draw eyes from pages, but boys are giving up faster. The OECD found that, among boys who do as much homework as the average girl, the gender gap in reading fell by nearly a quarter.

Once in the classroom, boys long to be out of it. They are twice as likely as girls to report that school is a “waste of time”, and more often turn up late. Just as teachers used to struggle to persuade girls that science is not only for men, the OECD now urges parents and policymakers to steer boys away from a version of masculinity that ignores academic achievement. “There are different pressures on boys,” says Mr Yip. “Unfortunately there’s a tendency where they try to live up to certain expectations in terms of [bad] behaviour.”

Boys’ disdain for school might have been less irrational when there were plenty of jobs for uneducated men. But those days have long gone. It may be that a bit of swagger helps in maths, where confidence plays a part in boys’ lead (though it sometimes extends to delusion: 12% of boys told the OECD that they were familiar with the mathematical concept of “subjunctive scaling”, a red herring that fooled only 7% of girls). But their lack of self-discipline drives teachers crazy.

Perhaps because they can be so insufferable, teenage boys are often marked down. The OECD found that boys did much better in its anonymised tests than in teacher assessments. The gap with girls in reading was a third smaller, and the gap in maths—where boys were already ahead—opened up further. In another finding that suggests a lack of even-handedness among teachers, boys are more likely than girls to be forced to repeat a year, even when they are of equal ability.

What is behind this discrimination? One possibility is that teachers mark up students who are polite, eager and stay out of fights, all attributes that are more common among girls. In some countries, aca- ►

Bad boys

15-year-olds who are low achievers in all subjects*
% of total, 2012



► demic points can even be docked for bad behaviour. Another is that women, who make up eight out of ten primary-school teachers and nearly seven in ten lower-secondary teachers, favour their own sex, just as male bosses have been shown to favour male underlings. In a few places sexism is enshrined in law: Singapore still canes boys, while sparing girls the rod.

Some countries provide an environment in which boys can do better. In Latin America the gender gap in reading is relatively small, with boys in Chile, Colombia, Mexico and Peru trailing girls less than they do elsewhere. Awkwardly, however, this nearly always comes with a wider gender gap in maths, in favour of boys. The reverse is true, too: Iceland, Norway and Sweden, which have got girls up to parity with boys in maths, struggle with uncomfortably wide gender gaps in reading. Since 2003, the last occasion when the OECD did a big study, boys in a few countries have caught up in reading and girls in several others have significantly narrowed the gap in maths. No country has managed both.

Onwards and upwards

Girls' educational dominance persists after school. Until a few decades ago men were in a clear majority at university almost everywhere (see chart 2), particularly in advanced courses and in science and engineering. But as higher education has boomed worldwide, women's enrolment has increased almost twice as fast as men's. In the OECD women now make up 56% of students enrolled, up from 46% in 1985. By 2025 that may rise to 58%.

Even in the handful of OECD countries where women are in the minority on campus, their numbers are creeping up. Meanwhile several, including America, Britain and parts of Scandinavia, have 50% more women than men on campus. Numbers in many of America's elite private colleges are more evenly balanced. It is widely believed that their opaque admissions criteria are relaxed for men.

The feminisation of higher education was so gradual that for a long time it passed unremarked. According to Stephan Vincent-Lancrin of the OECD, when in 2008 it published a report pointing out just how far it had gone, people "couldn't believe it".

Women who go to university are more likely than their male peers to graduate, and typically get better grades. But men and women tend to study different subjects, with many women choosing courses in education, health, arts and the humanities, whereas men take up computing, engineering and the exact sciences. In mathematics women are drawing level; in the life sciences, social sciences, business and law they have moved ahead.

Social change has done more to encourage women to enter higher education than any deliberate policy. The Pill and a decline

in the average number of children, together with later marriage and childbearing, have made it easier for married women to join the workforce. As more women went out to work, discrimination became less sharp. Girls saw the point of study once they were expected to have careers. Rising divorce rates underlined the importance of being able to provide for yourself. These days girls nearly everywhere seem more ambitious than boys, both academically and in their careers. It is hard to believe that in 1900-50 about half of jobs in America were barred to married women.

So are women now on their way to becoming the dominant sex? Hanna Rosin's book, "The End of Men and the Rise of Women", published in 2012, argues that in America, at least, women are ahead not only educationally but increasingly also professionally and socially. Policymakers in many countries worry about the prospect of a growing underclass of ill-educated men. That should worry women, too: in the past they have typically married men in their own social group or above. If there are too few of those, many women will have to marry down or not at all.

According to the OECD, the return on investment in a degree is higher for women than for men in many countries, though not all. In America PayScale, a company that crunches incomes data, found that the return on investment in a college degree for women was lower than or at best the same as for men. Although women as a group are now better qualified, they earn about three-quarters as much as men. A big reason is the choice of subject: educa-

tion, the humanities and social work pay less than engineering or computer science. But academic research shows that women attach less importance than men to the graduate pay premium, suggesting that a high financial return is not the main reason for their further education.

At the highest levels of business and the professions, women remain notably scarce. In a reversal of the pattern at school, the anonymous and therefore gender-blind essays and exams at university protect female students from bias. But in the workplace, says Elisabeth Kelan of Britain's Cranfield School of Management, "traditional patterns assert themselves in miraculous ways". Men and women join the medical and legal professions in roughly equal numbers, but 10-15 years later many women have chosen unambitious career paths or dropped out to spend time with their children. Meanwhile men are rising through the ranks as qualifications gained long ago fade in importance and personality, ambition and experience come to matter more.

The last bastion

For a long time it was said that since women had historically been underrepresented in university and work, it would take time to fill the pipeline from which senior appointments were made. But after 40 years of making up the majority of graduates in some countries, that argument is wearing thin. According to Claudia Goldin, an economics professor at Harvard, the "last chapter" in the story of women's rise—equal pay and access to the best jobs—will not come without big structural changes.

In a recent paper in the *American Economic Review* Ms Goldin found that the difference between the hourly earnings of highly qualified men and their female peers grows hugely in the first 10-15 years of working life, largely because of a big premium in some highly paid jobs on putting in long days and being constantly on call. On the whole men find it easier than women to work in this way. Where such jobs are common, for example in business and the law, the gender pay gap remains wide and even short spells out of the workforce are severely penalised, meaning that motherhood can exact a heavy price. Where pay is roughly proportional to hours worked, as in pharmacy, it is low.

There will always be jobs where flexibility is not an option, says Ms Goldin: those of CEOs, trial lawyers, surgeons, some bankers and senior politicians come to mind. In many others, pay does not need to depend on being available all hours—and well-educated men who want a life outside work would benefit from change, too. But the new gender gap is at the other end of the pay spectrum. And it is not women who are suffering, but unskilled men. ■



Interactive: Our "glass-ceiling index" reveals the best and worst countries for equal treatment at work
Economist.com/glassceiling



Health care in America

Shock treatment

A wasteful and inefficient industry is in the throes of great disruption

THE best-known objective of America's Affordable Care Act of 2010—commonly known as Obamacare—was to ensure that the 40m-plus Americans who lacked health insurance could get it. Less widely appreciated, but at least as important, are the incentives and penalties the law introduced to make the country's hideously expensive and poorly performing health services safer and more efficient. Economists are debating how much credit Obamacare should get for a recent moderation in the growth of health costs, and for a fall in the number of patients having to be readmitted to hospital (see page 27). Whatever the answer, many companies see the disruption unleashed by the reforms as the business opportunity of a lifetime.

One of the biggest shifts under way is to phase out the “fee for service” model, in which hospitals and doctors’ surgeries are reimbursed for each test or treatment with no regard for the outcome, encouraging them to put patients through unnecessary and expensive procedures. Since Obamacare they are increasingly being paid by results—a flat fee for each successful hip replacement, say. There are also incentives for providers which meet cost or performance targets, and new requirements for hospitals to disclose their prices, which can vary drastically for no clear reason.

Millions of people are now looking for health insurance on the new public exchanges set up under the reforms. And

Obamacare has come into effect at a time when American employers, who often provide health cover for their workers, are seeking to cut its cost by encouraging them to shop around on private exchanges, and by offering less generous plans.

The upshot is that there are growing numbers of consumers seeking better treatment for less money. Existing health-care providers will have to adapt, or lose business. All sorts of other businesses, old and new, are seeking either to take market share from the conventional providers, or to provide the software and other tools that help hospitals, doctors, insurers and

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patients make the most of this new world.

Patients are increasingly having to pay higher “deductibles” out of their own pockets, before the insurance kicks in, to keep the cost of the cover down. So for minor ailments and simple tests, it makes sense for such patients to go to one of the increasing numbers of walk-in clinics, staffed by well-qualified nurses, on the premises of retail pharmacies such as CVS and Walgreens (see chart). The prices are clear, the care is cheap and the service is quick. Walgreens has a partnership with Theranos, a diagnostics firm, which offers customers a range of tests from a tiny drop of blood. Walmart, a giant supermarket chain with many in-store pharmacies, also intends to become one of the leading sellers of affordable health services, says Alex Hurd, its product-development chief.

For injuries and illnesses that are more serious but not immediately life-threatening, lots of “urgent-care centres” are being opened as an alternative to going to a hospital emergency unit. Private-equity firms are pouring money into independent chains of centres. Merchant Medicine, a consulting firm, reckons that between them, these chains now have just over 1,500 urgent-care centres, up from about 1,300 at the start of 2013. The market is still fragmented but a national brand could emerge from one of the largest chains, such as Concentra or MedExpress.

Some hospital operators, seeking to cut their costs of care, and choosing to be among the disrupters rather than the disrupted, are also opening urgent-care centres. Aurora Health Care, a Wisconsin-based chain of hospitals and clinics, now has more than 30 of them.

Hospital operators are now facing a classic “innovator’s dilemma”, as described by Clay Christensen, a Harvard business professor. If they persist with ►



► their high-cost business model even as their customers discover that cheaper alternatives are good enough, they will be in trouble. According to Strata Decision Technology, an analytics firm, many hospital groups saw what was coming and started to cut their costs well before the provisions of Obamacare started to bite. One of the fastest movers is Advocate Health Care, a hospital operator from Illinois, which says it now earns two-thirds of its revenues from value-based payments.

The largest chains of for-profit hospitals, such as Tenet Healthcare, HCA and Community Health Systems, are rather profitable. They have trimmed their costs, been conservative with capital and, thanks to Obamacare raising the number of Americans with health insurance, now have more patients and fewer bad debts. However, credit-rating agencies are worried about the prospects for the not-for-profit hospitals, which are 60% of the total. With lower margins, and less capital to make investments, they have become targets for takeover, says Jim Bonnette of The Advisory Board Company, another consulting outfit.

As a result further consolidation in the hospital business is likely. This could mean greater efficiency and lower costs. But if antitrust authorities are not vigilant, it may lead in the longer term to a concentration of market power. If so, the benefits from the efficiencies being wrung out of the hospital system may end up in the pockets of shareholders rather than saving patients and insurers money.

Obamacare is also encouraging the creation of all sorts of health-related advisory and intermediary companies that help care providers, insurers and patients save money. A company called Vitals approaches employees on behalf of their company's health plan, and offers them cash rewards, and a taxi, if they agree to be treated at a cheaper provider. The sums to be saved can be astonishing: a new cost-comparison tool created by Blue Cross Blue Shield, a big alliance of private health insurers, has found that a colonoscopy with a biopsy costs \$8,489 at one clinic in Chapel Hill, North Carolina, but just \$928 at another provider in Greensboro, only 50 miles (80km) or so away.

Cohealo offers a "sharing economy" solution for hospitals and clinics wanting to make the best use of expensive equipment, in much the same way as Airbnb helps people with spare rooms fill them with paying guests. Doximity is trying to be a Facebook for doctors, letting them refer patients and discuss treatments securely without the blizzard of faxes they rely on today. Grand Rounds is a sort of medical Match.com: an online matchmaker that pairs patients with specialists. As in other industries, administrators are being tempted to switch to renting software and data

storage in the online "cloud": Athenahealth, a seller of medical back-office software, is trying to get doctors and hospitals to move patients' health records onto its cloud-based service.

Preliminary diagnosis

For supporters of Obamacare, it is clear that the reforms are empowering patients, driving public and private health insurers to achieve better value, forcing existing providers to shape up and providing opportunities for disruptive newcomers. Digital technology is also helping to increase transparency about prices, making it easier to share information and increase efficiency. For some analysts it all adds up to a "new health economy"—as PwC, a con-

sulting firm, puts it—the most significant re-engineering of the American health system, by far the world's costliest, since employers began providing cover for their workers in the 1930s.

And the revolution has only just begun. The Obama administration recently set a target of making 50% of Medicare payments value-based, rather than fee for service, by the end of 2018. America's largest private payers have a target of 75% by 2020. So hospitals do not have long to shape up. Some will have their profits squeezed, and customers stolen by new rivals. Some may close, or be taken over. But for other businesses, from supermarket and pharmacy chains to digital-health startups, there will be billions to be made. ■

Berkshire Hathaway

Correspondorous

NEW YORK

Warren Buffett's 50th annual missive to his company's shareholders obfuscates rather than illuminates

THE annual letters Warren Buffett sends to shareholders of Berkshire Hathaway are among the most influential documents in business. For 50 years they have offered a ruthlessly honest review of the company he runs. In 1999 Mr Buffett reflected on the worst year of his tenure. "Even Inspector Clouseau could find last year's guilty party: your chairman." In his latest letter, released on February 28th, he admits making a "big mistake" by hanging on to shares in Tesco, a troubled British retailer.

The letters have also provided an unfailingly intelligent explanation of the broader principles of investing, stripped bare of mumbo-jumbo. Little wonder that they are read around the world. Guo Guangchang, the boss of Fosun Group, a Chinese conglomerate, is a fan. Jamie Dimon, the boss of JPMorgan Chase, models his own letters on the sage of Omaha's.

Yet Mr Buffett's 50th letter to shareholders is an exception, serving to muddy rather than clarify, for two reasons. First, because it does not tackle the questions

that hang over Berkshire's conglomerate model and its durability. Second, because of the uncharacteristic coyness with which Mr Buffett and his partner Charlie Munger—respectively aged 84 and 91—discuss how or when they will give up their jobs.

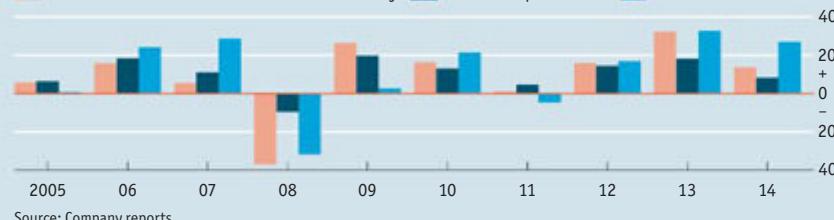
First, the conglomerate question. Berkshire has gradually shifted from being an investment vehicle that owns traded shares to a collection of wholly- or partly-owned businesses, such as Heinz, a food manufacturer. Listed equities now make up only 22% of Berkshire's assets, down from 72% in 1994. Mr Buffett offers a barnstorming defence of Berkshire as a conglomerate, which he says is sprawling, "and constantly trying to sprawl further." It buys businesses to hold on to them for ever, avoids getting involved in weak or hard-to-understand companies, gives managers autonomy, ignores the advice of investment bankers and keeps central overheads lower than a limbo stick. Berkshire's head office employs just 24 people.

But the letter offers little analysis on ►

Brought to book

% change on a year earlier

S&P 500 total return Berkshire Hathaway: book value per share market value



▶ how much of Berkshire's success is due to Mr Buffett rather than its business model. He makes "all major capital-allocation decisions", according to the statutory annual report. The culture that keeps managers happy surely owes a lot to him, as does Berkshire's reputation as a fine custodian, which is one reason why family-run firms like selling out to it. Mr Munger, who writes his own letter, insists that there is a "Berkshire system" that will endure his and his boss's eventual departure, but he posits rather than proves this.

Mr Buffet used to argue that Berkshire's book value per share, rather than its share price, was a good proxy for its long-term worth. But the group's book value has stopped outperforming the broader stock-market—in fact it has underperformed it in five of the past six years (see chart, previous page). So now Mr Buffet has begun to argue that book value is no longer such a good measure, and to give greater prominence to Berkshire's share price. This sort of goalpost-moving is a habit of lesser conglomerates than Berkshire, and is hardly a promising sign.

As for the succession question, the message is cryptic. In his letter Mr Buffet says that "I believe we now have the right person to succeed me," but declines to specify who that is. Mr Munger's letter is less vague than that message but not entirely consistent with it. He mentions two individuals, Ajit Jain (who runs the group's main insurance business) and Greg Abel (who is in charge of its energy business), who he says are "world-class" managers.

Despite his stated confidence in the next generation, Mr Buffet seems insecure about their likely performance. His letter all but pre-commits his successor to a fixed strategy, stating that no dividend or buy-backs are likely to occur for 10-20 years. He is keen for his son, Howard, to take over eventually as non-executive chairman, to act as a safeguard in case "the wrong chief executive should ever be employed". Mr Buffet owns about 34% of Berkshire's voting rights, but he has also pledged to give away much of his wealth—so it is unclear how much influence the family will have in the long run.

Berkshire has always been an unconventional firm, from its early investments in the unfashionable area of insurance, to its takeover of Burlington Northern Santa Fe, a railway operator, during the 2009 slump, and its unshakable confidence in America, which receives 90% of its capital investment and where it says "the mother lode of opportunities" lies. Berkshire is worth \$360 billion and is America's fourth most valuable firm—so perhaps it has earned the right to do as it pleases. Yet judged by the fine standard of its predecessors, Mr Buffet's 50th letter to shareholders, like Mr Munger's, leaves them with more questions than answers. ■



Silicon Valley headquarters

Googledome, or temple of doom?

