

INSIDE THIS WEEK: TECHNOLOGY QUARTERLY

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America
takes on FIFA

Shrinking cities



China's stockmarket bubble

Is there life on one of Saturn's moons?

The weaker sex

No jobs, no family, no prospects



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**On the cover**

Blue-collar men in rich countries are in trouble. They have not adapted well to trade, technology or feminism. How to help them: leader, page 9. Our essay documents lives without work, without family and without prospects, page 17

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Politics



Ireland became the first country in the world to legalise gay marriage via the popular vote in a referendum. Voters backed a change to the constitution to extend marriage rights to same-sex couples by 62% to 38%. The measure was carried in all but one of Ireland's constituencies. Homosexuality was illegal in Ireland until as recently as 1993.

Andrzej Duda of the conservative Law and Justice (PiS) party defeated the incumbent, Bronislaw Komorowski, of the centrist Civic Platform party, in an upset victory in **Poland's** presidential election. The PiS is also ahead in the polls for the general election due in the autumn. Liberals fear the party will return Poland to the atmosphere of nationalist paranoia that prevailed under the previous PiS government.

Spain's regional elections saw large gains for two upstart parties, the left-wing Podemos movement and the liberals of Ciudadanos. However, fragmented left-wing parties will face difficult negotiations to form coalition governments in most of Spain's regions.

Denmark's prime minister, Helle Thorning-Schmidt, called a general election for June 18th. Her centre-left coalition has been in office since 2011, but an anti-immigrant party is polling well.

David Cameron outlined his new government's agenda in a queen's speech to Parliament, the first from a Conservative majority government since 1996. As promised, a referen-

dum on **Britain** remaining in the EU was included. Mr Cameron met Jean-Claude Juncker, the president of the European Commission, this week to set out his stall for renegotiating Britain's membership.

Not a good sign

The FARC, a leftist guerrilla army that has been fighting **Colombia's** government for 50 years, suspended a ceasefire it had declared in December. The war has escalated in recent weeks. Colombia's president, Juan Manuel Santos, ordered the resumption of air raids after the FARC killed 11 soldiers in April; 27 FARC guerrillas were then killed by Colombian attacks. Despite the fighting, both sides resumed peace talks in Havana.



Leopoldo López, an imprisoned leader of **Venezuela's** opposition, started a hunger strike. He is demanding that the regime led by Nicolás Maduro free political prisoners, end censorship and hold elections. Mr López was accused of inciting violence during protests against the government in February 2014.

At least 250,000 people attended a ceremony in San Salvador, the capital of **El Salvador**, to celebrate the Catholic church's beatification of Archbishop Oscar Romero, who was murdered in 1980 after speaking out against the country's then right-wing regime.

Flashpoint

Israel bombed targets in **Gaza** after a rocket was fired from the strip into Israel. Hamas, the Islamist group that governs Gaza, arrested three members of a militant group on suspicion of firing the rocket. Mean-

while Amnesty, a human-rights group, released a report accusing Hamas of abducting, torturing and murdering civilians in Gaza during a bout of fighting last year.

It emerged that Tony Blair is to step down next month as the envoy of the "Quartet"—the UN, America, the European Union and Russia—a job that seeks to secure peace between Israel and the Palestinians.

Libya's internationally recognised prime minister, Abdullah al-Thinni, survived an attempted assassination after he left a parliamentary session in Tobruk. Gunmen in cars opened fire on his convoy, wounding one bodyguard.

Hopes of a negotiated end to protests in **Burundi** against plans by the president, Pierre Nkurunziza, to run for a third term were dampened after an opposition leader was killed. The continuing violence threatens parliamentary elections that are due to be held on June 5th.

Elections in **Ethiopia**, Africa's second-most populous nation, proceeded peacefully but were expected to deliver a preordained result: the re-election of the ruling party.

Jumping hurdles

After months of manoeuvring the American Senate passed a bill that would grant Barack Obama **Trade Promotion Authority** and guarantee up-or-down votes in Washington to fast-track trade deals. Some Democrats held out against the bill despite the addition of amendments to provide support for American workers. The bill now heads to the House.

Nebraska's legislature abolished the **death penalty** in the state, overturning a veto from the governor. Nebraska is deeply conservative, but a growing number of Republicans have taken up the cause of banning the death penalty, arguing that it does not deter murderers, is more expensive than life imprisonment

(thanks to costly lengthy appeals), and is at odds with Christian morality.

The Obama administration published new rules to protect America's waterways and wetlands. Republicans and some **farmers** reckon the measures represent a big expansion of federal powers and are gearing up for a legal fight.

Melting



A heatwave killed more than 1,370 people in **India** in a week. More than a 1,000 died in the southern state of Andhra Pradesh. Hundreds succumb to heat every year in India, but this year is especially bad.

Thousands of migrants, many of them **Rohingya** from Myanmar, remained adrift at sea awaiting rescue in the Bay of Bengal and the Andaman Sea. Thailand prepared to convene a regional meeting to discuss the crisis.

Security forces in the far western Chinese region of **Xinjiang** have reportedly broken up 181 terrorist groups since they launched a crackdown on extremist violence a year ago. Chinese officials often blame violent incidents in Xinjiang on ethnic Uighur terrorists linked to jihadists abroad. Uighur exiles say the terrorist label is unjustified.

Peru agreed to study a proposal involving co-operation with Brazil and **China** to build a railway stretching 5,300km (3,300 miles) from Peru's Pacific coast to the Atlantic shore of Brazil. China's prime minister Li Keqiang discussed the idea with the Peruvian president, Ollanta Humala, during a trip that also took him to Brazil. ►

Business



Seven senior officials from **FIFA** were arrested on charges of corruption in a dawn raid on a hotel in Zurich, the Swiss city where football's world governing body is based. They, and seven others, including five business executives, stand accused by America's Justice Department of "rampant, systemic and deep-rooted" bribery stretching back 25 years. The Swiss authorities opened a separate criminal investigation into the awarding of the 2018 and 2022 World Cups to Russia and Qatar. The news shook the sport; many hope the arrests will lead to a cleansing of FIFA's stables.

First banks, now the bankers
A former trader went on trial in London over the **LIBOR** scandal. Tom Hayes, whose former employers included UBS and Citigroup, was described by prosecuting lawyers as the alleged "ringmaster" of efforts to manipulate the benchmark inter-bank interest rate. He pleaded not guilty to eight charges of conspiracy to defraud. It is the first time someone has appeared in the dock on LIBOR charges, though a few bankers have pleaded guilty in related cases rather than face a court.

The IMF declared that China's currency is no longer undervalued because of its "substantial real effective appreciation over the past year". This puts the IMF at odds with America, which reckons the Chinese government keeps the yuan at an artificially low rate in order to gain a trade advantage. In March Jack Lew, America's Treasury secretary,

read out a long list of concerns about the slow pace of reforms to China's economy, and included the management of the exchange rate among them.

China's stockmarkets wobbled on May 28th, following a streak of bubbly gains. The Shanghai Composite ended the day 6.5% down as investors booked profits and fretted about tighter lending practices at brokerages.

The share price of **Broadcom**, a chipmaker, surged by more than 20% amid reports that it was the target of a bid by Avago Technologies, in what could be the biggest takeover in the semiconductor industry to date.

Coming to a tablet near you

Eighteen months after it first bid for the company, **Charter Communications** at last secured a deal to buy **Time Warner Cable**, for \$55 billion. Charter was thwarted in its first bid by a rival offer from Comcast, though that offer ultimately fell foul of competition regulators. Charter's acquisition is a triumph for John Malone, its biggest shareholder, who has pushed for consolidation in the cable-tv industry to meet the challenge from content streamed over

the internet. Patrick Drahi, a French telecoms entrepreneur, was also in the running to buy TWC, but said the timing wasn't right and he doesn't do "bulimic growth".

The Irish government gave its approval to the proposed takeover of **Aer Lingus**, Ireland's national airline, by IAG, which owns British Airways. IAG still needs the support of **Ryanair**, which holds a 30% stake in Aer Lingus, for its bid to succeed. Ryanair, meanwhile, said its profit had surged by 66% in the 12 months to March 31st, to €867m (\$1.1 billion). Business has taken off since it ditched its strictly no-frills image in order to target wealthier flyers. Ryanair hopes to carry 100m passengers this year for the first time.