Tech firms are building pharaonic head offices again

MARC ANDREESSEN knows a thing or two about Silicon Valley's penchant for status symbols and its braggadocio. As a venture capitalist and serial entrepreneur, he has helped turn more than a few minnows into high-tech giants. As an investor, he serves these days on the boards of Facebook and Hewlett-Packard, among others. Along with avoiding such cardinal sins as going public too soon and being too eager to cash out, Mr Andreessen is adamant that his charges must refrain, at all cost, from pouring huge sums into glamorous new headquarters.

Silicon Valley did not invent the edifice complex. The compulsion to build monuments to a ruler's power and prestige has existed since history began. But flush with cash and with interest rates near zero, the Valley's leading lights are now competing with each other over who can build the most lavish digs, to feed their corporate egos as well as to attract and retain talent.

Despite Mr Andreessen's forebodings, Facebook's new West Campus in Menlo Park features a nine-acre (36,000 square metre) rooftop picnic area and a tunnel under the adjacent expressway to connect it to the firm's existing headquarters. When 2,800 employees move in this summer, it is expected to be the world's largest open-plan office.

On February 27th Google sought planning permission for an even grander campus than its existing Googleplex in Mountain View. The 230,000 square metre site will be covered by light, canopy-like struc-

tures (pictured) that can be rearranged to meet changing requirements.

Apple's new doughnut-shaped, four-storey headquarters, resembling nothing so much as an alien spacecraft lurking eerily among a forest of 6,000 freshly planted trees, is under construction in Cupertino. This "mother ship", the costs of which are rumoured to have escalated beyond \$5 billion, will be two-thirds the size of the Pentagon and capable of housing more than 12,000 people when it opens next year.

There has not been such a flurry of edifice-building in the Valley since the glory days of the dotcom boom in the late 1990s. Firms like Sun Microsystems, Silicon Graphics, Excite and Borland Software built vainglorious corporate complexes just before the tech bubble burst. By coincidence, the tech-heavy NASDAQ composite index this week hit 5,000 for the first time since March 2000, when it peaked at 5,048. By October 2002 it had fallen to 1,114, and many a glass palace in Silicon Valley stood empty as a result.

As in every boom, the bulls say this time is different. At the height of the dot-com frenzy, NASDAQ companies' shares were trading at 50 times earnings. Now they are at a more realistic 18 times (see Buttonwood). Google, Apple and Facebook are highly profitable and look likely to remain so. Still, a New Yorker looking up at the Pan Am, Chrysler and General Motors buildings might recall, wistfully, that the same must once have been said of those fallen titans, too. ■

Altice and Numericable-SFR

Borrow, buy, cut

PARIS

A fast-growing telecoms empire is being built on debt and cost-cutting

PATRICK DRAHI, the main mover-and-shaker in Europe's slowly consolidating telecoms market, says he likes to keep a low profile. That is getting harder. On *Forbes* magazine's latest list of the world's richest people, published this week, he shot from 215th to 57th place, and from 14th to third in France.

The outfit through which he is transforming the industry, as well as his own fortunes, is still far from a household name. Altice is a holding company registered in Luxembourg, quoted in Amsterdam and 57%-owned by Mr Drahi through another holding company called Next LP. Until recently its main activity was acquiring and sprucing up an eclectic collection of dozy cable (and some mobile) operators in countries from Israel to the Caribbean. But its sights have been raised. It was floated in January 2014. Since then its share

price has more than trebled; it is now valued at more than €23 billion (\$25 billion).

Mr Drahi hit the headlines a year ago when Altice and Numericable, its French cable subsidiary, bought control of SFR, France's second-biggest mobile operator, from Vivendi, a conglomerate, for €13.5 billion in cash. It was announced on February 27th that another €3.9 billion will secure Vivendi's remaining 20% of SFR.

In December Altice bought Virgin Mobile France, the country's largest "virtual" mobile operator (meaning that it uses spare capacity on another operator's network), for an unspecified sum. The purchase of Portugal Telecom from Oi, its Brazilian owner, in a deal valuing it at €7.4 billion, is likely to close in late April. In all, Altice and its subsidiaries have in the past year or so spent about €28 billion on bulk-up. And there is speculation Mr Drahi will make an offer for Bouygues Telecom, the third-biggest operator in France, for perhaps €7.5 billion-€9 billion. In all these acquisitions, the plan is to send in a crack team to cut costs quickly.

Much of this dealmaking is financed by borrowing. Altice aims to keep its debt to four times earnings before interest, taxes, depreciation and amortisation (EBITDA); and Numericable-SFR's to between 3.5 and

4 times EBITDA. Both are at least double the norm for mobile operators, though cable firms often have similar ratios.

Analysts expect net debt to rise above even these limits once the payments to Vivendi and Portugal Telecom are factored in. Nawar Cristini of Nomura, an investment bank, estimates Altice's net debt by the end of its 2015 financial year at 4.8 times EBITDA, and that is before any bid for Bouygues. On February 20th Moody's, a ratings agency, said it was reviewing Numericable-SFR for a possible downgrade.

Mr Drahi can muster powerful counterarguments, however. At today's low interest rates, investors are ravenous for yield; Altice can borrow cheaply and in spades. Looking to raise €5.7 billion in January for Portugal Telecom, Altice found takers for €60 billion; in April 2014 the group's €12 billion package of high-yield debt attracted demand for \$100 billion-worth.

Ms Cristini calculates that Altice's debt will fall slightly to 4.3 times EBITDA in 2017, as cost savings boost profits. But this assumes that Altice can cut costs as quickly as it hopes—no easy task in Europe—and that it stops borrowing in order to expand. Having got so far with his debt-fuelled acquisition spree, it is hard to imagine Mr Drahi stopping now. ■

The glass-ceiling index

Progress towards workplace equality for women comes in small steps. Last month Keidanren, Japan's powerful business lobby, appointed its first female executive. This week Toyota announced its first foreign female executive. Japan's government is pressing businesses to appoint more women to their boards. But as shown by our glass-ceiling index, updated to mark International Women's Day on March 8th, it remains far behind the Nordic countries, which are the best places to be a working woman. The index combines data on higher education, labour-force participation, pay, child-care costs, maternity rights, business-school applications and representation in senior jobs. Finland is now in first place, leaping ahead of Norway and Sweden, in part because it has recently given women almost two and a half weeks of extra paid maternity leave. New Zealand has slipped five places, because of the rising cost of child care. This year's index includes Turkey, which with South Korea and Japan is among the worst OECD member countries for women's workplace equality. It has the largest gap between male and female workforce participation, and the lowest share of women in senior management jobs—10%. Turkish women can only dream of the rights enjoyed by their Finnish sisters.



Sources: OECD; Catalyst; Egon Zehnder; European Commission; GMAC; ILO; Inter-Parliamentary Union; World Economic Forum; *The Economist*

Interactive: Select weights for nine indicators to create your own index at Economist.com/glassceiling

The art market

Brush with the law

A well-known middleman is accused of fleecing wealthy clients

ANY billionaire with a weakness for Picasso or Gauguin will know Yves Bouvier. The suave Swiss businessman owns and runs Natural Le Coulre, one of the largest shippers and storers of art for super-rich clients. He pioneered the concept of fine-art freeports—fancy storage and private-viewing facilities that are popular with plutocrats who have far more paintings, sculptures and fine wine than they can fit in their palaces. Mr Bouvier has also brokered discreet transactions between collectors, and it is this role of middleman that has landed him in trouble.

On February 28th Mr Bouvier was *mise en examen* (charged) in Monaco with fraud and complicity in money-laundering, and subsequently bailed for €10m (\$11m). The investigation is over the alleged bilking of a long-standing client: Dmitry Rybolovlev, an oligarch who made his fortune in fertilisers and owns the principality's football club. The Russian grew suspicious after a chance meeting with the seller of a work he had bought through Mr Bouvier. (Buyers and sellers in high-end art deals are off-

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Head-scratcher, and Mr Bouvier

ten kept at arm's length.) He concluded that the broker must have secretly raised his cut by fiddling documents so that the buyer's paperwork showed a higher price than the seller's. Mr Bouvier's lawyers have denied that he was involved in any wrongdoing.

The case could undermine the viability of R4, a €150m exhibition-and-performing-arts park spread over 20,000 square metres of île Seguin, in Paris; building work is due to start this year, and Mr Bouvier is the main backer. It could also lead to greater scrutiny of his state-of-the-art freeports in Geneva, Singapore and Luxembourg, which between them house hundreds of billions of dollars' worth of valuables. These were already under the regulatory spotlight for the tax benefits and secrecy they offer—though Mr Bouvier has always vehemently rejected claims that they are havens for dodgy deals or ill-gotten wares.

Whatever the facts of the present case, critics say it is time a harsher light was shone on the art world. Oversight has remained scant, even as art has flourished as an asset class. Stories abound of collusion among bidders to support prices at auction, and "chandelier bidding", in which auctioneers call out phoney bids, while gazing vaguely over bidders' heads. Auction houses cleaned up their act after a price-fixing scandal in the 1990s but some still engage in questionable practices, such as "irrevocable" bids, whereby third parties guarantee a sale price and take a cut if it is exceeded, but do not have to disclose if they themselves bid the price up.

Given the opacity of the business, allegations of shenanigans can be hard to verify. Its defenders argue that buyers are generally rich and sophisticated, and can look after themselves. Indeed, other billionaire buyers are now likely to follow Mr Rybolovlev's lead and track down sellers, to see if their paperwork matches. ■

E-commerce in South-East Asia

Home-field advantage

JAKARTA

The global online-shopping giants may not find it easy to conquer the region

TROPICAL rain pounds on the roof of a cavernous warehouse near Jakarta, Indonesia's capital. Inside, youngsters in orange t-shirts haul around clothes, luggage and electrical goods for Lazada, an e-commerce firm, which has just moved in. The 12,000 square metre space is three times the size of the depot it has vacated, but it already looks full. Three years ago Lazada's entire stock filled a storeroom the size of a studio flat, recalls Magnus Ekbom, its twenty-something boss in Indonesia.

Internet shopping accounts for less than 1% of all purchases in South-East Asia—a region twice as populous as America, where the proportion is nearly 10%. But surging smartphone use and a broadening middle class mean the market is set to multiply; perhaps fivefold by 2018, reckons Frost & Sullivan, a consulting firm. Since it launched in 2012 Lazada has laid claim to six South-East Asian countries, largely unchallenged by e-commerce giants such as Amazon of the United States, Alibaba of China and Rakuten of Japan. It may soon have to fight them for its territory.

Lazada was created by Rocket Internet, a Berlin-based investor and incubator that cranks out startups designed to dominate emerging markets. Rocket still holds a 24% stake, though Lazada has now raised more than \$600m from investors including Tesco, a British grocer, and Temasek, a Singaporean sovereign-wealth fund. These deals appear to value it at about \$1.3 billion, which could well make it South-East Asia's dearest technology firm.

Like other Rocket companies, Lazada is run by a gaggle of young European expatriates, plucked from finance and consulting. It seems ready to stomach years of losses. In the first half of 2014—the only recent period for which results are available—it lost \$50m before interest, tax, depreciation and amortisation, on revenues of \$60m.

Again like other Rocket companies, its critics say it is just a copycat, in this case a mere clone of Amazon. Lazada's bosses say such charges underestimate the sophistication and gumption required to succeed in places such as Thailand, Indonesia, the Philippines and Vietnam. Online marketing is trickier there than in America or Europe, because locals use a much wider variety of search and social-media sites. The region's diversity means constant tweaking of online portals to suit local languages and cultures. It also means battling a hotch-potch of customs rules.

By far the biggest challenges are payment and delivery. Fewer than one in ten South-East Asians has a credit card, and those that do have them tend not to use them online, for fear of fraud. So a big chunk of Lazada's customers prefer to pay in cash when their goods arrive, which requires more sophistication from delivery partners. Postal services are often sluggish and unreliable—especially in the vast archipelagos of Indonesia and the Philippines—and local logistics firms are still unused to handling high volumes of small packages. About a third of Lazada's orders are delivered by its own fleet of vans and motorbikes, which now serve more than 80 South-East Asian cities.

Lazada's rapid growth has started to rouse competitors, including the big conglomerates whose shopping centres dominate the region's retail markets. On February 25th Lippo Group launched Matahari-Mall, a new e-commerce venture, in partnership with the Matahari chain of department stores, in which Lippo owns a stake and which are anchor tenants of some of Lippo's shopping centres.

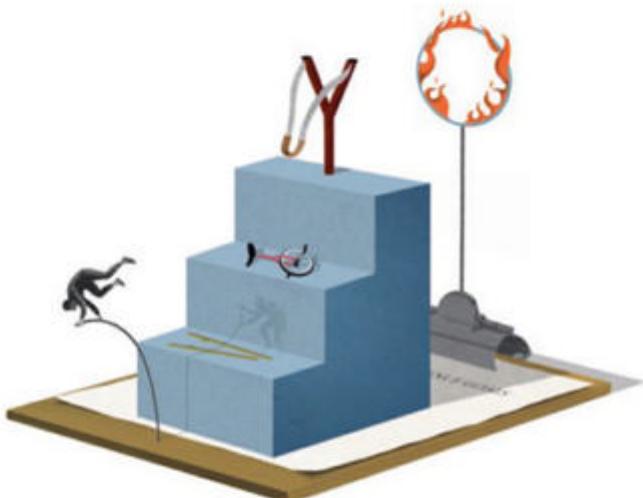
Messaging services and web portals are turning to e-commerce to boost their profits. In February, Line, a popular messaging app owned by Naver of South Korea, started selling groceries in Thailand. Last October Softbank, a Japanese internet and telecoms conglomerate, and Sequoia Capital, an American investor, put \$100m into Tokopedia, a sort of Indonesian eBay.

But the most serious threat to Lazada comes from the overseas e-commerce giants. After Lazada was set up, Indonesia passed a law banning further foreign investment in e-commerce firms which hold their own inventory (Tokopedia does not)—but politicians have recently talked of repealing it. Amazon has begun offering free delivery to big-spending South-East Asian shoppers who don't mind waiting for wares shipped from America. Last month Alibaba opened an Indonesian outpost of Aliexpress, which helps shoppers import goods from Chinese manufacturers. In May it took a 10% stake in Singpost, Singapore's state postal service—perhaps in preparation for a more vigorous assault.

Max Bittner, Lazada's overall boss, thinks it would take time for these firms to replicate his firm's local knowledge and delivery networks. One of his priorities is to expand relationships with suppliers and manufacturers in China, the better to compete with the bottomless catalogue of cheap products which Alibaba, in particular, could bring to the region. South-East Asia may still prove big and diverse enough for several large e-retailers to co-exist—but investors will spill a lot of red ink finding out, thinks Paul Srivorakul of aCommerce, which processes online orders for consumer brands and retailers. "It could be a bloodbath," he says. ■

Schumpeter | The quantified serf

Management by goal-setting is making a comeback, its flaws supposedly fixed



THINK of it as the workplace equivalent of the Fitbit or Nike FuelBand: a way to set your goals and monitor your progress, and to share the journey with colleagues, who will cheer you on and give you a helpful nudge whenever you fall behind. Or, for the more sceptically inclined employee, think of it as a way to make the big boss even more like Big Brother.

“Quantified work” is the vision of BetterWorks, a Silicon Valley startup that aims to bring “goal science” to offices everywhere. Its software lets groups of employees collaborate in setting each other’s objectives. Everyone can see how everyone else is doing, by means of a smartphone app. This sort of collegial, real-time performance measurement has already been introduced at some of the Valley’s most prominent firms, such as Google, Twitter and Intel. BetterWorks’ version is so far being used by 50 businesses, from Vox, a media company to Kroger, a grocery chain.

“The traditional once-a-year setting of employee goals and performance review is totally out of date,” says Kris Duggan, one of BetterWorks’ founders. “To really improve performance, goals need to be set more frequently, be more transparent to the rest of the company, and progress towards them measured more often.”

Working out how best to set targets for employees has long been an obsession of management thinkers. In 1954 Peter Drucker came up with a theory of “management by objectives”. He proposed that bosses should set the company’s overall goals and then, in discussion with each worker, agree on a subset of goals to align what they were supposed to do with the goals of the firm. Drucker believed that these goals should be SMART (specific, measurable, actionable, realistic and time-sensitive). His idea was briefly the height of corporate fashion. Yet its results were often disappointing and even Drucker lost some of his enthusiasm for it. One problem was that it was too bureaucratic. Another, according to today’s management thinkers, was that Drucker focused only on outcome goals (say, increase sales by 20% a year), whereas the ideal outcome is often uncertain. It is sometimes better to set workers indirect goals, such as gathering data, that will point to what the final objective should be.

There is nonetheless a wealth of evidence that setting well-designed objectives does improve employees’ performance. There have been more than 1,000 academic experiments in goal-set-

ting, of which over 90% have produced positive results, says Gary Latham of the University of Toronto. If so, it must surely be one of the most tested, and proven, ideas in the whole of management theory. The studies show that an employee with a goal that is clear and simple, and challenging yet attainable, will perform better than one whose only instruction is to do as good a job as possible. Among other things, such a goal helps an individual or team to focus, to evaluate performance, to assess whether to maintain or change course, and to enjoy a sense of achievement when they succeed.

Recent evidence also supports Mr Duggan’s argument that it pays to set goals more frequently than once a year. A study of big companies by Deloitte, a consulting firm, found that those which set goals quarterly were nearly four times more likely to be in the top quartile of performers. (It also found that more than half of senior executives have their goals revised in the course of the year, but only one-third of middle managers do so.)

Then again, there is also ample evidence of the nasty consequences that can follow when employees are given poorly chosen objectives. For instance, a recent study by Mr Latham and others found that managers who believe they have been set a goal that is unattainable are more likely to abuse their subordinates. “It’s like taking out your frustrations by kicking the dog,” he says.