Uber was handed another setback, this time in Italy, where a court in Milan banned its app-based unlicensed car-sharing service across the entire country. Licensed taxi drivers argued that Uber creates unfair competition, a gripe that has been echoed in the many legal cases brought against Uber in cities around the world. It has two weeks to comply with the Italian ruling. In London hundreds of the city's licensed black cabs

brought traffic to a halt in another protest against Uber.

The growth of the global market for **smartphones** will slow this year to 11.3%, according to IDC, a market-research firm. That is down from 27.6% last year and a bit lower than IDC's previous forecast. The main reason is that the Chinese market is nearing saturation point and is predicted to rise by just 2.5% in 2015, the first time it will have lagged the worldwide market.

Not disappearing soon

Evan Spiegel, the 24-year-old founder of **Snapchat**, a photo-messaging app that was valued at \$15 billion after a round of fundraising in March, confirmed that his firm is preparing for an IPO, though he didn't say when.

Pizza Hut said that it would no longer add artificial flavours and colours to its food. Like others in the fast-food industry it is adapting to the rising demand for fresher alternatives. Pizza Hut's customers will now feel that little bit healthier tucking into a deep-filled Pepperoni Lovers pizza with a cheese-stuffed crust.

Other economic data and news can be found on pages 80-81



The weaker sex

Blue-collar men in rich countries are in trouble. They must learn to adapt



of the world they still enjoy social and legal privileges simply because they have a Y chromosome. So it might seem odd to worry about the plight of men.

Yet there is plenty of cause for concern. Men cluster at the bottom as well as the top. They are far more likely than women to be jailed, estranged from their children, or to kill themselves. They earn fewer university degrees than women. Boys in the developed world are 50% more likely to flunk basic maths, reading and science entirely.

One group in particular is suffering (see page 17). Poorly educated men in rich countries have had difficulty coping with the enormous changes in the labour market and the home over the past half-century. As technology and trade have devalued brawn, less-educated men have struggled to find a role in the workplace. Women, on the other hand, are surging into expanding sectors such as health care and education, helped by their superior skills. As education has become more important, boys have also fallen behind girls in school (except at the very top). Men who lose jobs in manufacturing often never work again. And men without work find it hard to attract a permanent mate. The result, for low-skilled men, is a poisonous combination of no job, no family and no prospects.

From nuclear families to fissile ones

Those on the political left tend to focus on economics. Shrinking job opportunities for men, they say, are entrenching poverty and destroying families. In America pay for men with only a high-school certificate fell by 21% in real terms between 1979 and 2013; for women with similar qualifications it rose by 3%. Around a fifth of working-age American men with only a high-school diploma have no job.

Those on the right worry about the collapse of the family. The vast majority of women would prefer to have a partner who does his bit both financially and domestically. But they would rather do without one than team up with a layabout, which may be all that is on offer: American men without jobs spend only half as much time on housework and caring for others as do women in the same situation, and much more time watching television.

Hence the unravelling of working-class families. The two-parent family, still the norm among the elite, is vanishing among the poor. In rich countries the proportion of births outside marriage has trebled since 1980, to 33%. In some areas where traditional manufacturing has collapsed, it has reached 70% or more. Children raised in broken homes learn less at school, are more likely to drop out and earn less later on than children from intact ones. They are also not very good at forming stable families of their own.

AT FIRST glance the patriarchy appears to be thriving. More than 90% of presidents and prime ministers are male, as are nearly all big corporate bosses. Men dominate finance, technology, films, sports, music and even stand-up comedy. In much

These two sides often talk past each other. But their explanations are not contradictory: both economics and social change are to blame, and the two causes reinforce each other. Moreover, these problems are likely to get worse. Technology will disrupt more industries, creating benefits for society but rendering workers who fail to update their skills redundant. The OECD, a think-tank, predicts that the absolute number of single-parent households will continue to rise in nearly all rich countries. Boys who grow up without fathers are more likely to have trouble forming lasting relationships, creating a cycle of male dysfunction.

Tinker, tailor, soldier, hairdresser

What can be done? Part of the solution lies in a change in cultural attitudes. Over the past generation, middle-class men have learned that they need to help with child care, and have changed their behaviour. Working-class men need to catch up. Women have learned that they can be surgeons and physicists without losing their femininity. Men need to understand that traditional manual jobs are not coming back, and that they can be nurses or hairdressers without losing their masculinity.

Policymakers also need to lend a hand, because foolish laws are making the problem worse. America reduces the supply of marriageable men by locking up millions of young males for non-violent offences and then making it hard for them to find work when they get out (in Georgia, for example, felons are barred from feeding pigs, fighting fires or working in funeral homes). A number of rich countries discourage poor people from marrying or cohabiting by cutting their benefits if they do.

Even more important than scrapping foolish policies is retooling the educational system, which was designed in an age when most men worked with their muscles. Politicians need to recognise that boys' underachievement is a serious problem, and set about fixing it. Some sensible policies that are good for everybody are particularly good for boys. Early-childhood education provides boys with more structure and a better chance of developing verbal and social skills. Countries with successful vocational systems such as Germany have done a better job than Anglo-Saxon countries of motivating non-academic boys and guiding them into jobs, but policymakers need to reinvent vocational education for an age when trainees are more likely to get jobs in hospitals than factories.

More generally, schools need to become more boy-friendly. They should recognise that boys like to rush around more than girls do: it's better to give them lots of organised sports and energy-eating games than to dose them with Ritalin or tell them off for fidgeting. They need to provide more male role models: employing more male teachers in primary schools will both supply boys with a male to whom they can relate and demonstrate that men can be teachers as well as firefighters.

The growing equality of the sexes is one of the biggest achievements of the post-war era: people have greater opportunities than ever before to achieve their ambitions regardless of their gender. But some men have failed to cope with this new world. It is time to give them a hand. ■

Share prices in China

Flying too high

The long-term consequences of China's coming stockmarket correction are the ones to fear



IF YOU were a Chinese worker you could have spent the past year toiling to earn a living. Or you could have bought some shares and sat on the sofa (see page 62). Chinese equities have been on a bull run of epic proportions. The CSI300, an index of the biggest mainland stocks, has more than doubled over the past year. That looks positively anaemic compared with ChiNext, a market for Chinese startups which has tripled in 12 months; let alone with shares in Qtone, an online-education company that gained almost 1,300% between its listing early in 2014 and the middle of this month. Its own directors have warned investors to be wary of "ignorant hype".

The signs of overvaluation are everywhere. Stocks listed on the Shenzhen exchange, home to most tech firms, have an average price-earnings ratio of 64; for those on the exchange for small and medium-sized enterprises it is 80. (For most stocks a P-E ratio above 25 is considered expensive.) ChiNext is now priced at nearly 140 times last year's earnings, a valuation that puts it in the same league as NASDAQ, America's tech-heavy exchange, at the height of the dotcom frenzy. Companies whose shares are listed in Hong Kong and in Shanghai are trading at a 30% premium in the mainland, near a four-year high. Some are twice as valuable in China, even though mainland money can now more easily slosh southward into the Hong Kong market.

Retail investors, long the "greater fools" of stockmarket booms and busts, are piling in. In a single week in April, Chinese punters opened more than 4m new brokerage accounts. More than two-thirds of newcomers to the market left school before the age of 15, according to one study. Construction companies that have rebranded themselves as high-tech firms have seen their shares double.

The markets are plainly soaring too high. At some point they will crash. Predicting exactly when is a fool's errand, but the warning signs are accumulating. Recent violent lurches in the share prices of Hanergy and Goldin, two Chinese firms listed in Hong Kong, may have been early signs of trouble. Housing markets in big cities are heating up again: that will probably lead investors to turn away from equities and back to property. Even the Chinese authorities have started warning of risks, though whenever the market has shown signs of correcting in the past they have lost their nerve and talked up share prices. More important than guessing when the crash will come, however, is the question of how serious its economic effects will be. Paradoxically, these are likely to be more damaging over the long term than the short.

Rally drivers

The near-term fallout will be painful for some, to be sure. If the market crashes, aggressive investors, whether individuals or firms, will find themselves in trouble. Many Chinese people have bought shares using borrowed money. The amount of margin financing, whereby investors borrow from brokers

and put up extra collateral if the price moves against them, has more than quintupled over the past year to 2 trillion yuan (\$325 billion). Adding up other forms of debt financing, Credit Suisse estimates that credit-financed share purchases have reached as much as 9% of market capitalisation, five times higher than the level in most developed markets.