It can be hard to judge the dividing line between goals that are suitably stretching and ones that are excessively demanding, says Max Bazerman of Harvard Business School. He was one of the authors of a 2009 study in failure, “Goals Gone Wild”, which found several adverse side-effects of poor objective-setting. These included employees neglecting important matters that happened not to be included among their goals; the corrosion of a workplace’s internal culture; reduced motivation among employees; and the temptation to indulge in unethical or risky behaviour. For example, an hourly revenue goal for car-repair workers at Sears in the 1990s led to systematic overcharging, often for work that was not needed. A goal of getting the Ford Pinto to market by 1970 led to the car being launched in a hurry without safety checks that might have revealed a deadly tendency for it to burst into flames in accidents.

Measured response

Mr Duggan argues that the BetterWorks system, by letting everyone in a firm see everyone else’s goals, harnesses crowdsourcing to ensure that the objectives are neither too hard nor too easy. Goal-setting should also be separate from performance reviews that influence salary and bonuses, he says, to give workers permission to test themselves and sometimes to fail. Google expects its goals to be met only 60-70% of the time, for example.

Letting employees set and monitor their goals in collaboration, and giving them licence to fail occasionally, may well be feasible at young, innovative firms, such as Google, with a high-performance culture. It is harder at businesses where staff are disengaged and managers less open to experimentation. And even Google sometimes gets its goals in a twist. Reports on its recent decision to withdraw Google Glass temporarily from the market suggest that the wearable computer was launched too soon. Sergey Brin, one of the firm’s founders, was said to have insisted on pressing ahead, despite his engineers’ protests that they could not make the product good enough by his deadline. Even the most motivated and dedicated workers may fail to meet their goals if the boss demands the impossible. ■



Global banks

A world of pain

NEW YORK

The giants of global finance are in trouble

ONLY pop music and pornography embraced globalisation more keenly than banks did. Since the 1990s three kinds of international firm have emerged. Investment banks such as Goldman Sachs deal in securities and cater to the rich from a handful of financial hubs such as Hong Kong and Singapore. A few banks, such as Spain's Santander, have "gone native", establishing a deep retail-banking presence in multiple countries. But the most popular approach is the "global network bank": a jack of all trades, lending to and shifting money for multinationals in scores of countries, and in some places acting like a universal bank doing everything from bond-trading to car loans. The names of the biggest half-dozen such firms adorn skyscrapers all over the world.

This model of the global bank had a reasonable crisis in 2008-09: only Citigroup required a full-scale bail out. Yet it is now in deep trouble. In recent weeks Jamie Dimon, the boss of JPMorgan Chase, has been forced to field questions about breaking up his bank. Stuart Gulliver, the head of HSBC, has abandoned the financial targets that he set upon taking the job in 2011. Citigroup is awaiting the results of its annual exam from the Federal Reserve. If it fails, calls for a mercy killing will be deafening (see next story). Deutsche Bank is likely to shrink further. Standard Chartered, which operates in Asia, Africa and the Middle East, is parting company with its long-

standing boss, Peter Sands.

Domestic lenders that global banks have long sneered at are doing far better. In Britain, Lloyds has recovered smartly over the past two years. In America the most highly rated banks—based on their share price relative to their book value—are Wells Fargo and a host of midsized firms.

The panic about global banks reflects their weak recent results: in aggregate the five firms mentioned above reported a return on equity of just 6% last year. Only JPMorgan Chase did passably well (see chart). Investors worry these figures betray a deeper strategic problem. There is a growing fear that the costs of global reach—in terms of regulation and complexity—ex-

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ceed the potential benefits.

It all seemed far rosier 20 years ago. Back then banks saw that globalisation would lead to an explosion in trade and capital flows. A handful of firms sought to capture that growth. Most had inherited skeleton global networks of some kind. European lenders such as BNP Paribas and Deutsche Bank had been active abroad for over a century. HSBC and Standard Chartered were bankers to the British empire. Citigroup embarked on a big international expansion a century ago; Chase, now part of JPMorgan Chase, opened many foreign branches in the 1960s and 1970s.

As they expanded in the 1990s and 2000s all of these firms concentrated on multinationals, which required things like trade finance, currency trading and cash management. But all expanded beyond these activities to varying degrees and in different directions; today they typically account for only a quarter of sales. Deutsche and StanChart bulked up in investment banking. BNP built up retail operations in America. At the most extreme end of the spectrum Citi and HSBC tried to do everything for everyone everywhere, through lots of acquisitions. They sold derivatives in Delhi and originated subprime debt in Detroit.

This model is in trouble for three reasons. First, these giant firms proved hard to manage. Their subsidiaries struggled to build common IT systems, let alone establish a common culture. Synergies have been elusive and global banks' cost-to-income ratios, bloated by the costs of being in lots of countries, have rarely been better than those of local banks. As a result these firms have all too often been tempted to make a fast buck. Citi made a kamikaze excursion into mortgage-backed bonds in 2005-08. StanChart made loans to indebted Asian tycoons.

Not good enough



*Return on core Tier-1 equity.
Excludes "one-off items" and assumes 12% core-capital ratio

Sources: Company reports; *The Economist*

► Second, competition proved to be fiercer than expected. The banking bubble in the 2000s led second-rate firms such as Barclays, Société Générale, ABN Amro and Royal Bank of Scotland (RBS) to expand globally, eroding margins. In 2007 RBS bought ABN in a bid to rival the big network banks. It promptly went bust, proving that two dogs do not make a tiger. The global giants also lost market share in Asia to so-called "super-regional" banks, such as ANZ of Australia and DBS of Singapore. Big local banks in emerging markets, such as ICBC in China, Itaú in Brazil and ICICI in India, also began to build out cross-border

operations.

If mismanagement and fierce competition were problems before the crisis, the regulatory backlash after it has been brutal. American officials have begun to enforce strict rules on money-laundering, tax evasion and sanctions, meaning that global banks must know their customers, and their customers' customers, if they want to maintain access to America's financial system—which is essential given that the dollar is the world's reserve currency. Huge fines have been imposed on StanChart, BNP and HSBC, among others, for breaking these rules.

Bank supervisors, meanwhile, have imposed higher capital standards on global banks. Most face both the international "Basel 3" regime and a hotch-potch of local and regional regimes. A rule of thumb is that big global banks will need buffers of equity (or "core tier one capital") equivalent to 12-13% of their risk-adjusted assets, compared to about 10% for domestic firms. National regulators increasingly demand that global banks ring-fence their local operations, limiting their ability to shift capital around the world. The cost of operating the systems that keep regulators happy is huge. HSBC's compliance costs rose to \$2.4 ►

Buttonwood | The curse of the top dog

Apple's low price-earnings ratio reflects understandable scepticism

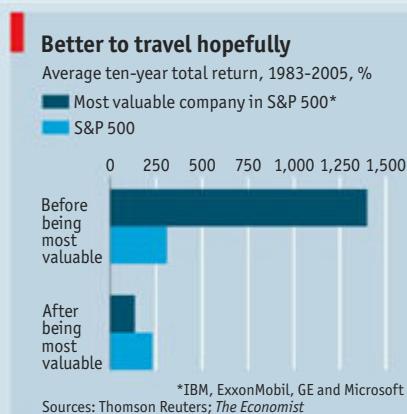
APPLE'S growth record is staggering. The company's share price has risen more than 300-fold since flotation. It recently became the first company in history to reach a market capitalisation of \$700 billion, giving it a bigger value than the entire stock exchanges of Mexico, Russia or Saudi Arabia. In the first quarter of its current financial year, Apple generated more than \$30 billion of cash. At that rate, it could pay off Greece's entire debt burden within three years.

While sales of both the iPod and iPad have been slipping, more than 1% of the global population bought an iPhone in the latest quarter. Overall, sales were 30% higher than in the same quarter a year earlier. The next big hope is the Apple Watch, which may be unveiled on March 9th.

Back in the late 1990s, when the dot-com boom was in full swing, you would have expected a company growing that fast to have traded on a price-earnings ratio of 100, or at least 70-80. But at the start of March, based on earnings forecasts of \$8.50 for the current year, Apple's p/e ratio is just 15. That is the kind of rating given to a run-of-the-mill stock, not a turbocharged growth star.

This may reflect scepticism about whether the company can replace the iPhone with a hot new product: the watch may not do the trick. But investors may also be recognising an old problem. Companies cannot grow for ever at the kind of pace Apple has been managing.

In his book "The Second Curve", Charles Handy, a management guru, recounts seeing a graph in the office of IBM showing American GDP on one line and the company's revenues on another. The latter were eventually projected to overtake the former. Mr Handy assumed the graph was a joke, but the Big Blue executives were serious. Nothing is more dan-



gerous than the tendency to extrapolate from a recent trend.

At some point, a company will so dominate its market that further growth becomes impossible. The executives may become complacent and fail to recognise the threat of new products and services. Think of how Nokia dominated the market for mobile phones, only to be caught out by the rise of first BlackBerry and then Apple and Samsung. It takes an enormous amount of willpower to respond to an evolving market by cannibalising your own product; few executives have been able to manage it.

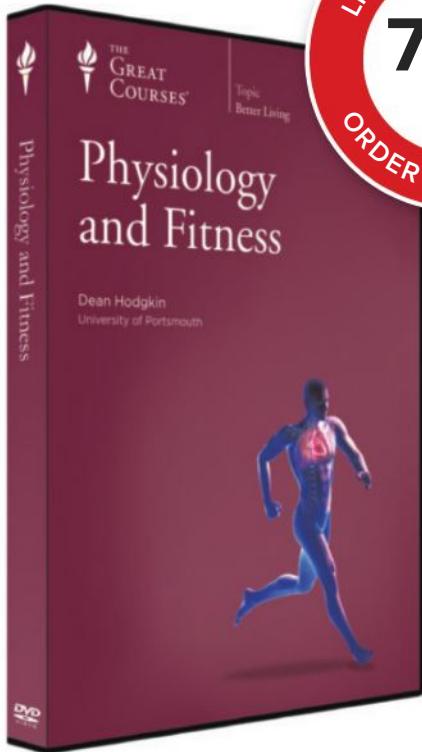
Another option is for a big company to use its cash or shares to diversify into other sectors, but history suggests this approach has only a limited chance of success. The management usually spends too much money on the acquisitions and too much time trying to integrate the new businesses into the merged group. Even GE, the only survivor from the original list of companies comprising the Dow Jones Industrial Average back in 1896 (sadly, National Lead and Tennessee Coal & Iron are no longer with us), has made mistakes in its diversifi-

cation strategy. Remember Kidder Peabody, the investment bank that it was forced to sell in the mid-1990s after large losses in bond trading.

There seems to be an innate tendency for market giants to underperform (see chart). Between 1983 and 2005, the title of largest company in the S&P 500 switched between IBM, Exxon Mobil, GE and Microsoft. In the ten years before each became top dog, these stocks achieved an average return of 1,282%, compared with a return of 302% for the S&P 500 over the same period. But in the ten years after they reached the peak, the average return of the top dogs was just 125%, compared with 199% for the S&P 500.

The simplest explanation is that companies become "hot stocks" because of a combination of rapid growth in profits and a widely admired business model. This prompts investors to award the company a premium rating, pushing up its market value. By that stage, the company is vulnerable to disappointment: either its profits growth will falter or doubts will appear about its long-term potential. Profit forecasts will be reduced, or the multiple investors are willing to pay for those profits will fall.

Since Apple does not command that high a rating at the moment, investors are clearly dubious about its long-term growth prospects. After all, just to maintain its recent sales pace, it will have to sell 3 billion iPhones over the next ten years. And if the stock were to replicate the average 125% total return of previous top dogs, its market value would have to reach \$1.4 trillion by 2025. Perhaps everyone will be wearing Apple watches and driving Apple cars by then. But history, and the stock-market, suggest not.



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34. Resistance Band Workout
35. Training Bar Workout
36. Stretching Routine

Physiology and Fitness

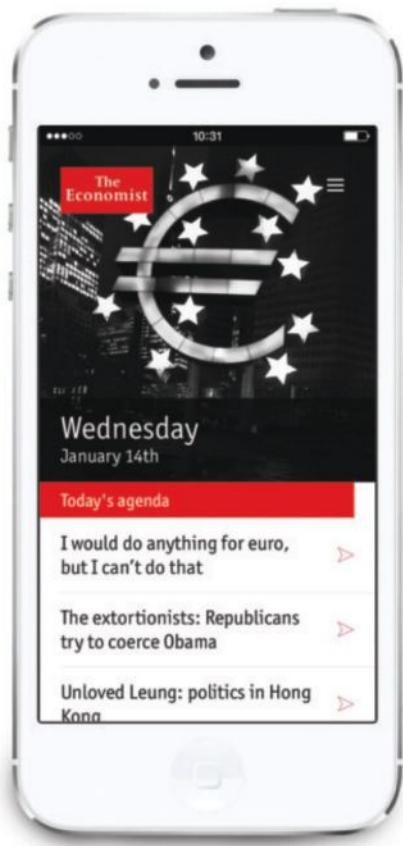
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- ▶ billion in 2014, 50% higher than the year before. JPMorgan is spending \$3 billion more on controls than it did in 2011.

One measure of these firms' viability is their "best case" return on equity (ie, assuming that the huge, supposedly, one-off legal fines and restructuring costs incurred over the past half-decade suddenly stop, but the new capital standards are fully implemented). On this basis most global banks barely achieve 10% (see prior chart). The overall figures hide lots of rot. After three decades of trying to diversify from its base in Asia, HSBC still makes the bulk of its money there; the other two-thirds of its business underperforms badly for the most part. JPMorgan Chase's profits are more evenly spread, but about two-thirds of its businesses fail to cross the 10% hurdle. The same is true of StanChart. From the outside—and perhaps from the inside, too—Citi's reporting system is too crude to make any sensible judgment. Deutsche looks better than most, but many of its rivals question its capital calculations.

Another test of viability is to compare the benefits of being global with the costs. In February JPMorgan Chase said that the revenue uplift and cost savings it gets from its scale boost profits by \$6 billion-7 billion a year. There is a plausible case that the extra capital it must carry, and the regulatory costs its complexity incurs, offset a big chunk of that benefit. (If they dared to reveal them, the figures for other banks would probably look far worse.) Scale does not seem to mean cheaper funding. It is no cheaper to buy a credit-default swap, which pays out if a borrower goes bust and so is a reasonable proxy for borrowing costs, on the debt of JPMorgan Chase or Citi than it is on that of mid-sized American banks. All are regarded by debt investors as government-backed.

The financial arguments for global banks no longer appear convincing. Yet unscrambling these firms would be hellish. And in any case both managers and investors see two possible rays of light. One is gradually rising interest rates in America: JPMorgan Chase reckons these might add a fifth to its profits by 2017. The other is declining competition, which would allow them to raise their prices. The withdrawal of second-tier banks should help—on February 26th RBS said it would shrink its commercial and investment-banking operations down to 13 countries from over 50 at the peak of its pomp in 2008.

Yet there are always new competitors to push down margins. Japanese banks are on a cross-border lending bender for the first time since the 1980s. China's banks are steadily expanding. The Western network banks were right to assume that globalisation would lead to a big increase in the amounts of money sloshing around the world. They have yet to work out how to prosper from it. ■



Citigroup

Citi never reaps

NEW YORK

Making money from a global banking network is as difficult as it is alluring

WILLIAM BRADY (pictured above, in the middle) and Howard Sheperd had each spent more than 30 years at National City Bank before becoming its leaders in 1948. But even after all that time, they were not really sure how the sprawling financial conglomerate that would become Citigroup made money. George Moore, who would later rise to chairman, was appointed head of a "New Look Committee" to unravel the mystery. His conclusion: "We have never really known just where we made our net profits, but have generally proceeded on the assumption that we should encourage the growth of all these businesses to the maximum, on the theory that the more they grow the more money we could make."

The assumption under the current boss, Michael Corbat, is precisely the opposite. But working out how Citigroup makes its money—and therefore which parts of the business are most dispensable—is just as vexing. In total, Mr Corbat reckons 60 businesses have been sold since the crisis. Among them are brokerage arms in America and Japan, a student-loan operation and some credit-card units. The most visible contraction has been in Citi's consumer business, which is shrinking from 50 countries to 24, and in America, from 14 cities to seven. This week, Citi announced the sale

of OneMain Financial, a subsidiary that makes high-interest consumer loans, and a stake in Akbank, a Turkish lender.

In spite of all this restructuring, Citi's performance remains dismal. Part of the problem is the endless restructuring itself: provisions related to it were \$148m in the first quarter of 2013, \$75m in the second, \$133m in the third, \$234m in the fourth, \$211m in the first quarter of 2014, \$397m in the second, \$382m in the third and \$655m in the fourth, according to S&P Capital IQ, a financial-data firm. Its return on equity last year was 3.4%. Regulators have frozen its dividend at one cent per share (a yield of less than 0.1%) since the crisis. Even as the share prices of other American banks approach or pass their pre-crisis peaks, Citi's is down by 90% (see chart on next page). Its market capitalisation is well below its book value, suggesting it would be more valuable if broken up.

On March 11th the Federal Reserve will reveal the results of the second of the two annual “stress tests” it conducts for big banks, which attempt to simulate downturns to make sure that banks have enough capital to withstand them. Citi failed this test in 2012 and in 2014, and as a result has not been allowed to raise its dividend. The first failure prompted the departure of its then chief executive, Vikram Pandit; a third ►

► one would probably put an end to Mr Corbat's tenure.

Citi's sprawl is hard to fathom. It is present in 101 countries, and handles \$3 trillion of transactions daily. It finances \$600 billion in trade every year. More than half its deposits are foreign—far more than any other American bank, according to Moers Services, a research firm. Foreign operations provide 60% of its revenue; two-thirds come from emerging markets. This part of the bank initially catered to multinationals, and to the American government and military. But as ever more, and smaller, firms expanded abroad, its customer base grew.