Even so, the effect of a correction on the economy will be less dramatic than the bursting of a similar bubble in America or Europe. China's bourses are small relative to the size of the economy. The free-float market capitalisation is about 40% of GDP; the frothy ChiNext market is worth less than 10% of GDP. In most developed markets the equivalent figure is more than 100%. As a result, the stockmarket bonanza has been less important to China's growth than often imagined. Many had thought the rally would lead to more consumption as investors felt richer. In fact, households have allocated less than 10% of their wealth to shares.

The mechanics of a stockmarket reversal may also mute its impact. Hong Kong's markets have no "circuit-breakers"—built-in limits on how far a stock can rise or fall without a suspension of trading—which helps explain the stomach-churning movements in Hanergy's and Goldin's shares. By contrast, the mainland market restricts gains and falls to a daily maximum of 10%, which means a downward correction will be a long spiral rather than a vertiginous drop.

Crash or big bang

More worrying is the lengthy shadow that a crash could cast over the development of China's equity markets. History does not bode well. After the country's last stockmarket bust, in 2007, share prices stagnated for nearly seven years. Investors lost faith; regulators slowed, and then froze, listings.

A similar chill today would be far costlier, for two reasons. First, the Chinese economy has depended disproportionately on borrowing in recent years: total debt has jumped from about 150% of GDP in 2008 to more than 250% today. More equity financing is needed to diversify the mix of corporate funding, and to take the pressure off a banking system that is weighed down by dud loans.

Second, it could slow the pace of financial liberalisation. Chinese regulators have made impressive progress recently—for example, by freeing the rates that banks charge for loans and dangle on savings products, and by relaxing capital controls. A bust might deter them from pressing ahead with more market-based policies.

That would be a mistake. More market reforms, not fewer, are needed to put China's stockmarket on a sounder footing. Making it easier to short stocks would enable sceptical investors to put downward pressure on ballooning shares. Giving mainland punters more access to foreign stock exchanges would drain some of the speculative cash from China. Speeding up listing processes would ensure that the supply of equities can rise to meet surging demand; otherwise money just chases the existing pool of stocks. China cannot eliminate booms and busts from its financial markets, but it can remove the distortions that make them all too common. ■

Turkey's election

Why Turks should vote Kurd

It is the best way of stopping their country's drift towards autocracy



is campaigning for the Justice and Development (AK) party that he founded to win a majority large enough to change the constitution into one with a strong executive presidency. It is to be hoped that he fails.

As prime minister for over 11 years Mr Erdogan notched up many achievements. The economy was mostly stabler and growth steadier than in the 1990s. He tamed Turkey's coup-prone generals and its aggressively secularist establishment. In October 2005 he secured the prize of opening negotiations to join the European Union. He pushed Turkey into a more active foreign-policy role in the Middle East. And he has come closer than any predecessor to making peace with the country's 15m restless Kurds.

But these achievements are now looking less impressive. Growth has slowed sharply, the lira is under pressure and investors are fretting about a coming bust, not least because Mr Erdogan has attacked the independent central bank. He has failed to liberalise the economy. The EU talks seem to be going nowhere. The Kurdish peace process has stalled. And his vaunted foreign policy has failed (see page 27).

Mr Erdogan has become increasingly intolerant, nationalist and autocratic, especially since a harsh crackdown on protests in Istanbul's Gezi Park two years ago. Opponents have been hassled. The internet has been censored. Journalists have been

silenced or jailed: Turkey comes an embarrassing 149th out of 180 countries for press freedom. When police and prosecutors began a corruption probe in late 2013 that touched not just senior ministers but also Mr Erdogan's own family, he responded by firing or reassigning them and taking greater control over the judiciary. Turkey's institutions are young and relatively weak: checks and balances on a forceful prime minister (or a putative strong president) are all but non-existent.

In the light of all this, an executive presidency partly modelled on France's sounds like a bad idea. With Mr Erdogan in the job, it could swiftly slide towards authoritarianism. Corruption would be harder to counter. And the EU would lose any interest in Turkish accession.

Potential Putin problem

Turkey does not need a Charles de Gaulle, still less a Vladimir Putin. Instead, it needs greater devolution of power (elected provincial governors would be a good start) and a consensual, not confrontational, approach to constitutional change. So voters should not give AK the supermajority that would allow it to set about such change on its own. Instead, they should back an opposition party.

The two main opposition parties are weak outfits with lack-lustre leaders. The strongest opposition figure is Selhattin Demirtas of the small pro-Kurdish People's Democratic Party (HDP), which is polling close to the 10% threshold that it needs to reach in order to win seats in the national assembly. If it got into parliament, there would be a double benefit: the way the political maths work, Mr Erdogan would probably have to abandon the executive presidency, and the Kurdish peace process would gain a welcome boost. Turks should give their votes to the HDP. ■

Corruption in football

At last, a challenge to the impunity of FIFA

The arrest of officials should be the first stage in a thorough cleansing of a discredited organisation



FEW arrests can have provoked such Schadenfreude as those of seven senior officials of FIFA, football's world governing body, early on May 27th at a swish Swiss hotel. The arrests are part of a wide-ranging investigation by America's FBI into corruption at FIFA, dating back over two decades. The indictment from the Department of Justice named 14 people on charges including racketeering, wire fraud and paying bribes worth more than \$150m. They are likely to face charges in a US federal court. As more people start talking in a bid to *sauve qui peut*, the investigation will with luck reach into every dark and dank corner of FIFA's Zurich headquarters (see page 55).

American extraterritorial jurisdiction is often excessive in its zeal and overbearing in its methods, but in this instance it deserves the gratitude of football fans everywhere. The hope must be that FIFA's impunity is at last brought to an end and with it the career of the ineffably complacent Sepp Blatter, its 79-year-old president, who was nonetheless expected to be re-elected for a fifth term after *The Economist* had gone to print.

The evidence of systemic corruption at FIFA has been accumulating for years, but came to a head in 2010 with the bidding for two World Cups. When the right to hold the competition in 2022 was won by tiny, bakingly hot Qatar, against the strong advice of FIFA's own technical committee, suspicions that votes had been bought were immediately aroused. Thanks to two female whistleblowers and the diligent investigative work of the *Sunday Times*, a wealth of damning evidence was un-

▶ earthed involving a Qatari FIFA official, Mohamed bin Hammam, who allegedly wooed football bigwigs in Africa with a \$5m slush fund.

Under pressure, Mr Blatter eventually agreed to set up a FIFA "ethics court". He also appointed Michael Garcia, the American lawyer who helped oust Eliot Spitzer from the position of New York governor, to investigate the allegations of vote-rigging and kickbacks. Incredibly, Mr Garcia, who spent more than a year looking into the allegations, never interviewed Mr bin Hammam or examined the trove of e-mails acquired by the *Sunday Times*. Only a summary version of his report, itself condemned by the investigator as "erroneous representations of the facts and conclusions", was ever published. Mr Garcia resigned and Mr Blatter sailed serenely on, reneging on a commitment not to stand for election again. The idea that a clearly tainted World Cup bidding process should be reopened was firmly squashed.

The underlying problem at FIFA is that it controls television and marketing rights (worth \$4 billion at last year's World Cup in Brazil), which can be used by those in power to win the loy-

alty of football federations from poor countries, particularly in Africa. Corruption is tolerated, as long as the money is spread around. Critics of FIFA are dismissed as bad losers and racists.

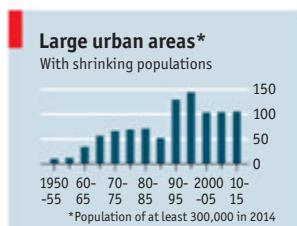
The language it understands

Even now, there is no certainty that FIFA will embrace reform. The initial test of its willingness to clean house should be the replacement of Mr Blatter with someone who can be trusted with that mission, which must begin with reopening the bidding for the 2018 and 2022 World Cups under conditions of complete transparency. If nothing changes, others must act. UEFA, European football's umbrella organisation, should leave FIFA and take its teams out of the World Cup. Europe's broadcasters should decline to bid for rights. And FIFA's biggest sponsors—the likes of Adidas, Coca-Cola, Visa and Hyundai—should realise that association with it risks damaging their brands. They must hit the organisation where it hurts most: in its bulging wallet. Until now the stench from FIFA has prompted people to do nothing more than hold their noses. That is no longer an option. ■

Urban policy

How to shrink a city

Many cities are losing inhabitants. Better to manage decline than try to stop it



at least the problem is widely acknowledged. That is not true of another pressing urban dilemma: what to do with cities that are losing people.

They are hardly unusual. Almost one in ten American cities is shrinking. So are more than a third of German ones—and the number is growing (see page 52). Although Japan's biggest cities are thriving, large numbers of its smaller ones are collapsing. Several South Korean cities have begun to decline—a trend that will speed up unless couples can somehow be persuaded to have more babies. Next will come China, where the force of rapid urbanisation will eventually be overwhelmed by the greater power of demographic contraction. China's total urban population is expected to peak by mid-century; older industrial boom towns are already on a downward slope.

An abandoned street containing a rotting nursery or primary school is a sad sight. And declining cities have more than visual problems. Disused buildings deter investors and attract criminals; superfluous infrastructure is costly to maintain; ambitious workers may refuse to move to places where the potential clientele is shrinking. Where cities are economically self-sufficient, a smaller working population means a fragile base on which to balance hefty pension obligations. That is why Detroit went bust.

So it is unsurprising that governments often try to shore up their crumbling smaller cities. Japan recently announced tax cuts for firms that are willing to move their headquarters out of

ONE of the biggest challenges for the world this century is how to accommodate the hundreds of millions of people who will flock to cities, especially in emerging economies. Coping with this human torrent will be fearsomely difficult—but

thriving Tokyo. Office parks, art museums and tram lines have been built in troubled American and European cities, on the assumption that if you build it, people will come.

For the most part, they will not. Worse, the attempt to draw workers back to shrinking cities is misconceived. People move from smaller to larger cities in countries like Germany and Japan because the biggest conurbations have stronger economies, with a greater variety of better-paying jobs. The technological revolution, which was once expected to overturn the tyranny of distance, has in fact encouraged workers to cluster together and share clever ideas. Britain's productivity is pitiful these days (see page 29) but it is almost one-third higher in London than elsewhere.

Policies meant to counteract the dominance of big cities are not just doomed to fail but can actually be counter-productive. The most successful metropolises should be encouraged to expand by stripping away planning restrictions. If housing were more plentiful in the bigger conurbations it would be cheaper, and the residents of declining cities, who often have little housing equity, would find it easier to move to them. Rent controls and rules that give local people priority in public housing should go, too: they harm the poor by locking them into unproductive places.

A new kind of garden city

Even so, many people will stay stuck in shrinking cities, which will grow steadily older. Better transport links to big cities will help some. But a great many cannot be revived. In such cases the best policy is to acquire empty offices and homes, knock them down and return the land to nature—something that has worked in the east German city of Dessau-Rosslau and in Pittsburgh in America. That will require money and new habits of mind. Planners are expert at making cities work better as they grow. Keeping them healthy as they shrink is just as noble. ■



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Collective decisions on land

We read with interest your concerns in "Forced errors" (May 2nd) about the suffering and waste created by India's poor system of forced land sales. One of us had personal experiences with the allocation of land in Brazil's favelas, which led us to design a system that enables land assembly and sale, and still protects landowners' rights.

As you point out, giving each seller an individual veto is hopeless. Nevertheless, sellers can be given a collective veto, through a vote on whether to accept a buyer's offer as a group. To protect minority sellers being shunted out of their homes unfairly, we propose using a system that allows voters to express the intensity of their preferences by buying votes. This system avoids landowners with superior plots being offered too little and lessens the power of holdouts, without needing to dislodge farmers forcibly.

SCOTT DUKE KOMINERS
Harvard Society of Fellows
Cambridge, Massachusetts
E. GLEN WEYL
Department of economics
University of Chicago

Russian lessons

Alexander Yakovenko, the Russian ambassador to Britain, eloquently drew your readers' attention to the monumental and heroic sacrifices made by the Soviet people during the second world war (Letters, May 16th). Only the churlish would begrudge the Soviet Union the lion's share of the credit for defeating the Nazis. He was right also to castigate the West's poltroonery in the years preceding the war, culminating in the Munich agreement. It is this shameful memory that makes the West so anxious to avoid repeating these mistakes, and which informs the West's response to Russia's illegal occupations of South Ossetia and Crimea.

Mr Yakovenko's pithy assertion that "state sovereignty is no carte blanche to suppress one's own citizens" is gratifying. It is only a pity that

Russia's governments, including the present one, have failed so consistently to live up to this ideal.

PABLO MILLER
Colchester, Essex

Rights, and wrongs

Lexington warns supporters of gay marriage to be "magnanimous in victory" if the Supreme Court strikes down bans on same-sex nuptials (May 9th). Does this mean, to take the situation alluded to in the column, that a gay legally married couple should quietly accept a religious university stopping them from living in a dormitory, and that the university should be allowed to keep its tax-exempt status? Few would argue that a mixed-race couple should have to endure such discrimination.

If the Supreme Court rules in favour of gay marriage undoubtedly a minority of our citizens will find it problematic and downright offensive. It is worth noting that this minority is shrinking rapidly. But a right is a right, and is not conditional on some people feeling uncomfortable with it.

Being magnanimous shouldn't mean accepting second-class status. Do we make this demand of other groups seeking to uphold their rights? Would we accept it for ourselves?

MICHAEL PLETTERS
El Paso, Texas

Hard graft

You claimed that the system for investigating bribery has become "ridiculous" and used Walmart as an example ("Daft on graft", May 9th). I hope you were trying to be ironic.

According to a Pulitzer prize-winning article published in the *New York Times* in 2012, Walmart was made aware of its bribery problem in 2005. Instead of listening to the whistle-blower, it transferred responsibility for the investigation to an employee in Mexico who stood accused of authorising the bribes. The director of corporate investigations said the six-page report produced a few weeks later was "truly

lacking". Despite this concern and an initial investigation suspecting misconduct, the matter was closed.

Walmart is now paying for turning a blind eye to its mess with further allegations in China, India and Brazil. It doesn't sound as if the proposed "compliance defence" would help it at all.

ERIC YOUNG
Philadelphia

The reforms mentioned in your leader would go some way to reducing corporate corruption. But, this still remains a compliance process which encourages management to tick the boxes while finding ways around the intent of the law. Any change for the better has to start with senior managers realising that being ethical is actually good for a sustainable business. Such behaviour can be learned, but it requires leaders to be willing to work at rewiring their own neural connections.

Unfortunately, as Tolstoy said, "Everyone wants to change the world, but no one wants to change themselves." Let's hope there are exceptions.

JOHN KNIGHTS
Chairman
LeaderShape
Oxford

Government and markets

"Of rules and order" (May 9th) rightly attributed the concept of a strong government setting the framework for free markets to the Austrian school associated with Friedrich Hayek. However, the concept was also embraced by one of the leading economists of the Anglo-Saxon world. In 1972 none other than Milton Friedman wrote that "The role of government...is to do something that the market cannot do for itself, namely, to determine, arbitrate, and enforce the rules of the game."

Had Hayek's and Friedman's insight been heeded in more countries during the boom years, the European Union might not be on the brink of self-destruction today.

MICHAEL TITZ
Windach, Germany

Floating kyats

You described the "tricky task" facing Cuba in unifying its two currencies ("Day zero or D-Day?", May 16th). Its government could learn something from Myanmar. Until the recent reforms in the country there were up to seven exchange rates applying to different types of transactions. Although the official rate had been kept for many years at six kyats to the dollar, the market rate fluctuated at up to 1,300 kyats to the dollar. If 24:1 in Cuba is "suicidal" for an attempt to harmonise the rates, how to describe the situation in Myanmar at 217:1?

In early 2012 the Central Bank of Myanmar, with the help of the IMF, successfully harmonised the rates. The kyat has been floating freely ever since.

LUC DE WAEGH
Managing partner
West Indochina
Yangon

Yeah, yeah, yeah

"The Stones or the Beatles?" you say, is "the most important question in music" ("First principals", May 9th). Easily answered: the Who.

REVEREND NEIL YOUNG
Mississauga, Canada

So you think the Rolling Stones are better than the Beatles? You're a fool on the hill.

STEVE TOWERS
Singapore ■

Executive Focus



DIRECTOR (Grade AD14)

DIRECTORATE-GENERAL FOR HUMAN RESOURCES AND SECURITY

Directorate "Security" (HR.DS), Brussels
COM/2015/10359

The European Commission's Security Directorate is part of the Directorate-General for Human Resources and Security and in charge of the institution's internal security policy. This policy seeks to ensure that, in all its places of activity, people, assets and information are adequately protected against security threats and safety risks.