Citi's international presence has always been both a strength and a liability. Take its Chinese operations, which helped keep the bank afloat in the 1930s, only to be forcibly closed in 1949. By the same token, Banamex, its Mexican unit, has been one of the most profitable parts of the bank, but lost \$360m due to fraud in 2013. Frank Vanderlip, the CEO who first expanded abroad, nearly killed the bank with a hefty bet on Russia just before the revolution. He was succeeded by James Stillman, who staked Citi's fortunes on global sugar markets with similarly disastrous results. Next up was "Sunshine Charley" Mitchell, who expanded both abroad and at home in the run-up to the Depression, leaving the bank in need of its first government bail-out.

If anything, the risks of big international operations appear to be growing. The fines and investigations the bank faced for its dealings in American mortgages before the crisis seem to be fading away. But it faces continuing litigation over allegations that it manipulated currency markets and interest rates and helped its clients launder money. Banamex is the subject of a fresh investigation; foreign transactions that may have helped companies to avoid American taxes have also caught the authorities' attention.

Increasingly, big banks are held responsible not only for their own misdeeds, but also for the conduct of their clients. They have to be on the look-out not only for specific crimes like fraud, but for unsavoury people and activities, from tax evasion to terrorism, more generally.

On top of this, big global banks face ever higher capital requirements, with overlapping regulations set in multiple jurisdictions. The discussion of Citi's obligations in this respect in its latest regulatory filing extends over 17 pages. The most important elements, says Steven Chubak, an analyst with Nomura Securities, are the 9% in common equity demanded by international banking standards (more than double the pre-crisis level of 4%) and various surcharges imposed by the Fed, which push the total to 11%. Further impositions may be on the way, including a "countercyclical capital buffer". Rules on holdings of



liquid assets add yet more complication and expense. Each time the overall capital requirement increases by a percentage point, Citi's return on equity declines by a similar amount, Mr Chubak estimates.

These rules are giving smaller banks, or purely domestically focused ones, a competitive advantage. American banks that regulators do not consider systemic, for instance, need an equity buffer of just 7%. Even Wells Fargo, America's biggest bank by market capitalisation, must hold only 10%, Mr Chubak estimates, thanks to its domestic focus. It is no coincidence that Wells recently exceeded the record valuation for an American financial firm set by Citi in 2001, of \$283 billion.

Mr Corbat's response to all this, and Mr Pandit's before him, has been to shrink and simplify. Citi's workforce has dropped by over a third since 2007, from 375,000 to 241,000. It will continue to fall. Consumer businesses are being jettisoned in various countries in the Middle East and Latin America, where concerns about money-laundering and financing terrorism are most acute.

But just how far to go is hard to decide. Some activities still look like anomalies: it is the only big bank that uses proprietary designs for its cash machines. Others, such as OneMain, are easily shorn, but very profitable: its return on equity is 19%.

Reducing the retail business is especially fraught. Citi initially tried to shrink its operations in Texas to two cities, Dallas and Houston. But customers were put off by its diminished presence, so it was forced to pull out of the state altogether. Analysts question whether it has an adequate network in the suburbs of Chicago and Boston to preserve its business in those cities.

Contraction abroad carries similar risks. Operations in obscure or hazard-prone countries may provide little or no return on their own, but may also be where Citi provides the greatest value to multinationals, in that companies have few reputable alternatives when doing business in such places. Hiving off Citi's corporate business in different countries would not

make any sense: American clients come to it for seamless access to foreign markets, and vice versa.

It is possible that Citi is already shrinking too much, consuming the seed corn that will produce profits later on, speculates Charles Peabody, an analyst with Portales Partners. Operations like retail banking, brokerage and asset management take time to build but provide steady pay-outs once established. It is this part of Citi that is being shed.

What remains is a more opaque and volatile corporate bank. Citi, Mr Peabody says, has recently become far more eager to undertake various risky sorts of transactions, such as "bought deals", in which a bank buys a huge block of shares in the hope that it can sell them in smaller parcels at a profit. The most recent data from American regulators, from September, show that Citi held derivatives contracts with a notional value of \$70 trillion—far more than any other commercial bank.

Citi says it is simply catering to its customers, who want to hedge against movements in commodities and currencies. But it is also on an increasingly urgent hunt for decent profits. How to produce them, however, is a question that has bedevilled Citi-group for more than a century. ■

Greece's economy

Running on empty

ATHENS

Political brinkmanship has exacted a heavy economic toll

IN LATE February, as Greece's new prime minister, Alexis Tsipras, reversed a crucial campaign pledge and infuriated his left-leaning Syriza party by asking for a four-month extension of the country's hated bail-out, there was little sense of crisis in central Athens. Cafés were busy; streets were clogged with traffic.

The impression of business as usual was illusory. The new government may have stepped back from the impending rift with its creditors, but its readiness to go so close to the edge has hurt the economy and brought the state close to bankruptcy. Worse, there is scope for more damage to be done this spring, since nothing has been settled between the Greek government and the IMF, the European Central Bank (ECB) and the European Commission (the institutions that speak for Greece's creditors). Fleshying out the thin list of reforms the government has presented so far is bound to be an agonising process.

The Greek economy had at last begun to grow again in 2014, after six years of recession had lopped more than a quarter ►

off GDP. Output started to increase in the first three months of last year (compared with the final three of 2013) and growth continued into the third quarter, when GDP rose by 0.7%, one of the best performances in the euro area.

That seems like a distant memory now. In the final three months of 2014, as elections loomed, output fell by 0.2%. The political turbulence has buffeted the economy and public finances in three main ways. First, anxieties about a possible "Grexit" from the euro and the forced conversion of bank accounts into less valuable drachmas caused a massive drain of deposits (see chart). In December and January Greek households and businesses pulled €17 billion (\$19 billion) out of banks; astonishingly, the outflows over these two months were bigger than those in May and June 2012, when two elections were held and fears of a Grexit also loomed large. The withdrawals continued in the first three weeks of February, reportedly at a weekly rate of between €2 billion and €3 billion.

The loss of deposits, which brought Greece alarmingly close to imposing capital controls, has undermined the banks. They have had to turn to the Greek central bank to tap "emergency liquidity assistance". Since such support is kept on the shortest-possible rein by the ECB in Frankfurt, this means that the banks are still acutely vulnerable. With their funding in disarray they are in no position to help businesses by making new loans, so the shortage of money at the banks is now affecting the wider economy.

Second, the political upheaval has created fresh uncertainty. With Greece's place in the euro once again in question, domestic investors have put projects on hold and foreign investors have been scared away. This paralysis will not abate until a lasting deal with creditors is struck that rebuilds confidence in Greece's long-term future within the euro area. Syriza's climbdown in late February has bought time but it has not brought any money from Greece's creditors. None will be available until the government shows that it is sincere in its promise to complete the re-



A euro in hand is worth two in the bank

forms that creditors still insist upon and that are supposed to steady both the economy and the public finances. On the campaign trail Syriza denounced many of them as intolerable.

Third, the political storm has induced a crisis in the public finances. Cut off from the bond markets again and without help from official lenders, the Greek government is struggling to pay its bills. This month is particularly tough as it has to find €1.5 billion to repay a portion of its debt to the IMF, as well as €4.5 billion to redeem maturing Treasury bills. Even if the bills can be refinanced, money is tight because tax revenues are down by €2 billion in January and February compared with the same two months in 2014. Many taxpayers have simply stopped paying taxes in the hope that the new government will be more lenient.

The worse the economy does, the more the public finances will deteriorate. The government had won permission from its creditors to run a smaller primary budget surplus (ie, excluding interest payments) than previously planned, but that concession may now be meaningless. And if the government responds by allowing arrears on purchases it has made to build up, as has happened in the past, that will hurt the businesses that go unpaid.

Amid the gloom, there is one piece of good news. The turmoil does not appear to have harmed tourism bookings. The hope is that 2015 will be another good year, after the number of tourists reached a record of 22m in 2014. But for Greece to resume its economic recovery a lot of things will have to go right. In particular, Mr Tsipras will have to break more election promises. Even if he climbs down completely, however, there is no way to undo the damage already done to the economy by the events of the past few months. ■

Inflation in Japan

The signal and the noise

TOKYO

The Bank of Japan is still far from its inflation target, but that may matter less

A RECENT speech by Haruhiko Kuroda, governor of the Bank of Japan, referred wistfully to the monetary regime in New Zealand in the 1990s, in which the finance minister offered the central-bank governor "escape clauses" absolving him of blame for missing inflation targets if, say, commodity prices fluctuated wildly. For Mr Kuroda, there is no "get out of jail free" card. The BoJ's target, laid down in 2013, was to raise core inflation (a measure that includes energy but excludes fresh food) to 2% by April. It remains far short of that goal. In January, core prices rose by a mere 0.2% year on year, excluding the effect of a recent increase in the consumption tax. Japan may even lurch back into deflation in the coming months.

The precipitous fall in the price of oil has thrown the BoJ off course. During the early stages of its monetary-easing programme, which began in April 2013, the weakening of the yen raised the cost of imported energy, which in turn boosted inflation. That may have lulled Mr Kuroda into overconfidence. In early 2014 he basked in the success of the monetary "arrow" of Abenomics, the economic revival plan of Shinzo Abe, the prime minister. In April of that year the consumer-price index (CPI) reached 1.5%. Mr Kuroda might then have pointed out that inflation was artificially high, says Christopher Wood of CLSA, a broker. Instead the governor declared in the summer that price growth would never again sink below 1%.

But if things were not as rosy as they looked back then, they are also now less dire than they seem. "Core core" CPI, which excludes energy as well as fresh food, is healthier, at 0.4%. The BoJ expects that this measure of inflation will stay positive or rise, even as core CPI falls. Economists reckon that Mr Kuroda chose the wrong gauge of prices. Switching now, however, might damage the bank's credibility even more than the return of deflation. Measures of inflation expectations, meanwhile, remain fairly stable.

For the broader economy, moreover, cheaper oil is greatly to be desired. The lift to growth from increased household spending capacity should eventually spur price rises. All in all that should add back some ¥7 trillion (\$58 billion) to the economy, roughly the same sum taken out by the rise in the consumption tax last April.

The government seems to be signalling that it is relaxed about Mr Kuroda's failure ►

The price of politics

Greece, private-sector bank deposits, €bn



► to meet his goal. The idea of setting 2% as a target was a fine one, but the BoJ should not be too theoretical, says Takeshi Niinami, a businessman who sits on an important economic-policy council. Inflation of 0.5%-1% would be adequate, says a close advisor to Mr Abe.

Many argue that the Bank of Japan's quantitative easing (QE, the printing of money to buy bonds, in the hope of stoking inflation) is now serving chiefly to inflate asset-price bubbles, particularly in Tokyo's property market. A weaker yen is seen as negative for household purchasing power. All this leaves many officials lukewarm about further monetary easing.

Another reason to hold fire could be that the BoJ's ability to ease may run into practical limits as it hoovers up ever more of the Japanese government-bond (JGB) market. It is now buying about ¥80 trillion of long-term JGBs a year, over twice the annual issuance. At the end of 2014 it owned about ¥200 trillion of JGBs, or nearly a quarter of the outstanding stock. Even bigger purchases would further distort the bond market. Although the aim of QE is to lower rates and spur lending, the BoJ presumably does not want to dispense with the discipline of the market altogether.

Then again, says Naohiko Baba of Goldman Sachs. "It is hard to imagine the Bank of Japan doing nothing if CPI turns negative this year." Other options include adopting a negative interest rate for excess bank reserves, or buying up equities. For now the BoJ has simply delayed its deadline for reaching inflation of 2% until earlyish next year.

Mr Kuroda's new mantra is higher wages as the key to lifting both inflation and overall growth (Japan exited two quarters of mild recession in the fourth quarter, when GDP expanded by an annualised 2.2%). In January he made a surprise visit to a meeting of Japan's main association of trade unions. Prospects for raises during the spring wage offensive (*shunto*), now under way, seem promising. After last year's *shunto*, base salaries rose for the first time in more than a decade, by 0.4% (see chart). A higher rise is expected this year.

One out of two ain't bad

Japan's:
% change on a year earlier



If the BoJ does end up easing further, it will need to handle internal opposition. In October dissent on its policy board about the merits of monetary easing made a close thing of Mr Kuroda's surprise decision to loosen further: he won the day by five votes to four. The government will stack the board with easing advocates when current members retire in the coming months. One idea is to appoint a sec-

ond woman to the board, which would advance another aim of Abenomics, to boost the role of women in the workplace. Yet there are few ardent reflationists among female academics. The pool is narrowed further by the apparent need to have a totally anodyne personal life: one potential candidate is said to have been ruled out because she had recently acquired a licence for professional *mah-jong*. ■

Training professional investors

Off-track betting

Fund managers turn to a cycling coach

PROFESSIONAL cycling is not the obvious place to look for lessons in investing. But in the past year several big British investment firms, including GLG Partners, J.O. Hambro and Schroders, have used the services of Shane Sutton, the technical director of Britain's cycling team. Mr Sutton, they hope, will teach managers to steer clear of biased hunches and performance-sapping habits.

Mr Sutton's coaching insights range from the mundane—12-hour days offer diminishing returns—to the arresting: he discovered that one trader made his most profitable decisions outside the office, making him the rare employee who could plausibly claim to be adding value on the golf course. He sent one trader home for a week to break a losing streak.

Mr Sutton works with a firm called Inalytics, which uses data to look for other foibles among its clients. The most common is the tendency to sell winners too early, cashing in a profit only to see the stock gain further (economists call this "the disposition effect"). The firm has crunched 12m individual trades going back to 2002, across 900 portfolios, to examine the performance of winning stocks—those worth more when sold than when bought. In all but a tiny number of cases, returns would have improved by 1-2% a year if the stocks had been held for a further 12 months.

Holding onto losers that you should have sold in the hope that they will recover is the flipside of the disposition effect, and means portfolios tend to contain more losers than winners. A study conducted in 2006 by Andrea Frazzini, an academic and investor, found that managers of American mutual funds sold an average of 3% more winners than losers from 1980 to 2003. But the impact on performance of holding losers is harder to measure: they frequently turn into winners when the price of a stock recovers, even though the manager might have done better to take the loss and reallocate the money to another stock.



It applies to the economic cycle too

Investors should be especially wary of two portfolio techniques that act as Trojan horses for such biases. The first is top-slicing, whereby managers sell part of a money-making position. They may claim this is to avoid holding too much of a single stock or in order to manage portfolio risk; frequently they are just selling winners. The second is the practice of building up a position slowly: buying a small amount of the stock, waiting to see if it goes up, then buying more if it does, thereby missing out on a portion of the initial gain.

In his pep talks, Mr Sutton reminds traders of such pitfalls. He is surprised by how much they rely on gut instinct, he says. Their employers, however, are "starting to embrace the idea that anything can be coached". Investors might benefit from coaching, too. The hope of picking winners leads customers to active funds, when passive ones tend to do even better.



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1. Bloomberg, as of 2/5/15. Cash is defined as cash and marketable securities. Corporate universe is S&P 500 companies ex-financials. 2. Based on \$4.652 trillion in AUM as of 12/31/14. Visit www.iShares.com or www.BlackRock.com to view a prospectus, which includes investment objectives, risks, fees, expenses and other information that you should read and consider carefully before investing. Risk includes principal loss. Funds that concentrate investments in a single sector may underperform or be more volatile than other sectors or than the general securities market. Technology companies may be subject to severe competition and product obsolescence. This information is strictly for illustrative and educational purposes and is subject to change. Funds distributed by BlackRock Investments, LLC. ©2015 BlackRock, Inc. All rights reserved. iSHARES and BLACKROCK are registered trademarks of BlackRock, Inc., or its subsidiaries. iS-14497-0215

Free exchange | Still, not stagnant

Economic history suggests that talk of American secular stagnation may be overblown

IS AMERICA stuck in a rut of low growth, feeble inflation and rock-bottom interest rates? Lots of economists believe in the idea of “secular stagnation”, and they have plenty of evidence to point to. The population is ageing and long-run growth prospects look dim. Interest rates, which have been near zero for years, are still not low enough to get the American economy zipping along. A new paper published by the University of Chicago’s Booth School of Business, however, reckons that secular stagnation is not quite the right diagnosis for America’s ills.*

A country in the grip of secular stagnation cannot find enough good investments to soak up available savings. The drain on demand from these underused savings leads to weak growth. It also leaves central banks in a bind. If the real (ie inflation adjusted) “equilibrium” interest rate (the one that gets an economy growing at a healthy clip) falls well below zero, then central bankers will struggle to push their policy rate low enough to drag the economy out of trouble, since it is hard to push nominal (ie, not adjusted for inflation) rates deep into negative territory. Worse, in the process of trying, they may end up inflating financial bubbles, which lead to unsustainable growth and grisly busts.

Stagnationists argue that this is not a bad description of America since the 1980s. Real interest rates have been falling for years, they note, a sign of a glut of savings. Recoveries from recent recessions have been weak and jobless. When growth has perked up, soaring asset prices and consumer borrowing appear to have done the heavy lifting.

The authors of the Chicago paper—James Hamilton, Ethan Harris, Jan Hatzius and Kenneth West—dispute this interpretation of events. Stagnationists are right, they note, that real interest rates have been falling, and have in fact been negative for much of the past 15 years. But low real rates do not necessarily imply that future growth will be weak, as many economic models assume. The authors examine central-bank interest rates, inflation and growth in 20 countries over 40 years. They find at best a weak relationship between economic growth and the equilibrium rate. If there is a long-run link, they argue, it tends to be overshadowed by other factors.

After the second world war, for example, government controls on rates (“financial repression”) prevented the market from having its say. In recent years short-run woes have dragged down the equilibrium rate, such as the “50-miles-per-hour headwinds” that Alan Greenspan, the chairman of the Federal Reserve, described in 1991, when bad loans pushed big American banks to

the brink of insolvency. The authors note that such stormy periods are usually short-lived, and that when the headwinds abate the equilibrium rate tends to pop back up.