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Please consult the Official Journal C 165 A of 20 May 2015 for the detailed vacancy notice as well as the eligibility and selection criteria.

Registration for applicants:
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The Hague, The Netherlands



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Deadline for expression of interest: on **August 31, 2015**.

Please send a C.V. and letter of expression of intent to:

Mouna Cherkaoui, (cherkaoui.mouna@hotmail.com) Chair, ERF Board Search Committee, and **Yasmine Fahim** (yfahim@erf.org.eg)



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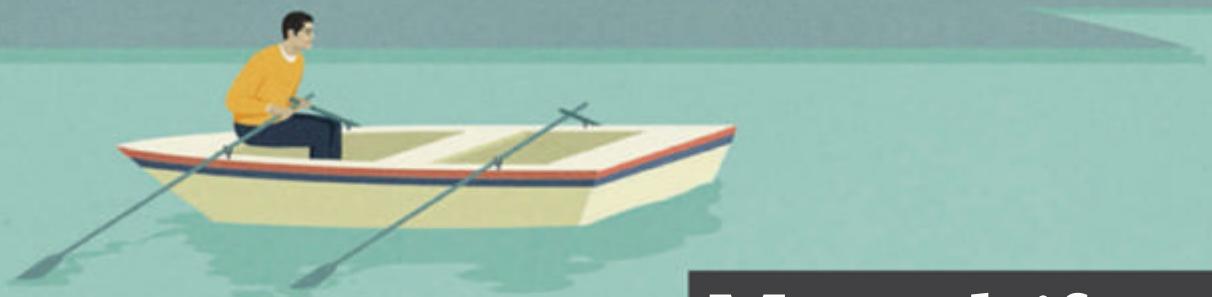
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Men adrift

Badly educated men in rich countries have not adapted well to trade, technology or feminism

KIMBERLEY, a receptionist in Tallulah, thinks the local men are lazy. "They don't do nothin'," she complains. This is not strictly true. Until recently, some of them organised dog fights in a disused school building.

Tallulah, in the Mississippi Delta, is picturesque but not prosperous. Many of the jobs it used to have are gone. Two prisons and a county jail provide work for a few guards but the men behind bars, obviously, do not have jobs. Nor do many of the young men who hang around on street corners, shooting dice and shooting the breeze. In Madison Parish, the local county, only 47% of men of prime working age (25-54) are working.

The men in Tallulah are typically not well educated: the local high school's results are poor even by Louisiana's standards. That would have mattered less, in the old days. A man without much book-learning could find steady work at the mill or in the fields. But the lumber mill has closed, and on nearby farms "jobs that used to take 100 men now take ten," observes Jason McGuffie, a pastor. A strong pair of hands is no longer enough.

"If you don't have an education, what can you do?" asks Paxton Branch, the mayor. "You can't even answer a phone if you don't have proper English." Blue-collar jobs require more skills than they used to, notes Katie McCarty of the North East Louisiana Workforce Centres, a job-placement agency. If you want to be a truck driver, you need at least an eighth-grade education to handle the paperwork, she observes; that is, the mental skills a 13- or 14-year-old is supposed to have, and which men disproportionately lack.

Orlando Redden is in his mid-40s and sporadically employed. He is big, strong and, by all accounts, a hard worker. But he is inarticulate, hazy about numbers and has no skills that would make an employer sit up and take notice. He has bounced from job to job throughout his adult life: minding the slot machines in a casino, driving a forklift, working as a groundskeeper, and so on.

The forklift job, at a factory that made mufflers for cars, was the best: it paid \$10.95 an hour. But then the factory closed. He lost his groundskeeper job, too, when a new boss merged two roles (groundskeeper and maintenance man) into one, and gave it to the man with more skills. He recently found a job with a ➤

paving contractor, which is better than nothing but requires him to commute more than 30 miles (50km) a day.

Tallulah may be an extreme example, but it is part of a story playing out across America and much of the rest of the rich world. In almost all societies a lot of men enjoy unwarranted advantages simply because of their sex. Much has been done over the past 50 years to put this injustice right; quite a bit still remains to be done.

The dead hand of male domination is a problem for women, for society as a whole—and for men like those of Tallulah. Their ideas of the world and their place in it are shaped by old assumptions about the special role and status due to men in the workplace and in the family, but they live in circumstances where those assumptions no longer apply. And they lack the resources of training, of imagination and of opportunity to adapt to the new demands. As a result, they miss out on a lot, both in economic terms and in personal ones.

For those at the top, James Brown's observation that it is a man's, man's, man's world still holds true. Some 95% of Fortune 500 CEOs are male, as are 98% of the self-made billionaires on the *Forbes* rich list and 93% of the world's heads of government. In popular films fewer than a third of the characters who speak are women, and more than three-quarters of the protagonists are men. Yet the fact that the highest rungs have male feet all over them is scant comfort for the men at the bottom.

Technology and trade mean that rich countries have less use than they once did for workers who mainly offer muscle. A mechanical digger can replace dozens of men with spades; a Chinese steelworker is cheaper than an American. Men still dominate risky occupations such as roofer and taxi-driver, and jobs that require long stints away from home, such as trucker and oil-rig worker. And, other things being equal, dirty, dangerous and inconvenient jobs pay better than safe, clean ones. But the real money is in brain work, and here many men are lagging behind. Women outnumber them on university campuses in every region bar South Asia and sub-Saharan Africa. In the OECD men earn only 42% of degrees. Teenage boys in rich countries are 50% more likely than girls to flunk all three basic subjects in school: maths, reading and science.

The economic marginalisation this brings erodes family life. Women who enjoy much greater economic autonomy than their grandmothers did can afford to be correspondingly pickier about spouses, and they are not thrilled by husbands who are just another mouth to feed.

If the sort of labour that a man like Mr Redden might willingly perform with diligence and pride is no longer in great demand, that does not mean there are no jobs at all. Everywhere you look in Tallulah there are women working: in the motels that cater to passing truckers, in the restaurants that serve all-you-can-eat catfish buffets, in shops, clinics and local government offices. But though unskilled men might do some of those jobs, they are unlikely to want them or to be picked for them.

In "The End of Men", a good book with a somewhat excessive title, Hanna Rosin notes that of the 30 occupations expected to grow fastest in America in the coming years, women dominate 20, including nursing, accounting, child care and food preparation. "The list of working-class jobs predicted to grow is heavy on nurturing professions, in which women, ironically, seem to benefit from old stereotypes," writes Ms Rosin. And those old stereotypes are deeply ingrained in the minds of the men they marginalise; they no more see jobs centred on serving or caring as their sort of thing than society does.

Although there is no reason in theory

Men at the top

Male share, March 2015 or latest, %

<i>Forbes</i> self-made billionaires	97.6
<i>Fortune</i> 500 CEOs	95.2
Heads of government	92.8
Central-bank governors	91.4

Sources: *Forbes*; *Fortune*; Inter-Parliamentary Union; Central Bank News

why men could not become nurses or care-home assistants, few do. Most schools would love to have more male teachers to serve as role models for boys, but not many volunteer. And poorly educated men are often much worse at things such as showing up on time and being pleasant to customers (even if you don't feel like it) than their female peers are. For the working class, the economy "has become more amenable to women than to men", argues Ms Rosin.

Criminality, alas, remains an option for men of all skill sets, as Tallulah's prisons bear witness. The world's most dysfunctional people are nearly all male. Men have always been more violent than women, even if they are less violent now than they used to be. In America today they commit 90% of murders and make up 93% of the prison population. They are also four times more likely to kill themselves than women are.

For many men in Tallulah, the greatest obstacle to finding a job is that they have already fallen foul of the law. Mikel Davis, a polite 29-year-old, is typical. He graduated from high school a decade ago and got "caught up in the street," he says. "My mind wasn't there. I wasn't dedicated to the right."

He started to deal small quantities of marijuana. He was caught, briefly jailed and released on probation. "I haven't peed dirty since," he says, but with a criminal record "finding a job was hell." Mr Davis applied to McDonald's, Arby's, Chevron—you name it. After a year he found work "washing cars in the rain". Now he toils at a burger joint, and is training to be a welder. When Mr Davis was selling drugs, he says, he could make more in a day than he does in a week wiping tables. But crime seldom pays in the long run. It is no way to support a family.



MR REDDEN has three children by three women. Mr Davis has two children by two. Neither man lives with any of the mothers or any of their children. Mr Davis supports both of his, he says: one, financially; the other, by visiting and helping around the home. He says he is still friendly with one mother, but "not in a committed relationship".

When they talk about a man's role in the home, though, both men sound like preachers from the 1950s. "Being a man means supporting your family," says Mr Davis. "You've got to do whatever it takes so they eat, [or] you're no man at all." Being a man, says Mr Redden, means you "work hard, provide for your kids, have a car and [maybel] get your own house some day." Mr Davis goes further: "If I have kids and my woman has to work, that's not what a woman should do. She should be home with the kids."

There is, to put it mildly, a disconnect between these ideas of a man's role and the reality of life in Tallulah. The busy women of Tallulah are far from rich, but they are getting by, and they are doing so without much help from men.

Fifty years ago the norms for marriage in most rich countries were simple and sexist. If a man got a woman pregnant the couple got married; in 1960 in America 30% of brides gave birth within eight and a half months of the wedding, according to June Carbone of the University of Minnesota and Naomi Cahn of George Washington University. After the arrival of children, the husband's responsibility was to earn and the wife's was to mind the home. There were exceptions, but the rules were universally understood and widely followed. According to Ms Carbone and Ms Cahn more ➤

Men at the bottom

Male share, 2015 or latest, %

Prisoners in the US	93
Global murder victims	79
Global deaths from suicide	66

Sources: National sources; UNODC; IHME



► than 80% of wives with young children stayed at home in 1960.

Those norms have changed. The pill, which was approved in America that same year, allowed women to regulate their fertility. It used to be common for brainy women to drop out of college when they became pregnant. Now they can time their babies to fit with their careers. The ability to defer children is one of the reasons why 23% of married American women with children now out-earn their husbands, up from 4% in 1960. Few women in rich countries now need a man's support to raise a family. (They might want it, but they don't need it.)

With women in a better position to demand equality, many men have changed their behaviour accordingly. Studies of who does what within two-parent families show a big generational shift. In 1965 fathers did 42 hours of paid work, 4 hours of housework and 2.5 hours of child care each week, according to the Pew Research Centre. Mothers did seven times as much housework as fathers, four times as much child care and one-fifth as much paid work, adding up to 51 hours a week. Overall, men had two extra hours a week to drink highballs and complain about their daughters' boyfriends.

Fast-forward to 2011 and there is less housework—thanks to dishwashers and ready meals—more evenly divided, with the mother doing 18 hours a week to the father's 10. Both parents are doing more child care. The mother is doing a lot more paid work; the father is doing five hours less. Overall, the father is toiling for 1.5 hours a week longer than the mother.

The same Pew survey suggests that most couples don't think the compromise they have reached is wildly out of kilter. Fully 68% of women say they spend the "right amount" of time with their kids; only 8% say they spend too much. Many parents find it hard to balance work and family, but there is not much apparent

difference between the sexes on this score: 56% of mothers and 50% of fathers say this is "very" or "somewhat" difficult.

As a measure of how male attitudes have changed, however, this sample is misleading. It excludes families where the father is no longer there. Couples split up for a variety of reasons, but a common complaint among women who throw out their partners is that the man was not doing his fair share. And here there is a huge class divide. Isabel Sawhill of the Brookings Institution argues, in "Generation Unbound", that college-educated men have adapted reasonably well to the feminist revolution but it "seems to have bypassed low-income men".

In 1970 there was not much difference between the happiness of better-off families and that of the less-well-off: 73% of educated white Americans and 67% of working-class whites said their marriages were "very happy", observes Charles Murray, a conservative writer. Among the professional class, marital satisfaction dipped sharply in the 1980s, suggesting that for a while men and women struggled with the new rules. But it has since recovered to roughly the level it was in 1970. By contrast, the share of working-class whites who say their marriages are very happy has fallen to barely 50%, despite the fact that fewer of them are getting hitched in the first place. In Britain, too, more-educated couples are more likely to say their relationship is "extremely happy".

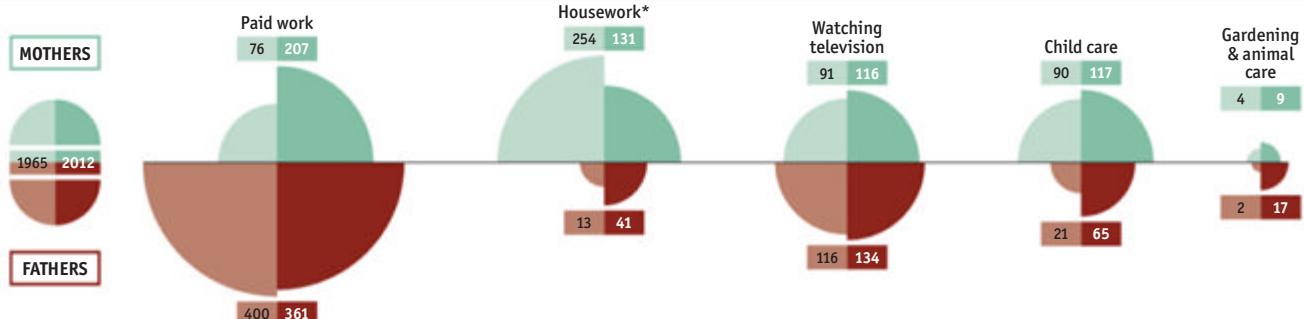
This difference is in part because unskilled men have less to offer than once they did. In America pay for men with only a high school diploma fell 21% in real terms between 1979 and 2013; for those who dropped out of high school it fell by a staggering 34%. Women did better. Female high-school graduates gained 3%; high-school dropouts lost 12%.

And the change is even more dramatic than these figures suggest. First, women are now better educated than men; the proportion of women with no more than a high-school education fell from 32.9% in 1979—one percentage point higher than men—to 11.4% in 2013, one percentage point lower. Second, many men do not work at all. In America, the share of men of prime working age who have a job has fallen from a peak of nearly 95% in the mid-1960s to only 84% in 2010. In Britain the share of men aged 16-64 who work has fallen from 92% in 1971 to 76% in 2013; for women it has risen from 53% to 67%. For those with few qualifications the situation is worse: in America in 2010 25% of 25- to 54-year-old men with only a high-school education were not in work; for those who did not graduate high school the rate was 35%.

There is no sugar-coating this: many blue-collar men no longer have the sort of earnings or prospects that will make women want to marry them. A recent Pew poll found that 78% of never-married American women say it is "very important" that a potential spouse should have a steady job. (Only 46% of never-married men said the same.) In theory, this preference should not stop men without steady jobs from finding a mate. There are roughly equal numbers of heterosexual men and women in rich countries, so you might expect nearly everyone to pair up. For poor people, es- ►

More equal, but not equal

Minutes per day spent by American:



Source: Liana Sayer, University of Maryland

*Cooking, cleaning and laundry

Pecially, it makes sense. Two pairs of hands can juggle work and kids more easily. Spouses can support each other through sickness or night school. But this works only if both believe that the commitment is long-term. It is pointless to make plans with someone you fear will sponge off you for a while and then vanish.

Which brings up the other side of the control modern contraception offers. When pregnancy is easily prevented or can be legally ended, it no longer functions as a road to marriage. It makes it easier for men who choose not to stick around to tell themselves, and their partners, that a child was not part of the deal.

No single factor can account for the fragility of working-class families. But economic and technological shifts have clearly affected social norms. Some scholars blame the welfare state for making the male breadwinner redundant. Robert Rector of the Heritage Foundation, a conservative think-tank, protests that women at the bottom of the social scale end up "married" to the taxpayer. Means-tested benefits make it easier to get by without a spouse, and sometimes penalise marriage. In America, a single mother with two children who earns \$15,000 a year would typically receive \$5,200 in food stamps, which would fall to zero if she were to marry a father who earned the same; and that is just one of 80 or so means-tested federal benefits.

Teena Davison, a cook in Tallulah, is raising four children on her own. One father is in Texas; the other is nearby but disengaged. "Sometimes they help out but basically I do it all," she says. She gave up trying to make either man do his share. "I don't want to go through it because they constantly lie, you know, tell the kids I'm going to get you this and never get it." So, she says, "I don't even bother with them [or] make a big fuss about it."

Nonetheless, she worries that the absence of a father might affect her children. The older ones "say bad things" about their dad when he lets them down. Ms Davison tells them to stop, "because he's their dad no matter what".