They also reckon the stagnationists are misinterpreting some of the evidence. Growth in the 1990s was not illusory, they argue. The stockmarket boom only really got going in 1998, after America’s unemployment rate had already fallen below 5%.

The expansion of the 2000s looks like a better example of secular stagnation. Investment in housing, which rose from 4.9% of GDP in 2001 to 6.6% at the market’s peak in 2006, helped sustain the boom. Rising house prices made Americans feel flush, propelling consumer spending. Expanding credit added about one percentage point to growth each year, says the paper.

Yet the behaviour of the economy in this period looks more like a product of distortion than stagnation. At the time China and oil-producing states were running enormous current-account surpluses with America and building up large foreign-exchange reserves, contributing to what Ben Bernanke, Mr Greenspan’s successor as Fed chairman, labelled a “global saving glut”. Expensive oil and rising Chinese imports placed a drag on growth that more or less offset the boost from housing. Take away the savings glut and the housing boom, and the American economy would not necessarily have grown any faster or slower, just more healthily.

Wallowing

What about the situation now? Some of the distorting forces of recent years are slowly fading. Household finances are certainly in better shape after a long period of deleveraging. That is helping to power a consumer-driven recovery in America that will eventually lead to higher interest rates.

On the other hand, stagnationists argue that the effects of demographic change are intensifying. Baby-boomers approaching retirement may be stashing more money away. Longer lifespans continue to spur saving. Axel Gottfries and Coen Teulings of Cambridge University have found that the increase in life expectancy over the past 40 years in rich and middle-income countries has raised the desired stock of savings by two times GDP.

Global conditions must also be taken into consideration. The authors of the Chicago paper calculate that over the long term, America’s real interest rate tracks the one prevailing across the world as a whole (see chart). Yet since about 2000 the real rate in America has generally been well below that of the world as a whole. The authors argue that thanks to the mobility of international capital that gap should soon close (albeit in part because global rates will probably fall). On their best estimates America’s equilibrium rate has probably fallen a little, relative to the average from the 1960s until 2007 of about 2%. But, they argue, the decline is smaller than many stagnationists believe, and the rate is almost certainly positive. Nor is a lower rate now a sign that growth will permanently fall below past averages.

That is still no reason to breathe easy. A low equilibrium rate raises the risk that central-bank interest rates will sometimes become stuck at zero, leaving an economy in a prolonged slump. Even if the risk of secular stagnation is overdone, the authors reckon that the Fed has good reason not to raise rates too soon. ■

They’ll come crawling back

Real interest rates, %



* Studies cited in this article can be found at www.economist.com/secstag15

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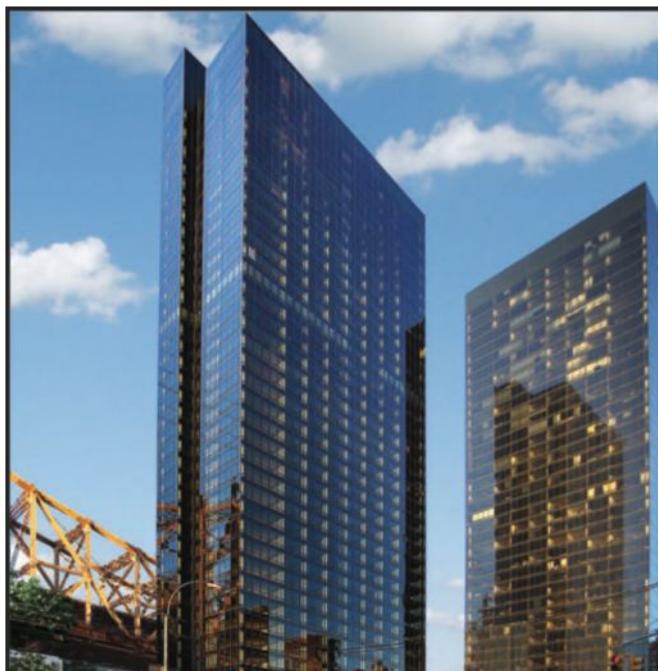
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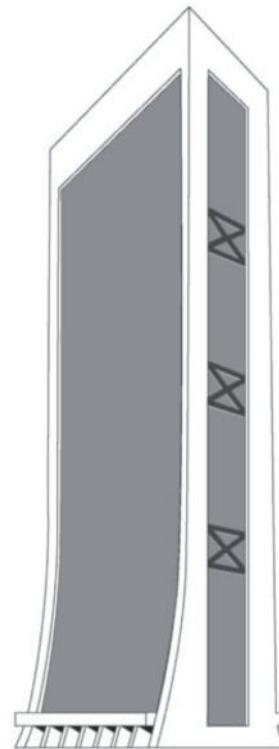
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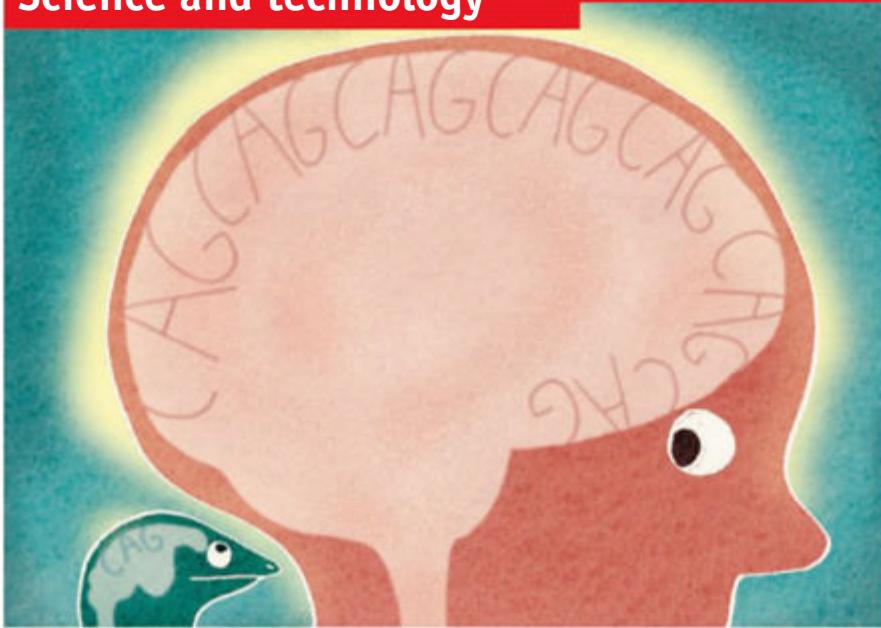
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Brain evolution and disease

A Faustian bargain

Could the key to the evolution of the human brain be found in a dreadful illness?

HUNTINGTON'S disease is awful. It slowly robs its victims of mobility, wits and emotions. And there is no cure. The idea that it might be the obverse of something good sounds, to say the least, counter-intuitive. Yet that is the contention of a small band of neuroscientists who have been studying it. They suggest the underlying cause of Huntington's, a strange form of genetic mutation called a triplet-repeat expansion, might also be one of the driving forces behind the expansion of the human brain. Huntington's, these people suspect, may be a price humanity pays for being clever.

Most genetic diseases are recessive. This means a faulty gene inherited from one parent can be covered for by a healthy one from the other. For someone to suffer symptoms, both of his or her parents must have a faulty copy of the gene in question—unless the victim is a man and the faulty gene is on his single X chromosome. Huntington's by contrast is a dominant disease. A faulty gene from either parent is enough to cause it.

The fault's nature is also strange. Usually when a gene goes wrong, part of it is either missing or has the wrong genetic letters in it. In Huntington's, the disease-causing version of the gene has too much DNA, not too little, and the protein produced, known as huntingtin, is thus too big. One part of every huntingtin gene contains a stretch in which the genetic letters

C, A and G are repeated several times, in that order. This translates into a chain of identical amino acids within the huntingtin molecule. (The amino acid in question is called glutamine.) In most people, the number of repeats ranges from nine to 35. These people are healthy. Those with 36 or more repeats are, however, at risk of developing Huntington's—and those with more than 40 will definitely develop it, unless they die beforehand of something else.

Harmful dominant mutations such as this are rarities. Unlike recessives, they have nowhere to hide from natural selection. It is that which has led some people to wonder if there is more to Huntington's disease than meets the eye. That even the healthy have a variable number of repeats suggests variety alone may confer some advantage. Moreover, there is a tendency for children to have more repeats than their parents, a phenomenon known as anticipation. This suggests a genetic game of "chicken" is going on: up to a point, more repeats are better, but push the process too far and woe betide you.

The trouble with triplets

Elena Cattaneo, a cell biologist at the University of Milan, has been investigating this idea for the past three years. Huntington's exact role remains obscure. But it is known (because it is produced in the relevant cells) to be involved in both the construction of brains in embryos and in the

Also in this section

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process of learning. So Dr Cattaneo began by looking into how the huntingtin gene evolved in creatures with increasingly complex nervous systems.

Huntingtin-like genes go back a long way, and display an intriguing pattern. A previous study had found them in *Dictyostelium discoideum*, an amoeba. *Dictyostelium*'s huntingtin gene, however, contains no CAG repeats—and amoebae, of course, have no nervous system. Dr Cattaneo added to this knowledge by showing the huntingtin genes of sea urchins (creatures which do have simple nervous systems) have two repeats; those of zebrafish have four; those of mice have seven; those of dogs, ten; and those of rhesus monkeys around 15.

The number of repeats in a species, then, correlates with the complexity of its nervous system. Correlation, though, does not mean cause. Dr Cattaneo therefore turned to experiment. She and her colleagues collected embryonic stem cells from mice, knocked the huntingtin genes out of them, and mixed the knocked-out cells with chemicals called growth factors which encouraged them to differentiate into neuroepithelial cells.

A neuroepithelial cell is a type of stem cell. It gives rise to neurons and the cells that support and nurture them. In one of the first steps in the development of a nervous system, neuroepithelial cells organise themselves into a structure known as the neural tube, which is the forerunner of the brain and the spinal cord. This process can be mimicked in a Petri dish, though imperfectly. In vitro, the neuroepithelial cells lack appropriate signals from the surrounding embryo, so that instead of turning into a neural tube they organise themselves into rosette-shaped structures. But organise themselves they do—unless, Dr Cattaneo found, they lack huntingtin.

▶ Replacing the missing gene with its equivalent from another species, however, restored the cells' ability to organise themselves. And the degree to which it was restored depended on which species furnished the replacement. The more CAG repeats it had, the fuller the restoration. This is persuasive evidence that CAG repeats have had a role, over the course of history, in the evolution of neurological complexity. It also raises the question of whether they regulate such complexity within a species in the here-and-now.

They may do. At the time Dr Cattaneo was doing her initial study, a group of doctors led by Mark Mühlau of the Technical University of Munich scanned the brains of around 300 healthy volunteers, and also sequenced their huntingtin genes. These researchers found a correlation between the number of a volunteer's CAG repeats and the volume of the grey matter (in other words, nerve cells) in his or her basal ganglia. The job of these ganglia is to co-ordinate movement and thinking. And they are one of the tissues damaged by Huntington's disease.

Another investigation into huntingtin's role in brains is now being carried out by Peg Nopoulos, a neurologist at the University of Iowa. She and her team are testing the cognitive and motor skills of children aged between six and 18, and comparing these volunteers' test performances and brain scans with their CAG counts.

So far, Dr Nopoulos has tested 80 children who have 35 or fewer repeats. She has found a strong correlation between the number of repeats and a child's test performances. More repeats are associated with both higher intelligence and better physical co-ordination (the former effect seems more pronounced in girls and the latter in boys). Like Dr Mühlau, Dr Nopoulos has found a correlation between repeat numbers and the volume of the basal ganglia. She has also found a correlation with the volume of the cerebral cortex—another area affected by Huntington's.

In the next part of her study, Dr Nopoulos plans to look at children whose repeat count is above 35—that is, in the range where disease is possible but not certain. If the trend to higher intelligence and co-ordination continues here, it will suggest some sort of equilibrium between the positive and negative effects of extending the glutamine chain in huntingtin, and that the game of genetic chicken is thus real.

Repeat performance

Dr Cattaneo's view is that something similar is happening at an evolutionary scale. Pushing up the CAG count increases the amount of neural tissue available, but this only helps if it is accompanied by the evolution of other developmental processes that can organise the extra tissue into something useful. If that does not happen,

the extra tissue is likely to end up as a burden that cannot be accommodated into the brain's architecture, and thus causes disease. More CAGs are therefore necessary, but not sufficient, for a more sophisticated nervous system—and too many are bad for you.

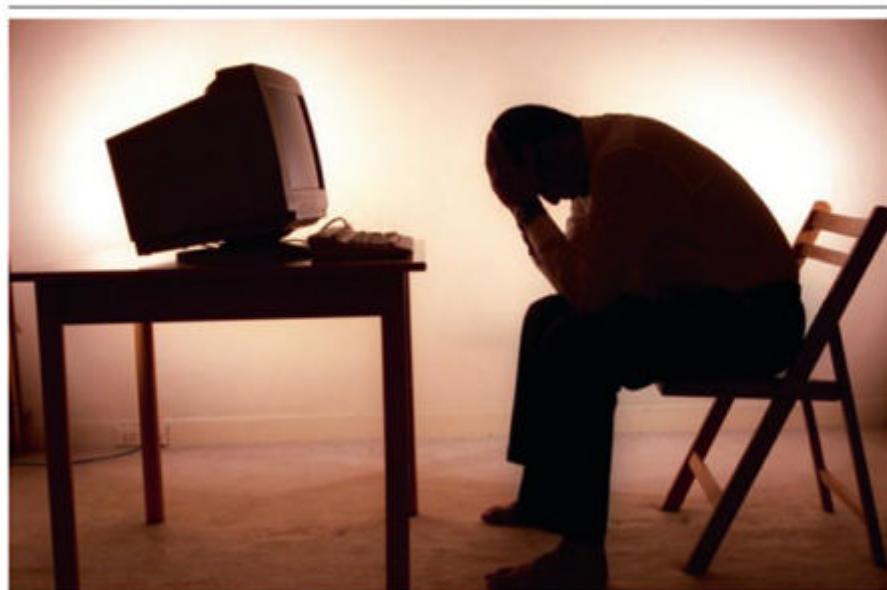
That makes sense, but does not quite capture what is happening in humans. Following Dr Cattaneo's logic, most people might be expected to have 36 repeats, for maximum neurological benefit with minimum risk. In fact, the average is 17. But the range goes up above 200. And then there is the odd phenomenon of anticipation to explain, too.

What causes anticipation is unknown. But it might, in conjunction with humanity's unusual habit of living in social groups, be the key to what is going on.

Big brains are expensive to run, so will appear only when they are useful. Mostly,

that seems to be in social species, where the intelligence they bring can be used to understand and manipulate other group members. Big brains may also be sexy, in the way that peacocks' tails or child-bearing hips are, and thus deliberately selected in partners by members of the opposite sex. Both of these mechanisms will lead to an arms race in which the important thing is to have a bigger brain than your neighbour's. In these circumstances a mutation which made it easier for big brains to evolve might do well. Anticipation could be such a mechanism.

The speed of the human brain's expansion is one of the most remarkable phenomena in evolutionary history. It has tripled in volume in less than 4m years. That this was permitted by a mutation which constantly generates brains that push the upper limits of the possible is a speculation. But it is an intriguing one. ■



Computer security

The law and unintended consequences

The perils of deliberately sabotaging security

COMPUTERS are notoriously insecure. Usually, this is by accident rather than design. Modern operating systems contain millions of lines of code, with millions more in the applications that do the things people want done. Human brains are simply too puny to build something so complicated without making mistakes.

On March 3rd, though, a group of researchers at Microsoft, an American computer company, Imdea, a Spanish research institute, and the National Institute for Re-

search in Computer Science and Automation, in France, discovered something slightly different. They found a serious flaw in cryptography designed to guard private data such as e-mails, financial information and credit-card numbers as they wing their way across the internet. By exploiting this flaw, a malicious hacker could see such information as unencrypted text—and thus insert data of his own, such as password-stealing code, while making it seem to come from a trusted source. ►

Discovering such bugs in the mess of code that underpins the internet is not unusual. But unlike most flaws, this one—dubbed **FREAK** (for “Factoring RSA Export Keys”—is not an accident. Rather, it is a direct result of the American government’s attempts to ensure, two decades ago, that it could spy on the scrambled communications of foreigners. That is an idea which, following Edward Snowden’s revelations about the long reach of Western spy agencies, is back in the news again.

In the early 1990s the internet was an academic network that was only just beginning to reach into the outside world. Security was an afterthought. Programmers at Netscape, a firm which made an early web browser, decided to correct that. They came up with a way to use high-quality cryptography to secure the link between a web page and its visitors.

In those days America’s government classified cryptography—then an arcane subject, of interest mostly to soldiers, diplomats and spies—as a munition, and regulated its export. American software companies could therefore supply their foreign clients only with an emasculated version that American spies, with their piles of powerful computers, were able to break.

It is this weakened cryptography that **FREAK** exploits. Although America’s rules were relaxed years ago, many web servers and browsers retain the code needed to comply with them—for this code still works and no one has bothered to rewrite it. The researchers found a way to persuade servers to generate 1990s-quality encryption keys from this code, and browsers to accept them. In the 1990s, only governments had the computing muscle to break such keys. These days, \$50 of time on Amazon’s cloud-computing service will do.

According to the researchers, millions of people are likely to be vulnerable. For the trick to work, someone must be using an affected piece of software such as Apple’s Safari web browser, or the standard browser built into phones powered by Google’s Android operating system (though not Chrome, Google’s proprietary browser). They must also connect to a website that is configured in a way that makes the exploit possible. When the bug was announced, there were millions of such sites, including the websites of the White House, American Express and Bloomberg.

This time, fortunately, there is an easy fix. The number of vulnerable sites is already falling and Apple has promised a patch within days. But the idea of deliberately weakening cryptography in the name of national security has not gone away. Mr Snowden’s revelations about the extent of Western surveillance have persuaded many information-technology firms—including Google and Apple—to begin encrypting their users’ communications. Western governments, in turn, have

begun demanding that those firms install cryptographic “back doors” to allow spies to unscramble those same communications, while reassuring citizens that their security would remain strong. David Cameron, Britain’s prime minister, said recently that there should be no form of communication that the government could not read.

But mathematics applies to just and unjust alike; a flaw that can be exploited by

3D printing

Entering the jet age

Aircraft engines may soon be built one layer at a time

ADDITIVE manufacturing, as it is known to those who use it—or 3D printing, as the rest of the world more poetically calls it—is unlikely to replace the metal bashing of mass production anytime soon. But for bespoke applications, even those that must meet tough engineering requirements, or “tolerances”, it may oust more traditional methods surprisingly quickly. Building a machine’s components a layer at a time means that complicated shapes can be made more easily than by starting with a lump of metal and removing what is not needed. There is also far less waste.

The latest straws in the wind come from the world’s antipodes. In Britain Rolls-Royce, a large engineering firm, is testing the technique for making parts of commercial-jet engines. In Australia a group of researchers at Monash University, in Melbourne, has built an entire, albeit small, such engine this way.

Rolls-Royce’s plan is to use 3D printing to construct the front bearing housing of its Trent XWB-97 engines. The bearing housing includes 48 aerofoil vanes which guide air into the jet’s compressor. It is 1.5 metres in diameter, measures half a metre from front to back, and is made of an alloy of titanium and aluminium.

Engineers in Rolls-Royce’s additive-manufacturing division, led by Neil Mantle, have been making experimental bearing housings for the Trent using a version of 3D printing that employs a beam of electrons to melt layers of powdered alloy. The melted

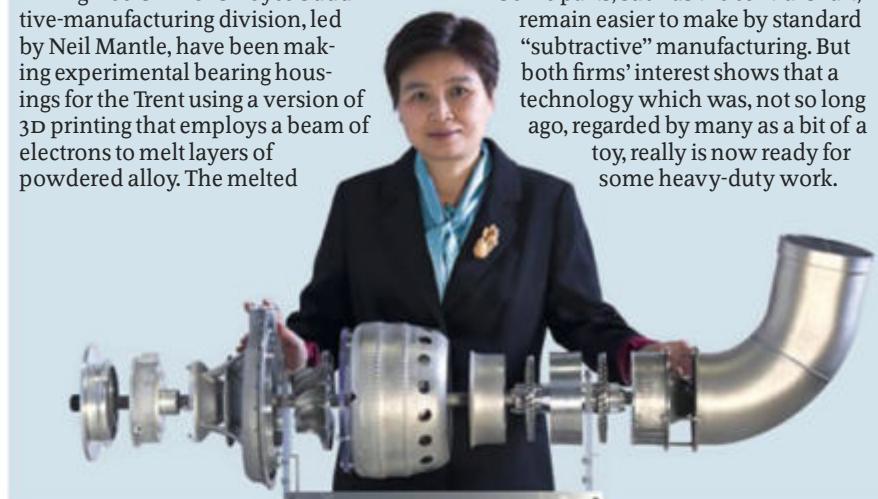
alloy then solidifies and adds to the growing structure. On-the-ground tests are encouraging, but proof will come when a plane powered by the tweaked Trents takes off—which the firm hopes to try out later this year.

The Monash device, put on display in the closing days of February at the Australian International Airshow, is what is known as an auxiliary power unit. It generates electricity rather than thrust and is used, among other things, to help start an aircraft’s main engines. It works, though, on the same principles as a jet that is designed to propel an aircraft.

Wu Xinhua of Monash’s Centre for Additive Manufacturing (pictured, with a disassembled version of the engine) and her colleagues based their power unit on a model built by Safran Microturbo, a French firm with which they are collaborating. They used a laser, rather than an electron beam, to do the melting. The result—whose components are made from titanium, nickel and aluminium alloys—is 60cm long and 40cm in diameter when assembled, and weighs 38kg. Whether it works has yet to be determined, but a test is planned.

Like Rolls-Royce, Safran does not intend to print entire engines routinely.

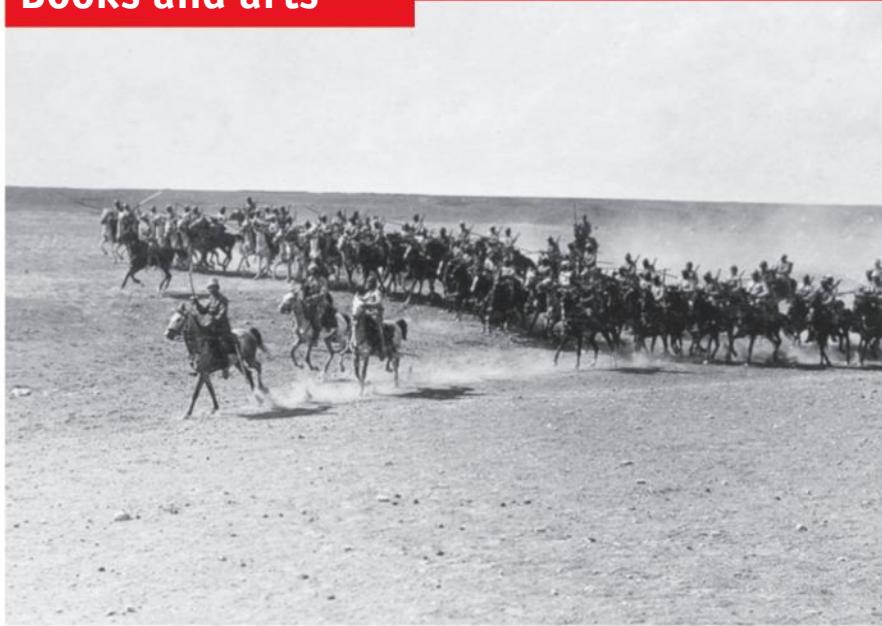
Some parts, such as the central shaft, remain easier to make by standard “subtractive” manufacturing. But both firms’ interest shows that a technology which was, not so long ago, regarded by many as a bit of a toy, really is now ready for some heavy-duty work.



begun demanding that those firms install cryptographic “back doors” to allow spies to unscramble those same communications, while reassuring citizens that their security would remain strong. David Cameron, Britain’s prime minister, said recently that there should be no form of communication that the government could not read.

But mathematics applies to just and unjust alike; a flaw that can be exploited by

Western governments is vulnerable to anyone who finds it. Matthew Green, a cryptographer at Johns Hopkins University, in Baltimore, observes, “this [vulnerability] has been open for decades. Who knows whether it’s ever been exploited? There are lots of smart people out there.” Weakening everyone’s security in the name of counter-terrorism may be a worthwhile trade-off, but it is a trade-off nonetheless. ■



The Ottoman Empire

Heading towards disaster

How a multinational Muslim empire was destroyed by the first world war

“UNTO us a son is born!” It was with great excitement that Enver Pasha, the most powerful of the triumvirate of Young Turks who ruled the Ottoman Empire, greeted the news that two German warships had sailed into neutral Turkish waters on August 10th 1914. The *Göeben*, a heavy battleship, and the *Breslau*, a light cruiser, had bombarded French Algerian ports at the start of the first world war, and were being pursued by French and British vessels across the Mediterranean.

The Turks extracted a high price for granting the ships haven, including recognition of their demands for the recovery of territories lost in earlier conflicts and financial help if they entered the war. To avoid immediate hostilities, though, the Turks ostensibly bought the German ships (and the services of their crews), replacing two dreadnoughts that had been ordered from, but requisitioned by, Britain.

Thus did Germany appear to gain a new ally, and Turkey a protector against dismemberment. The Ottomans came fully into the war two months later, when Germany sent the now Turkish-flagged *Göeben* to attack the Russian navy in the Black Sea. The European war turned global, with Indians, Australians and New Zealanders brought in to fight against Arabs and Turks. The conflict was to prove as disastrous for the Ottomans as for Germany, if not more so. A multinational Muslim empire that had once threatened Vien-

The Fall of the Ottomans: The Great War in the Middle East. By Eugene Rogan. Basic Books; 442 pages; \$29.99. Allen Lane; £25

na was broken up; the first modern genocide, of the Armenians, was committed; the Arab provinces were parcelled up into benighted colonial “mandates”; the foundations of the future Jewish state were laid; and the caliphate, established in the earliest days of Islam, was abolished.

If Germany’s humiliation at Versailles set the stage for German revanchism in the second world war, then the dismantling of the Ottoman Empire created the festering sore that is today’s Middle East. “The legitimacy of Middle Eastern frontiers has been called into question since they were first drafted,” writes Eugene Rogan. “Arab nationalists in the 1940s and 1950s openly called for unity schemes between Arab states that would overthrow boundaries widely condemned as an imperialist legacy.” Nearly a century and several wars later, the worst exponents of that resentment—the jihadists of Islamic State—have proclaimed the recreation of the caliphate.

The story of how the Ottoman Empire stumbled into a conflict for which it was unprepared, how it put up a stronger fight than anyone expected and how its carcass was torn apart are the subject of Mr Rogan’s assured account. Amid myriad books

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about the slaughter in Europe, Mr Rogan, the director of the Middle East Centre at Oxford University, sets out to tell the story through Ottoman eyes. Although he does not always succeed in delivering that viewpoint, the book stands alongside the best histories. Mr Rogan ably weaves the thinking and doings of the politicians and generals with their impact on the soldiers and civilian populations. He sketches many revealing vignettes: Anzac troops rioting around the brothels of Cairo; soldiers in the desert struggling to distinguish enemy combatants from harmless sheep; and a north African soldier-poet describing the carnage in a foreign field at Charleroi in Belgium: “They perished without anyone reciting the profession of faith for them, Lords! They lay exposed to the wild beasts, eagles and birds of prey.”

Mr Rogan offers a nuanced account of the greater and lesser moments—the Allied disaster at Gallipoli; the quagmire at Kut, the mass-murder of the Armenians, the Arab revolt, the conquest of Baghdad and Jerusalem, and the messy political scramble for Damascus.

But he is arguably at his most interesting in his account of the failure of what the Kaiser called *Islampolitik*, the idea that alliance with the Muslim power, and the authority of the caliphate, would weaken Britain and France by subverting the Muslim populations of their colonies in India and north Africa. There were isolated successes, including the enlisting of French north African prisoners-of-war to serve in Ottoman armies. But despite the call to jihad, for the most part Muslim populations and soldiers remained loyal to their colonial masters. Even the revelation of Allied double-dealing to carve up the Middle East, as detailed in the Sykes-Picot agreement, did not blunt the rebellion of the Arab Hashemites against the Ottomans. ►

The Bolshevik revolution of October 1917, which took Russia out of the war, might have ensured survival or even some kind of victory for the Ottomans, by freeing up troops from the east to go south. But it was squandered. Their capture of the oil-fields of Baku left them vulnerable to the British breakthrough in Palestine. In the end, Mr Rogan writes, the Ottomans were more influential than many imagined; instead of being the weakest link among the Central Powers, they held out to the end.

The Ottomans had lost wars before, but never the empire itself. This time it was different. The demands imposed by the Allies provoked a revolt by Mustafa Kemal, the hero of Gallipoli, who pushed the Greeks and Italians out of Anatolia, deposed the sultan and abolished the caliphate. Turkish nationalism thus salvaged the rump of Anatolia. But Arab nationalism was stillborn; the promise of self-determination made by America's president, Woodrow Wilson, was not applied to Egyptians demanding the end of British rule. Islam was the sword that the Kaiser had hoped to use; instead it was later grasped by disgruntled, disenfranchised Muslims against their own rulers, and against perceived foreign foes. ■

American power

The end is not nigh

Is the American Century Over? By Joseph Nye. Polity Press; 152 pages; \$12.95 and £9.99

"AMERICANS have a long history of worrying about their decline," notes Joseph Nye. Puritans in 17th-century Massachusetts lamented a fall from earlier virtue. The Founding Fathers fretted that the republic they had created might dissipate like ancient Rome. Modern scholars are a gloomy lot, too. Michael Lind of the New America Foundation, a think-tank, has written that, with America's foreign

policy in a state of collapse, its economy ailing and its democracy broken, the American century ended last year.

Mr Nye, a veteran observer of global affairs, is more optimistic. He expects that America will still play the central role in the global balance of power in the 2040s. What, after all, is the alternative?

Europe is hardly a plausible challenger. Though its economy and population are larger than America's, the old continent is stagnating. In 1900 a quarter of the world's people were European; by 2060 that figure could be just 6%, and a third of them will be over 65.

By 2025 India will be the most populous nation on Earth. It has copious "soft power"—a term Mr Nye coined—in its diaspora and popular culture. But only 63% of Indians are literate, and none of its universities is in the global top 100. India could only eclipse America if it were to form an anti-American alliance with China, reckons Mr Nye, but that is unlikely: Indians are well-disposed towards Washington and highly suspicious of Beijing.

China is the likeliest contender to be the next hyperpower: its army is the world's largest and its economy will soon be. (In purchasing-power-parity terms, it already is.) But it will be decades before China is as rich or technologically sophisticated as America; indeed, it may never be. By 2030 China will have more elderly dependants than children, which will sap its vitality. It has yet to figure out how to change governments peacefully. And its soft power is feeble for a country of its size. It has few real friends or allies, unless you count North Korea and Zimbabwe.

Hu Jintao, the previous president, tried to increase China's soft power by setting up "Confucius Institutes" to teach its language and culture. Yet such a strategy is unlikely to win hearts in, say, Manila, when China is bullying the Philippines over islands in the South China Sea. The staging of the 2008 Olympics in Beijing was a soft-power success, but was undercut by the jailing of Liu Xiaobo, a pro-democracy activist, and the resulting empty chair at the ceremony to award him the Nobel peace

prize. "Marketing experts call this 'stepping on your own message,'" says Mr Nye.

Perhaps the greatest threats to American pre-eminence are domestic. As pundits often point out, young American workers score terribly on cross-country comparisons of numeracy, and Americans are disillusioned with their government. Yet even here, Mr Nye sees hope: 82% of Americans say America is the best place in the world to live. It remains a magnet for foreign talent, and could be an even stronger one if it sorted out its immigration policy. A "long Jeffersonian tradition" says that one "should not worry too much about the level of confidence in government". Americans may grumble constantly about Washington, but the Internal Revenue Service detects no increase in cheating on taxes, and the proportion of Americans who bother to vote has risen since 2000.

"Leadership is not the same as domination," says Mr Nye; influence matters more than military might. This short, well-argued book offers a powerful rebuttal to America's premature obituarists. ■

Homicide investigation in America

Murder, she wrote

Ghettoside: A True Story of Murder in America. By Jill Leovy. *Spiegel & Grau*; 384 pages; \$28. Bodley Head; £16.99

VIOLENT crime in America has dropped dramatically in the past 20 years. In both New York and Los Angeles, the number of murders fell from about 2,000 a year in the early 1990s to a quarter of that number today. But though far fewer are being killed, black men are still dying at alarming rates in the toughest urban pockets. One such is a part of Los Angeles known as Watts, the subject of a harrowing investigation by Jill Leovy, a veteran police reporter for the *Los Angeles Times*.

In 2007, frustrated that so little attention was being paid to these street murders, Ms Leovy started a blog for her paper called "Homicide Report", describing every single murder in the city. Now, after a decade shadowing an LAPD homicide squad, she has gathered all she learned into a book to stress that this epidemic of murder is still raging. At a time when the Twitter hashtag #BlackLivesMatter is a rallying cry against police killings of black men, her aim in "Ghettoside" is to show that black lives in the inner city matter too—and must be made to matter more.

Ms Leovy powerfully portrays the cycle of violence in Watts through the true story of a single murder, told with the chilling detail and gripping pace of a prime-time ►



Captain America demonstrates his soft power



Watts, Los Angeles, 1966: What future awaited them?

► drama. Bryant Tennelle is the 18-year-old black son of an LAPD detective, a good boy gunned down by mistake; John Skaggs, a blond surfer turned homicide detective, doggedly investigates. As she chronicles the case, Ms Leovy weaves in other heart-breaking stories, taking the reader into police interrogations, the homes of grieving mothers, and hospitals where parents plead for the lives of their dying sons. A portrait emerges of a traumatised community cut off from the world, where thugs kill with impunity and residents are too terrified of reprisal to provide information to the cops.

The strength of "Ghettoside" lies in its blunt reminder of an ugly fact: murder victims in America are disproportionately black men. They represent 6% of America's population, but account for 40% of its murder victims, according to one study cited. For all the gains, Ms Leovy notes, two damning statistics have not budged for 30 years: the murder rate for black people remains five to seven times that of whites, and less than half of those doing the killing are caught and punished.

The violence is usually attributed to a hopeless cocktail of drugs, gangs and guns. But in Watts this is false, Ms Leovy reports. In recent years the drug trade has accounted for only 5% of local killings; black murder rates have held steady no matter what the motive. A root cause of the violence, she says, is the state's "inability to catch and punish even a bare majority of murderers". Indifference to black deaths has resulted in a parallel culture of rough justice that operates independently of the legal system, like other "vengeance cultures" from Northern Ireland to South Africa, Ms Leovy argues. Witnesses will not talk, so bringing suspects to justice is hard.