SEX ratios matter when it comes to forging relationships. And here the falling fortunes of working-class men do further damage. In 1960, among never-married American adults aged 25-34, there were 139 men with jobs for every 100 women, with or without jobs. (This was because women typically married somewhat older men.) By 2012 there were only 91 employed men for every 100 women in this group. "When women outnumber men, men become cads," argue Ms Carbone and Ms Cahn in "Marriage Markets: How Inequality is Remaking the American Family".

Even a small imbalance can have big effects. Imagine a simplified "mating market" consisting of ten men and ten women, all heterosexual. Everyone pairs up. Now take one man away. One woman is doomed to be single, so she may opt to poach another woman's partner. A chain reaction ensues: all the women are suddenly less secure in their relationships. Some of the men, by contrast, become tempted to play the field rather than settle down.

In most rich countries the supply of eligible blue-collar men does not match demand. Among black Americans, thanks to mass incarceration, it does not come close. For every 100 African-American women aged 25-54 who are not behind bars, there are only 83 men of the same age at liberty. In some American inner cities there are only 50 black men with jobs for every 100 black women, calculates William Julius Wilson of Harvard University. In theory black women could "marry out", but few do: in 2010 only 9% of black female newly-weds married men of another race.

When men with jobs are in short supply, as they are in poor neighbourhoods throughout the rich world, any presentable male can get sex, but few women will trust him to stick around or behave decently. Kathryn Edin and Maria Kefalas, two sociologists, asked a sample of inner-city women of all races why they broke up with their most recent partner. Four in ten blamed his chronic,

"It's easier without men. It's more predictable. I know whether I'm coming or going."

flagrant infidelity; half complained that he was violent.

Such experiences make working-class women distrust men in general. They still have babies with men, but they seldom marry them. A whopping 50% of births to American women without college degrees are non-marital, but only 6% of births to college graduates are. Similar trends can be seen in Europe. In Britain 90% of professional couples wait until they are married before having kids, compared with only half of those who earn the minimum wage. Looking at eight European countries, Brienna Perelli-Harris of the University of Southampton and others found that the less educated a mother is, the more likely she is to have a baby outside marriage.

Caitlin (not her real name), who lives in Hartlepool, in north-east England, first got pregnant at 16, ten years ago. She now has four children by two men. She broke up with the first one (a labourer) because they quarrelled "all the time". "He'd argue about me going out the door," she says. He was hardly a model father. Whether he helped with the chores depended on his mood, she says, and losing at PlayStation would put him into a foul one. He now lives with a new girlfriend. Caitlin does not trust him to take proper care of the children, so she has stopped them from seeing him. He tried to con the authorities to pay him the child benefits that should have gone to her, she says. As for the father of her fourth child: "I found out he was going to jail for GBH [inflicting grievous bodily harm] from the *Hartlepool Mail*." She has concluded that: "It's easier without men. It's more predictable. I know whether I'm coming or going."

Hartlepool has much in common with Tallulah. It was once a thriving industrial town, but as jobs in factories have vanished, the nuclear family has collapsed. The share of babies born outside marriage in Hartlepool has jumped from 12% in 1974 to 70% in 2013 (in England and Wales it rose from 9% to 48%).

Old-timers say life used to be simple for men. "I finished school at 16 on July 25th 1969. On August 1st I started in the steelworks," recalls Dave Wise. "You always knew where you were going to work. If your dad was at the steelworks, you went there too." Mr Wise now runs a community centre in West View, a down-at-heel part of Hartlepool. A sign outside says "Bite Back at Loan Sharks"—a local scourge.

Young men from Hartlepool who make it through university do just fine. But as in the rest of the rich world, boys there do worse than girls in school. They read less, do less homework and are ➤



► more disruptive—which may be why teachers give the same paper a worse grade if they know it was written by a boy, according to the OECD. Raymond Steel, a 19-year-old from Dyke House, another troubled Hartlepool neighbourhood, says he didn't enjoy school. "I lost interest quickly and was naughty until I got sent home." The girls did better, recalls his friend Kieran Murphy, because "they paid more attention." Both men are now learning trades—plumber and builder—but expect the hunt for work to be arduous.

They could move to London, where jobs are more plentiful. But it is hard to leave a tight-knit neighbourhood. In Hartlepool, siblings and cousins often live a street or two away, which creates a network of support. Caitlin and her sister, who is also a single mother, often help each other with the child care.

As in Tallulah, many men in Hartlepool have old-fashioned views. Mr Steel says it would be "a bad thing" if his future wife earned more than him—"You'd feel you were not providing." When men and women expect different things, relationships fail. Some hard-up mothers have all but given up hope of finding Mr Right. They strive to become financially independent and insist on controlling their own households, notes Ms Sawhill. "They often act as gatekeepers, by denying a father access to his own children."

Single motherhood is much better than living with an abusive partner. But the chronic instability of low-income families hurts women, children and men. The poverty rate for single-mother families in America is 31%, nearly three times the national norm. Children who grow up in broken families do worse in school, earn less as adults and find it harder to form stable families of their own. Boys are worse affected than girls, perhaps because they typically grow up without a father as a role model. Thus the problems of marginalised men tumble on down the generations.

Men who never shoulder family responsibilities miss out on a lot of joy, and so do many fatherless boys. In Britain, fewer than half of the children of divorce say they have a good relationship with their father. Mr Redden complains that his son, who lives with his mother, "doesn't listen to me...we ain't that tight like I'd like us to be."

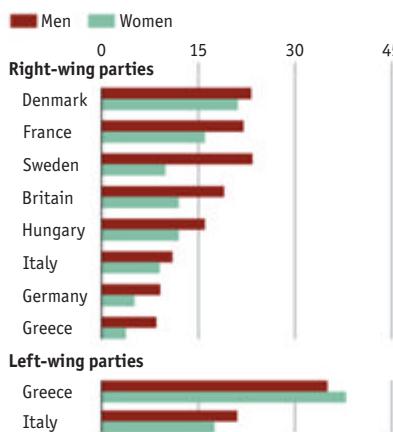


SWEDEN has done a better job than most countries of fostering equality between the sexes, and its success is particularly apparent in child care. You can't throw a ball in a Stockholm park without hitting a bearded man pushing a pram. Fredrik Blid, an engineer, is taking two of his small children for a stroll. "Day care is closed," he explains. Mr Blid and his partner (an art director at a firm that makes things for babies) split the child care 50/50. If a child is sick, they take alternate days off work. They did not discuss this before they had children. "It was natural," he says.

Perhaps. If so, though, nature has been helped along by the Swedish government's decades of work aimed at promoting gender equality, effort which consistently sees it get the highest scores on the Economist Intelligence Unit's Women's Economic Opportunity Index. The equality seen in parenting is supported and shaped by generous parental-leave laws. Each couple is entitled to 480 days off work (between them) for each child. The government pays the stay-at-home parent up to 946 kroner a day (\$12) to replace lost wages. Sixty of those 480 days are reserved for men, and are lost if not used. The government offers a bonus of up to 13,500

Angry men

European populist parties, share of vote or voting intentions, January 2015 or latest, % of total



Sources: YouGov; Ipsos MORI; Metron Analysis; national sources

kroner per child to couples who take equal time off work.

Such policies have had an effect: the share of parental-leave taken by men quadrupled from 6% in 1985 to 25% in 2013. But the government is not satisfied. It sees the unequal division of child care as one of the biggest remaining obstacles to women earning as much as men. Two of the smaller Swedish parties (including the Feminist party, which is bankrolled by Benny Andersson of ABBA), want to compel men to take 50% of parental leave.

This goes too far for many Swedes, particularly those with manual jobs. Working-class Swedish men often make much more money than their wives, thanks to strong unions in heavily male industries. When a waitress makes only 20,000 kroner a month, having her 50,000-a-month construction-worker husband take time off represents a significant cost, says Karin Svanborg-Sjovall of Timbro, a free-market think-tank in Stockholm; many

might see it as an unreasonable one. Among white-collar workers, wages are more equal and there is a less macho culture, so child care is split more evenly.

The parental-leave policy works well for professional women, many of whom work for the government, which is happy to accommodate their long absences (65% of managers in the public sector are female). But it has been a mixed blessing for blue-collar women in the private sector. Employers know that young female job applicants are likely to take a lot of time off. None would admit to discriminating, of course, but it is striking that 25% of blue-collar women are on temporary contracts and 50% work part-time—of whom nearly half say they would like to work full-time but cannot find an opening.