Detectives like Mr Skaggs, with his near-

flawless record of solving cases, show that things can be different. The conviction of Tennelle's murderers is an example of how cops can catch the bad guys and bring relief to the community, if they throw enough manpower at the problem. (Never mind that not all victims are the sons of cops, a fact the author does not really acknowledge.) Herein lies the book's main weakness. Ms Leovy is so close to the homicide squad that she rarely looks beyond it. Little is heard from residents about why they distrust police, for example. Nor can readers assess complaints that "no one cares" about these black victims without understanding how the LAPD spends its vast budget. This is a compelling report from the trenches, but more remains to be written, and done. ■

Disraeli's marriage

A mismatch made in heaven

Mr and Mrs Disraeli: A Strange Romance.

By Daisy Hay. *Farrar, Straus & Giroux*; 308 pages; \$27. *Chatto & Windus*; £20

QUEEN VICTORIA once thought her "very vulgar"; she was inclined to say "odd and startling things"; she might turn up "like the savages" in "a wreath of red feathers". Mary Anne Disraeli, wife of the prime minister, Benjamin Disraeli, and 12 years his senior, was roundly ridiculed as unworthy of her clever husband. But not by their friends. Yes, they rolled their eyes, yet they also saw her shrewdness and her warm heart. One even thought she matched him: "equally clever in her way".

What no one knew was that Mary Anne was a hoarder. Examining her papers after her death in 1872, Disraeli was astonished: "She does not appear to have destroyed a single scrap I ever wrote to her." Until Daisy Hay took on the task, no one had mined them for her sake rather than his.

Ostensibly, "Mr and Mrs Disraeli" is a portrait of a marriage once considered an absurd mismatch. But the pair had much in common, as Ms Hay, an academic at the University of Exeter, shows. Both were outsiders: Mary Anne, a sailor's daughter thrown among political aristocrats; and Benjamin, a novel-writing dandy in a huntin' and shootin' party, and of Jewish descent in an anti-Semitic society. Both were romantics and mythmakers, inventing and reinventing themselves to suit each other and their circumstances. All this Ms Hay brings out with scholarly perceptiveness.

And yet, despite the parallels, it is Mary Anne's half of the portrait that catches the light. Born in 1792, she carried a racy, Regency air about her to the end. When Disraeli first met her in 1832 he called her pretty, but "a flirt and a rattle". The words conjure up a character from Jane Austen—a Lydia Bennet or an Isabella Thorpe. In fact she was 40, and married—to a Welsh iron magnate and Tory MP, Wyndham Lewis. But Disraeli was on to something. There was a whiff of scandal about her. In her youth, a duel had been fought over her reputation. It would have been easy for her to have fallen through the cracks of respectable society. Ms Hay makes the point by prefacing her chapters with tiny stories about unfortunate women—sometimes friends and relations—who suffered social exile and disgrace, related in letters that Mary Anne collected throughout her life.

Childless herself, there was something of the child about Mary Anne. She loved dressing up and being outside. She would garden by torchlight so as not to lose the evenings. She also talked non-stop, without "a proper concatenation of images, ideas and phrases", said a friend. It all helped on the campaign trail. She canvassed tirelessly for her husbands—wearing a Welsh hat in Cardiff, purple ribbons in Maidstone and "playing the amiable to a pitch of distraction". Voters loved her: "Such a gay lady!" they told Disraeli. "You never can have a dull moment, Sir."

The final years of the marriage are the most touching part of this rich and detailed book. Disraeli wedded Mary Anne soon after Lewis's death in 1838 from a heart attack, frankly for her money. His political career required it. But what began in calculation grew into mutual love. By the end the queen herself, mourning her Albert, was hardly more devoted. In 1868, at Disraeli's suggestion, she made Mary Anne Viscountess Beaconsfield—her prize, perhaps, for at last looking something like an ideal Victorian wife. ■

Alexander McQueen and John Galliano

Two butterflies, one wheel

Gods and Kings: The Rise and Fall of Alexander McQueen and John Galliano. By Dana Thomas. Penguin Press; 420 pages; \$29.95. Allen Lane; £25

Alexander McQueen: Blood Beneath the Skin. By Andrew Wilson. Simon & Schuster; 369 pages; £25. To be published in America by Scribner in September

SAVAGE BEAUTY", a glitzy retrospective of the designs of Alexander McQueen, will open at the Victoria & Albert Museum in London later this month, just over five years after his suicide. This is being advertised as something of a homecoming for a London-born designer, and a commercial coup for the museum: the show attracted 661,000 visitors to the Metropolitan Museum in New York in 2011, making it the eighth-most-viewed exhibition in the Met's history.

John Galliano, another British designer, has also been in the news recently. Few would have been willing to predict a successful rehabilitation after footage emerged of him yelling anti-Semitic abuse at a woman in a Parisian café. But earlier this year Mr Galliano's comeback show for Maison Margiela couture was praised by

the industry just four years after his disgrace. Cate Blanchett, an Australian actress, wore his designs to the recent Oscars ceremony, ensuring further acclaim—and sales. This is a good time, then, for the publication of Dana Thomas's new book about the pair, and Andrew Wilson's new McQueen biography.

"Gods and Kings" benefits immensely from both Ms Thomas's insider's view and the knowledge she brings as a longtime fashion journalist. Woven through this tale of the careers of two of fashion's *enfants terribles* is another: the rise and the subsequent battles of two French luxury conglomerates, LVMH (run by Bernard Arnault) and PPR (now Kering, run by François-Henri Pinault). When McQueen and Mr Galliano worked at Givenchy and Dior respectively, Mr Arnault was their boss. But in 2001 Mr Pinault spirited both McQueen and his namesake label away from LVMH when he bought a controlling interest in a deal worth a reported \$25m.

The era most closely associated with the two designers—the 1990s and 2000s—were the luxury industry's gold-rush days. Some of the figures are staggering: at the time of his death, aged 40, McQueen had a £20m (\$28m) fortune. A ten-minute Dior show staged by the extravagant Mr Galliano is said to have cost \$2m. In 2002 Dior's sales rose by 41% to \$536m, while sales at Mr Galliano's own label totalled \$30m. Even the brands' couture shows, which had been in decline for years, began to flourish. The mantra of the new luxury



McQueen's crown of horns

tycoons, particularly Mr Arnault, was publicity, and plenty of it, which was something show-pony designers like McQueen and Mr Galliano could certainly generate. Their shows might cost \$1m to produce, but they could make 25 times that in advertising. Even if not a single couture garment was sold, the hype would shift millions of bottles of perfume, handbags and shoes—products with the largest markups.

The books are critical of this publicity-and profit-hungry new model. Mr Galliano began his career producing two collections a year; the need for constant media coverage meant that by 2011 he was overseeing 32. "The go-go pace was unsustainable", Ms Thomas writes, "and the wreckage it caused astounding."

She and Mr Wilson present McQueen and Mr Galliano as troubled, bombastic and sometimes cruel, but hugely talented nonetheless. Gay men from humble backgrounds, both were bullied at school, but their talents were recognised while they were young and their careers took off. Some of the anecdotes relating to their private lives—particularly in Mr Wilson's close-up of McQueen—are excruciating. The turn of the millennium found Mr Galliano so removed from reality that he was unable to send an e-mail or use an ATM. McQueen, who was apparently abused by his brother-in-law as a child, had rapacious appetites for sex and drugs and took huge risks with his health. When Sarah Burton, the creative director of his eponymous label, arrived as a young intern she was warned her duties could be unorthodox: "You could be washing up a shitty dildo." At points, the narratives are so sordid and the pair so dislikeable that readers might struggle to believe they were simultaneously creating clothes filled with drama and élan. But what will surprise no one, given the huge strains of their professional careers, is how poorly they coped in their turbulent private lives. ■



The man who made the Impressionists

When Paul Durand-Ruel, a French art dealer, fell for the works of the Impressionists in the early 1870s, they were reviled, almost unsellable. He bought some 12,000 paintings, including 1,000 by Monet (above, "The Artist's Garden in Argenteuil") and eventually created a market for their work. A superb new exhibition at the National Gallery in London tells his story. See Economist.com/durandruel for a full review

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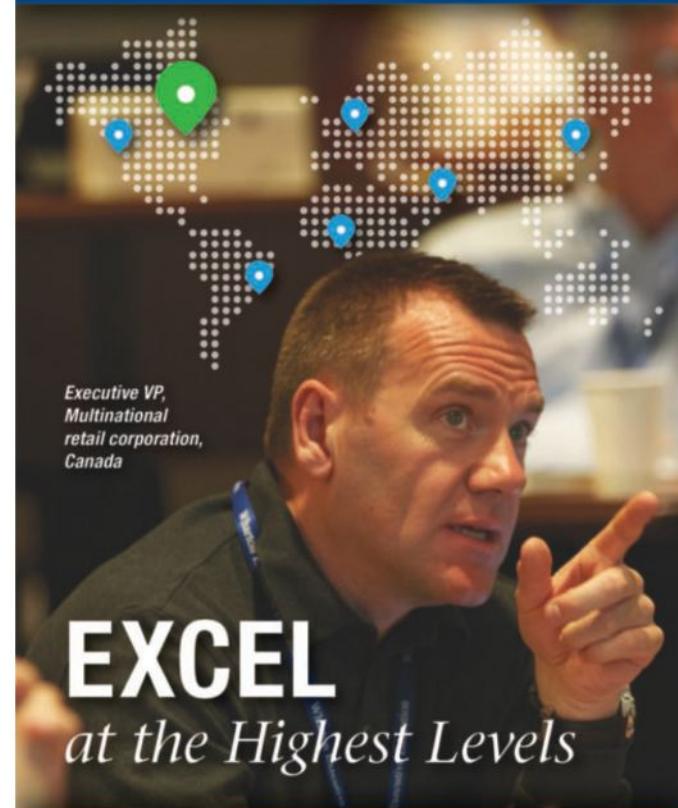
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| | latest | qtr* | 2015† | latest | 2015† | latest | 2015† | rate, % | latest 12 months, \$bn | % of GDP 2015† | % of GDP 2015† | 10-year gov't bonds, latest | Mar 4th | year ago |
| United States | +2.4 | 04 | +2.2 | +3.2 | +4.8 Jan | -0.1 Jan | +0.3 | 5.7 Jan | -388.1 Q3 | -2.2 | -2.5 | 2.09 | - | - |
| China | +7.3 | 04 | +6.1 | +7.2 | +7.9 Dec | +0.8 Jan | +1.5 | 4.1 Q4§ | +213.8 Q4 | +2.1 | -2.9 | 3.30§§ | 6.27 | 6.14 |
| Japan | -0.5 | 04 | +2.2 | +1.1 | -2.6 Jan | +2.4 Jan | +1.0 | 3.6 Jan | +24.3 Dec | +1.7 | -7.2 | 0.38 | 120 | 102 |
| Britain | +2.7 | 04 | +2.2 | +2.6 | +0.5 Dec | +0.3 Jan | +0.5 | 5.7 Nov†† | -163.0 Q3 | -4.3 | -4.6 | 1.88 | 0.66 | 0.60 |
| Canada | +2.6 | 04 | +2.4 | +2.1 | +4.3 Dec | +1.0 Jan | +1.1 | 6.6 Jan | -39.3 Q4 | -2.5 | -1.5 | 1.51 | 1.24 | 1.11 |
| Euro area | +0.9 | 04 | +1.4 | +1.3 | -0.2 Dec | -0.3 Feb | nil | 11.2 Jan | +309.1 Dec | +2.4 | -2.2 | 0.38 | 0.90 | 0.73 |
| Austria | -0.2 | 04 | nil | +1.3 | -2.6 Dec | +0.6 Jan | +1.3 | 4.8 Jan | +2.4 Q3 | +2.4 | -2.3 | 0.48 | 0.90 | 0.73 |
| Belgium | +1.0 | 04 | +0.7 | +1.2 | -2.4 Dec | -0.4 Feb | +0.4 | 8.5 Jan | +8.0 Sep | -0.1 | -2.4 | 0.56 | 0.90 | 0.73 |
| France | +0.2 | 04 | +0.3 | +0.9 | -0.1 Dec | -0.4 Jan | +0.1 | 10.2 Jan | -30.5 Dec‡ | -1.1 | -4.3 | 0.67 | 0.90 | 0.73 |
| Germany | +1.5 | 04 | +2.8 | +1.6 | -0.4 Dec | nil Feb | +0.2 | 6.5 Feb | +284.5 Dec | +7.1 | +0.7 | 0.38 | 0.90 | 0.73 |
| Greece | +1.2 | 04 | -1.5 | +2.0 | -3.9 Dec | -2.8 Jan | -0.8 | 25.8 Nov | +2.3 Dec | +2.6 | -3.2 | 9.74 | 0.90 | 0.73 |
| Italy | -0.3 | 04 | -0.1 | +0.5 | +0.1 Dec | -0.2 Feb | nil | 12.6 Jan | +38.6 Dec | +1.6 | -3.0 | 1.41 | 0.90 | 0.73 |
| Netherlands | +1.0 | 04 | +1.8 | +1.3 | -2.8 Dec | nil Jan | +0.5 | 8.9 Jan | +91.5 Q3 | +9.1 | -2.0 | 0.43 | 0.90 | 0.73 |
| Spain | +2.0 | 04 | +2.7 | +2.0 | +2.2 Dec | -1.1 Feb | -0.7 | 23.4 Jan | +0.7 Dec | +0.5 | -4.5 | 1.37 | 0.90 | 0.73 |
| Czech Republic | +1.2 | 04 | +1.5 | +2.9 | +7.3 Dec | +0.1 Jan | +0.3 | 7.7 Jan§ | +0.2 Q3 | -0.4 | -1.7 | 0.64 | 24.8 | 19.9 |
| Denmark | +1.3 | 04 | +1.7 | +1.6 | +4.7 Dec | -0.1 Jan | +0.7 | 5.0 Dec | +21.2 Dec | +5.8 | -3.0 | 0.42 | 6.73 | 5.43 |
| Hungary | +3.4 | 04 | +3.6 | +2.4 | +4.8 Dec | -1.4 Jan | +1.2 | 7.4 Jan§†† | +5.7 Q3 | +4.8 | -2.6 | 2.99 | 277 | 226 |
| Norway | +3.2 | 04 | +3.7 | +1.0 | +3.1 Dec | +2.0 Jan | +1.4 | 3.7 Dec‡‡ | +42.5 Q4 | +11.3 | +7.5 | 1.54 | 7.78 | 6.01 |
| Poland | +2.8 | 04 | +2.8 | +3.2 | +1.7 Jan | -1.3 Jan | +0.8 | 12.0 Jan§ | -7.1 Dec | -2.4 | -1.4 | 2.23 | 3.75 | 3.04 |
| Russia | -0.3 | 04 | na | -3.5 | +1.0 Jan | +15.0 Jan | +12.5 | 5.5 Jan§ | +56.6 Q4 | +4.6 | -1.5 | 12.19 | 61.9 | 36.1 |
| Sweden | +2.6 | 04 | +4.6 | +2.3 | -1.6 Dec | -0.2 Jan | +0.2 | 8.4 Jan§ | +35.7 Q4 | +5.6 | -1.6 | 0.76 | 8.33 | 6.45 |
| Switzerland | +1.9 | 04 | +2.4 | +1.0 | +2.7 Q4 | -0.5 Jan | -0.7 | 3.1 Jan | +45.7 Q3 | +7.6 | +0.3 | -0.01 | 0.96 | 0.89 |
| Turkey | +1.7 | 03 | na | +4.2 | +4.6 Dec | +7.5 Feb | +6.7 | 10.7 Nov§ | -45.8 Dec | -4.1 | -1.7 | 8.27 | 2.56 | 2.21 |
| Australia | +2.5 | 04 | +2.2 | +2.6 | +3.3 Q4 | +1.7 Q4 | +1.7 | 6.4 Jan | -40.1 Q4 | -2.8 | -2.2 | 2.64 | 1.28 | 1.12 |
| Hong Kong | +2.2 | 04 | +1.5 | +2.5 | -1.7 Q3 | +4.1 Jan | +3.3 | 3.3 Jan‡‡ | +7.7 Q3 | +2.3 | +0.1 | 1.68 | 7.76 | 7.76 |
| India | +7.5 | 04 | +4.0 | +6.6 | +1.7 Dec | +5.1 Jan | +6.0 | 8.8 2013 | -23.4 Q3 | -1.6 | -4.1 | 7.69 | 62.3 | 61.9 |
| Indonesia | +5.0 | 04 | na | +5.5 | +5.2 Dec | +6.3 Feb | +5.2 | 5.9 Q3§ | -26.2 Q4 | -2.6 | -1.8 | 7.10 | 13,037 | 11,575 |
| Malaysia | +5.8 | 04 | na | +5.5 | +7.4 Dec | +1.0 Jan | +3.2 | 3.0 Dec§ | +15.2 Q4 | +3.8 | -4.7 | 3.91 | 3.66 | 3.27 |
| Pakistan | +5.4 | 2014** | na | +5.6 | +2.4 Dec | +3.2 Feb | +4.6 | 6.2 2013 | -3.3 Q4 | -0.8 | -5.2 | 9.20††† | 102 | 105 |
| Singapore | +2.1 | 04 | +4.9 | +3.1 | +0.9 Jan | -0.4 Jan | +0.5 | 1.9 Q4 | +58.8 Q4 | +23.8 | +1.1 | 2.33 | 1.37 | 1.27 |
| South Korea | +2.8 | 04 | +1.5 | +3.7 | +1.8 Jan | +0.5 Feb | +1.5 | 3.8 Jan§ | +92.8 Jan | +5.7 | +0.5 | 2.36 | 1,102 | 1,071 |
| Taiwan | +3.3 | 04 | +4.8 | +3.7 | +8.1 Jan | -0.9 Jan | +1.0 | 3.8 Jan | +65.3 Q4 | +12.0 | -1.2 | 1.64 | 31.4 | 30.4 |
| Thailand | +2.2 | 04 | +7.1 | +4.2 | -1.3 Jan | -0.5 Feb | +1.8 | 1.1 Jan§ | +14.2 Q4 | +2.6 | -1.6 | 2.63 | 32.4 | 32.3 |
| Argentina | -0.8 | 03 | -2.1 | +0.5 | -2.1 Jan | —*** | — | 6.9 Q4§ | -5.0 Q3 | -0.9 | -2.8 | na | 8.74 | 7.88 |
| Brazil | -0.2 | 03 | +0.3 | nil | -5.2 Jan | +7.1 Jan | +7.0 | 5.3 Jan§ | -90.4 Jan | -4.0 | -4.8 | 12.77 | 2.98 | 2.34 |
| Chile | +0.8 | 03 | +1.5 | +3.0 | +5.8 Jan | +4.5 Jan | +3.6 | 6.2 Jan§†† | -5.0 Q3 | -1.6 | -1.9 | 4.26 | 619 | 560 |
| Colombia | +4.2 | 03 | +2.6 | +3.9 | +2.2 Dec | +3.8 Jan | +3.6 | 10.8 Jan§ | -16.2 Q3 | -5.8 | -2.1 | 6.70 | 2,541 | 2,048 |
| Mexico | +2.6 | 04 | +2.7 | +2.9 | +3.0 Dec | +3.1 Jan | +3.9 | 4.4 Jan | -26.5 Q4 | -1.8 | -3.4 | 5.81 | 15.1 | 13.3 |
| Venezuela | -2.3 | 03 | +10.0 | -3.2 | +0.8 Sep | +68.5 Dec | +65.9 | 5.5 Dec§ | +10.3 Q3 | -1.8 | -15.1 | 16.71 | 6.29 | 6.35 |
| Egypt | +6.8 | 03 | na | +3.9 | +6.4 Dec | +9.7 Jan | +9.7 | 12.9 Q4§ | -4.4 Q3 | -1.4 | -10.7 | na | 7.63 | 6.96 |
| Israel | +3.6 | 04 | +7.2 | +3.5 | +1.2 Dec | -0.5 Jan | nil | 5.6 Jan | +11.2 Q3 | +4.6 | -3.1 | 1.68 | 3.99 | 3.49 |
| Saudi Arabia | +3.6 | 2014 | na | +2.5 | na | +2.2 Jan | +2.8 | 6.0 2014 | +120.1 Q3 | -1.1 | -9.7 | na | 3.75 | 3.75 |
| South Africa | +1.3 | 04 | +4.1 | +2.4 | +0.5 Dec | +4.4 Jan | +5.6 | 24.3 Q4§ | -19.7 Q3 | -4.8 | -3.6 | 7.76 | 11.8 | 10.8 |

Source: Haver Analytics. *% change on previous quarter, annual rate. †The Economist poll or Economist Intelligence Unit estimate/forecast. §Not seasonally adjusted. ‡New series. **Year ending June. ††Latest 3 months. †††3-month moving average. §§5-year yield. ***Official number not yet proven to be reliable; The State Street PriceStats Inflation Index, Jan 35.9%; year ago 26.04%. †††Dollar-denominated bonds.

The Economist

Events

THE FUTURE OF TRAVEL

MARCH 24TH 2015, CIRCULO DE BELLAS ARTES, MADRID

THE TRAVEL INDUSTRY IS EVOLVING AND CONSUMERS ARE MORE DEMANDING. WHAT WILL THE GLOBAL TRAVEL INDUSTRY LOOK LIKE IN 2025?

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Markets

| | % change on | | | |
|---------------------------|------------------|-------------|---|-------|
| | Index Mar 4th | one week | Dec 31st 2014 in local currency terms | in \$ |
| United States (DJIA) | 18,096.9 | -0.7 | +1.5 | +1.5 |
| China (SSEA) | 3,436.4 | +1.6 | +1.4 | +0.3 |
| Japan (Nikkei 225) | 18,703.6 | +0.6 | +7.2 | +7.4 |
| Britain (FTSE 100) | 6,919.2 | -0.2 | +5.4 | +3.2 |
| Canada (S&P TSX) | 15,082.8 | -1.0 | +3.1 | -4.2 |
| Euro area (FTSE Euro 100) | 1,184.2 | +1.2 | +14.2 | +4.5 |
| Euro area (EURO STOXX 50) | 3,583.4 | +1.2 | +13.9 | +4.2 |
| Austria (ATX) | 2,465.5 | -0.8 | +14.1 | +4.4 |
| Belgium (Bel 20) | 3,702.2 | +0.8 | +12.7 | +3.1 |
| France (CAC 40) | 4,917.4 | +0.7 | +15.1 | +5.3 |
| Germany (DAX)* | 11,390.4 | +1.6 | +16.2 | +6.2 |
| Greece (Athex Comp) | 849.2 | -8.0 | +2.8 | -6.0 |
| Italy (FTSE/MIB) | 22,131.1 | +0.9 | +16.4 | +6.5 |
| Netherlands (AEX) | 483.6 | +1.1 | +13.9 | +4.2 |
| Spain (Madrid SE) | 1,120.5 | +0.1 | +7.5 | -1.7 |
| Czech Republic (PX) | 1,014.2 | -1.4 | +7.1 | -1.2 |
| Denmark (OMXCB) | 790.0 | +0.7 | +17.0 | +6.9 |
| Hungary (BUX) | 17,824.3 | -4.0 | +7.2 | +1.0 |
| Norway (OSEAX) | 656.2 | -1.2 | +5.9 | +1.6 |
| Poland (WIG) | 53,161.9 | +0.5 | +3.4 | -2.0 |
| Russia (RTS, \$ terms) | 889.7 | +0.7 | +16.7 | +12.5 |
| Sweden (OMX30) | 1,664.5 | -0.8 | +13.7 | +6.5 |
| Switzerland (SMI) | 8,992.5 | +0.2 | +0.1 | +3.4 |
| Turkey (BIST) | 82,067.2 | -5.4 | -4.3 | -12.7 |
| Australia (All Ord.) | 5,871.5 | -0.6 | +9.0 | +4.3 |
| Hong Kong (Hang Seng) | 24,465.4 | -1.3 | +3.6 | +3.6 |
| India (BSE) | 29,380.7 | +1.3 | +6.8 | +8.5 |
| Indonesia (JSX) | 5,448.1 | +0.1 | +4.2 | -0.6 |
| Malaysia (KLCSE) | 1,825.5 | +0.5 | +3.7 | -0.6 |
| Pakistan (KSE) | 33,243.0 | -1.8 | +3.5 | +2.1 |
| Singapore (STI) | 3,415.5 | -0.7 | +1.5 | -1.6 |
| South Korea (KOSPI) | 1,998.3 | +0.4 | +4.3 | +4.5 |
| Taiwan (TWI) | 9,621.7 | -0.8 | +3.4 | +4.0 |
| Thailand (SET) | 1,562.8 | -1.7 | +4.4 | +6.2 |
| Argentina (MERV) | 9,668.4 | +1.1 | +12.7 | +9.1 |
| Brazil (BVSP) | 50,468.1 | -2.6 | +0.9 | -10.3 |
| Chile (IGPA) | 19,284.3 | -0.5 | +2.2 | -0.1 |
| Colombia (IGBC) | 10,151.9 | -2.8 | -12.7 | -19.3 |
| Mexico (IPC) | 43,296.6 | -1.2 | +0.3 | -2.0 |
| Venezuela (IBC) | 3,889.9 | +8.7 | +0.8 | na |
| Egypt (Case 30) | 9,461.1 | -0.1 | +6.0 | -0.7 |
| Israel (TA-100) | 1,356.9 | +1.6 | +5.3 | +2.6 |
| Saudi Arabia (Tadawul) | 9,462.6 | +1.6 | +13.6 | +13.6 |
| South Africa (JSE AS) | 52,891.3 | -0.6 | +6.3 | +3.9 |

The Economist poll of forecasters, March averages (previous month's, if changed)

| | Real GDP, % change | | Consumer prices | | Current account | |
|---------------|--------------------|---------|-----------------|------|-----------------|------|
| | Low/high range | average | 2015 | 2016 | 2015 | 2016 |
| Australia | 1.9/2.9 | 2.3/3.5 | 2.6 | 3.1 | 1.7 (1.8) | 2.7 |
| Belgium | 0.7/1.6 | 0.7/1.9 | 1.2 (1.3) | 1.5 | 0.4 | 1.5 |
| Britain | 2.4/3.0 | 1.7/3.0 | 2.6 | 2.4 | 0.5 (0.6) | 1.8 |
| Canada | 1.6/2.9 | 1.5/2.9 | 2.1 (2.2) | 2.3 | 1.1 (1.0) | 2.1 |
| France | 0.3/1.3 | 0.5/2.1 | 0.9 | 1.4 | 0.1 | 1.2 |
| Germany | 1.0/2.0 | 1.3/2.5 | 1.6 (1.4) | 1.8 | 0.2 | 1.6 |
| Italy | -0.2/0.8 | 0.3/1.5 | 0.5 (0.4) | 1.1 | nil | 1.0 |
| Japan | 0.4/2.3 | 0.8/2.5 | 1.1 | 1.7 | 1.0 (1.1) | 1.4 |
| Netherlands | 0.5/1.7 | 1.1/1.9 | 1.3 | 1.6 | 0.5 (0.4) | 1.3 |
| Spain | 1.4/2.5 | 1.4/2.5 | 2.0 | 2.0 | 0.7 (-0.8) | 1.1 |
| Sweden | 1.6/3.2 | 2.0/3.6 | 2.3 | 2.7 | 0.2 (0.3) | 1.4 |
| Switzerland | nil/2.1 | 0.5/2.3 | 1.0 (1.5) | 1.4 | -0.7 (-0.4) | 0.3 |
| United States | 2.8/3.7 | 2.4/3.5 | 3.2 (3.3) | 2.9 | 0.3 (0.4) | 2.3 |
| Euro area | 0.7/1.6 | 0.8/2.2 | 1.3 (1.2) | 1.6 | nil | 1.2 |

Sources: Bank of America, BNP Paribas, Citigroup, Commerzbank, Decision Economics, Deutsche Bank, Economist Intelligence Unit, Goldman Sachs, HSBC Securities, ING, JPMorgan Chase, KBC Bank, Morgan Stanley, RBC, RBS, Schroders, Scotia Capital, Société Générale, Standard Chartered, UBS

Other markets

| | % change on | | | |
|---------------------------------|----------------------|-------------|---|-------|
| | Index Mar 4th | one week | Dec 31st 2014 in local currency terms | in \$ |
| United States (S&P 500) | 2,098.5 | -0.7 | +1.9 | +1.9 |
| United States (NAScomp) | 4,967.1 | nil | +4.9 | +4.9 |
| China (SSEB, \$ terms) | 295.2 | +0.9 | +2.6 | +1.5 |
| Japan (Topix) | 1,517.0 | +0.6 | +7.8 | +8.0 |
| Europe (FTSEurofirst 300) | 1,557.0 | +1.0 | +13.8 | +4.1 |
| World, dev'd (MSCI) | 1,760.9 | -0.9 | +3.0 | +3.0 |
| Emerging markets (MSCI) | 976.3 | -1.7 | +2.1 | +2.1 |
| World, all (MSCI) | 429.2 | -1.0 | +2.9 | +2.9 |
| World bonds (Citigroup) | 879.7 | -1.7 | -2.5 | -2.5 |
| EMBI+ (JPMorgan) | 698.6 | -0.2 | +1.0 | +1.0 |
| Hedge funds (HFRX) | 1,240.9 [§] | +0.5 | +1.8 | +1.8 |
| Volatility, US (VIX) | 14.2 | +13.8 | +19.2 (levels) | |
| CDSs, Eur (iTRAXX) [†] | 50.2 | -1.7 | -18.8 | -25.8 |
| CDSs, N Am (CDX) [†] | 61.7 | -0.1 | -6.6 | -6.6 |
| Carbon trading (EU ETS) € | 7.1 | -4.8 | -2.9 | -11.2 |

Sources: Markit; Thomson Reuters. *Total return index.

[†]Credit-default-swap spreads, basis points. [§]Mar 3rd.

Indicators for more countries and additional series, go to: Economist.com/indicators

The Economist commodity-price index

| | 2005=100 | | | |
|-------------------------|----------|----------|-----------|----------|
| | Feb 24th | Mar 3rd* | one month | one year |
| Dollar Index | | | | |
| All Items | 144.8 | 144.4 | -0.7 | -16.5 |
| Food | 164.0 | 162.9 | -0.6 | -18.6 |
| Industrials | | | | |
| All | 124.8 | 125.3 | -1.0 | -13.4 |
| Nfa [†] | 121.0 | 122.3 | +2.6 | -21.1 |
| Metals | 126.4 | 126.6 | -2.4 | -9.7 |
| Sterling Index | | | | |
| All items | 170.6 | 170.9 | -2.4 | -9.4 |
| Euro Index | | | | |
| All items | 158.8 | 160.6 | +1.6 | +2.6 |
| Gold | | | | |
| \$ per oz | 1,198.3 | 1,023.2 | -18.7 | -23.5 |
| West Texas Intermediate | | | | |
| \$ per barrel | 48.5 | 50.4 | -4.5 | -51.2 |

Sources: Bloomberg; CME Group; Cotlook; Darmenn & Curl; FT; ICCO; ICO; ISO; Live Rice Index; LME; NZ Wool Services; Thompson Lloyd & Ewart; Thomson Reuters; Urner Barry; WSJ. *Provisional

[†]Non-food agriculturals.

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The ruler who never was

Boris Nemtsov, leader of Russia's reformers, was shot dead on February 27th, aged 55

HE COULD have been president of Russia. So Boris Nemtsov's supporters thought, and so Boris Yeltsin hoped when he groomed him as his successor. But that would need to have been the sort of Russia Mr Nemtsov dreamed of: free, enterprising, hard-working, proud, slightly disorganised, and open to the world. In such a country, he would have fitted right in.

Ideology puzzled him. In the 1980s he was a physicist in Gorky, where Andrei Sakharov was exiled, but no dissident himself. Nor was he a communist. He could never understand why people clung so fiercely to political dogma. The values of his adored Jewish mother, a skilled and caring paediatrician who struggled to bring him up, with his sister, in a tiny apartment, were good enough for him.

Nor did he understand why people needed the suffocating help of the party or the state. He could always live on his wits, as he did by tutoring schoolchildren. There were jobs if you looked, as there were always pretty women happy to be seen on his strong, chivalrous arm. Self-reliance was another quality the reformers, like him, were counting on when they started.

It was needed in politics, too. He won election in 1990 as a member of Russia's first democratic parliament; and when Yeltsin later appointed him governor of

Nizhny Novgorod (previously Gorky), he persuaded the president to make that job an elected office also. If Russians were allowed to vote freely they would, he believed, choose sensibly; and he would talk sense, and truth, back to them.

He remained Yeltsin's golden boy. The president took him round the world, parading him as his successor, testing how well he could hold his drink, and even trying to marry him into the royal house of Sweden. At a reception in Stockholm Mr Nemtsov was seated, on Yeltsin's orders, next to the 20-year-old Princess Victoria. As the dinner wore on, the tipsy order came down that he should kiss her.

In 1997 he was persuaded to leave Nizhny Novgorod, where he was hugely popular, to go to Moscow as Yeltsin's deputy prime minister. He held the job with Anatoly Chubais, another reformer, and together they dazzled Yeltsin with the prospect of a new country. As a state official, though, Mr Nemtsov gave himself no airs. Gone was all that balderdash about the sacred mystique of the Russian state; journalists had his mobile number and called him Boris, without his patronymic. He used simple words, often so simple that he seemed naive and, with his bubbly frivolity, unserious. But this was a man who had done research on "acoustic lasers"; his

world-view was crystal clear. Stealing, betraying and killing were wrong. Thinking, loving and living were good. Such moral clarity became almost unimaginable in Vladimir Putin's Russia.

The tag "oligarch", for Russia's tycoons, was his coining. He took them on. In his dream of a "normal Russia" such men had no place. But nor did he fit into their world; and they were much more powerful. On the TV channels they controlled, prostitutes were hired to gossip about him and his gaffes were dramatised. At last Yeltsin dropped him, and in 1999 Mr Putin got the job he had been meant to have.

Mr Nemtsov's opposition struggled. In 2003 his party, the Union of Right Forces, came nowhere in the elections. Suddenly, he had nothing to do. He had made no money while in government, a fact that seemed both irritating and eccentric to those who milked their time in office. With the oil price going up and the economy booming, the country no longer needed him, his ideas or his values. A passionate windsurfer, he knew there was no wave to ride—until, a year later, the first Orange revolution broke out on the Maidan in Kiev.

At once he became a target for groups mobilised by the Kremlin to forestall contagion from Ukraine. With his broad shoulders and casual air, he shrugged them off at first. He carried on writing reports about Mr Putin's kleptocracy and, in December 2011, joined the protests in Moscow. A year before, the same thing had earned him two weeks in jail. He had wondered then how far he could go down this path. He was prepared to sacrifice the high life and making money. But he was not prepared to die.

In fascism's face

Grassroots politics seemed the best course of action. In 2013 he got elected into a local parliament in Yaroslavl, not far from Nizhny Novgorod, where he handed out leaflets on the streets. After Russia's annexation of Crimea, however, he found himself in a different country. Suddenly he was dealing not just with corrupt government, but also with millions of people whipped into a state of patriotic frenzy. Russia, he fretted, was turning into a fascist state, complete with Nazi-style propaganda and assault brigades.

When he spoke out now against the war in Ukraine, he was almost a lone voice. A vast banner-portrait calling him a traitor hung outside a bookshop in Moscow. Cheerfully determined, he went on distributing his leaflets, most recently for a rally that became his memorial procession.

He was not born for hatred or heroics. He had dreams, but had never intended to become a fighter against state-sponsored fascism. He was simply a good man: too good, in the end, for the country and the times he lived in. ■



A CALM IS NOT DESIRABLE IN
ANY SITUATION IN LIFE — ABIGAIL ADAMS



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