Some liberal Scandinavian men find their new roles demoralising. Karl Ove Knausgaard, a Norwegian novelist married to a Swede, writes of walking "around Stockholm's streets, modern and feminised, with a furious 19th-century man inside me". One expects novelists to be disgruntled, but they are not the only ones. In a recent poll 23% of Swedish men supported the far-right Sweden Democrats (SD)—more than twice the number of women who did. A similar pattern can be seen in other European countries: men are far more likely than women to vote for protest parties such as Greece's Golden Dawn, Hungary's Jobbik, the Netherlands' PVV and France's Front National.

The SD is an anti-immigrant party: its supporters fret that hordes of refugees from Somalia and Syria will bankrupt Sweden's welfare state. However, it is also in revolt against what William Hahne, an SD leader, calls "extreme feminism". The SD wants to return to a family-based tax system that would favour single-breadwinner homes. Mr Hahne complains that "If a man is masculine in Sweden today he is seen as bad." A hunky blond ex-paratrooper, he had to apologise after getting drunk and abusive in a bar in Iceland in 2010.

"[I walk] around Stockholm's streets, modern and feminised, with a furious 19th-century man inside me".

Some supporters of the Sweden Democrats are men who have been left behind as the economy shifts from industry to services, suggests Asa Regner, Sweden's minister for gender equality. Others take a "very old-fashioned" view of the family that the majority has left behind, but a minority misses deeply. Many of them, Ms Regner speculates, "wish for a country which is simply not there any more."



MEN are not easy to help. "We find it's very difficult to connect with [them]," says Carol Walker of Relate, a British counselling charity. "They don't want to talk about their relationships, sometimes." This slotting into stereotype matters more when economic times are hard. Couples badly affected by the financial crisis were eight times more likely to split up than those who were unscathed, according to a Relate-sponsored study called "Relationships, Recession and Recovery". As ever, the connections go both ways: the same study found that an unstable relationship at home makes it harder to thrive in the workplace.

Losing a job can affect a man's libido. "If they've always been strong and suddenly feel helpless, that can cause sexual problems," says Ms Walker, who works in north-east England. Some men feel emasculated if their partner out-earns them. "It is hard to be a traditional man in a non-traditional world," says Ms Walker.

If you offer a man counselling, he may refuse. The very notion is unmanly, some feel, though it is often quite effective. Still, there are ways to lure men into talking about their feelings. John Errington, a former lorry driver, organises a "men's shed" in Wingate, a former mining village near Hartlepool. It is literally a shed, with a darts board and a hob for making tea. Local men meet there and do constructive things, such as plant vegetables or do odd jobs. At the same time, they socialise. Some have lost jobs or wives; others just want something to do. At least one volunteer is trained in spotting the warning signs of depression or suicide.

Hanna Rosin talks of "plastic women", who adapt deftly to economic and social change, and "cardboard men", who fail to adapt and are left crumpled. She has a point. The sheds, though, show some are trying. On a recent Wednesday afternoon four men in Wingate gathered to chat and cook panaculty, a local stew of corned beef, potatoes, carrots, leeks and sprouts, swimming in beef stock. "It gets me out of the house," says Ken Teasdale, a widower. "We all help each other," says Barry Setterfield, a retired joiner. The "men's sheds" movement, canny in its appropriation of one of the time-honoured male preserves not normally associated with power or status, started in Australia and has spread to Britain, Finland and Greece. There are more than 40 in County Durham, where Wingate is. Boosters say they save public money by keeping men out of hospital. Participants love them.

As the sheds show, working-class men have changed with the times. At home they are far more likely to change nappies than their fathers were, or to do the ironing, perhaps while watching

football on the television. But they have not changed as fast as the world around them. And that world has not finished changing.

Jobs that reward muscle alone are not coming back, so men will need to pump up their brains instead. Several countries are experimenting with ways to make school more stimulating for children in ways that boys will appreciate. The OECD suggests offering them books they might actually enjoy—about sports stars, perhaps, or dragons. Christina Hoff Sommers of the American Enterprise Institute, a think-tank, suggests giving boys gizmos to fiddle with and more breaks so they can run around outside and let off steam: all helpful, and all things that might be appreciated by girls, too. A greater appreciation of anti-boy bias among teachers would help, as well, as would more men teaching.

Men in the classroom do not just broaden children's experience; they provide role models doing something both caring and disciplined. Boys need to know that their jobs will not be like those of the sports stars they read about; they also need to know that, energy having been let off in the playground, timeliness and good behaviour matter. Manners maketh man—especially in the service industries.

It is inevitable that more men will earn less than their female partners in years to come. To pull their weight, they will have to do more at home. There are few signs that women want househusbands; but though they don't want a man who does all the housework they often want one who does more of it. And doing more chores could ultimately make blue-collar men happier, because it would help them forge happy relationships. As the experience of white-collar men shows, more equal unions can be just as rewarding for men as the old-fashioned sort.

When men live with women on more equal terms, they may grow closer to their children. Fathers may find they like being attentive, and it would certainly be good for their kids, especially the boys. As one man whose dad abandoned him lamented on Fathers' Day in 2008:

"[Fathers] are teachers and coaches. They are mentors and role models. They are examples of success and the men who constantly push us toward it. But if we are honest with ourselves, we'll admit that what too many fathers also are is missing—missing from too many lives and too many homes. They have abandoned their responsibilities, acting like boys instead of men. And the foundations of our families are weaker because of it."

The speaker is now president of the United States—plenty of fatherless boys turn out fine. But his point, which is echoed by many more conservative thinkers, is sound. There are many ways to be a man, but not all of them are equally honourable. ■





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Russia and the West

Alternative reality

MOSCOW

Vladimir Putin concocts a new story on Ukraine, leaving the West wondering what he is up to

IN THE original instalment of the “hybrid war” that it launched against Ukraine last year, Russia’s propaganda machine depicted its neighbour as a neo-Nazi state whose soldiers burnt villages and crucified children in the Russian-speaking east. But after the vast military parade Russia staged on May 9th, marking its victory over German (and by implication Ukrainian) fascism, a new story-line started to take shape. Ukraine is now portrayed as a failed state. It has defaulted on its debts and violated every international norm, and its Western sponsors are panicking. A new Maidan revolution could happen at any time—the smell of burnt tyres is in the air.

Western leaders, the story goes, have realised their mistake and are flocking to make amends with Vladimir Putin, the magnanimous Russian leader who tried to warn them against supporting Ukraine. First it was Angela Merkel, the German chancellor, who sought an audience with Mr Putin. Then it was John Kerry, America’s secretary of state, who flew all the way to Sochi to pay his respects. “America has realised that Ukraine is not worth spoiling its relationship with Russia,” proclaimed Channel One, Russia’s main television station. Russia’s military might and its alliance with China, the channel implied, had forced America back to the table.

The images of war which dominated Russian television for the past year have

been supplanted by tales of diplomatic victories and Ukraine’s failures. If war resumes, according to Channel One, it will be launched by the desperate Ukrainians. This new narrative is not meant only for a Russian audience. No sooner had Mr Kerry left Sochi than Russia sent its emissaries to Kiev to tell Petro Poroshenko, Ukraine’s president, that America and Europe had dumped him. The other intended audience was the European Union, which on June 22nd will decide whether to prolong its sanctions on Russia. If America is willing to make amends, Moscow is asking, what is the point of spoiling good business with us?

In fact, American sources insist Mr Kerry’s visit was meant not to make amends but to ascertain Mr Putin’s thinking on several issues. Will Mr Putin work against America on Iran? Is he willing to co-operate in Syria? Will he stop meddling in Ukraine? The answer to all three questions seemed to be no. Mr Kerry also delivered a message in response to Mr Putin’s nuclear sabre-rattling: do not go too far in testing NATO’s military resolve, as it will backfire. Mr Putin spun Mr Kerry’s visit as a diplomatic triumph, but he now faces the question of what to do next.

The situation in Ukraine has reached a stalemate. Although Mr Putin endorsed the Minsk peace agreement last September, his goals are the opposite of those of

Ukraine and the West. He wants the separatist Donbas to remain inside Ukraine, but as an open sore which Russia can prod when needed to control the country. Only once he has this “political settlement” will he discuss closing the border with Ukraine. The West wants Russia to secure the border and withdraw its forces from Ukraine, so that local elections in Donbas can pave the way for its reintegration. That would defy the purpose of Mr Putin’s exercise.

Yet the conflict cannot be frozen without a permanent Russian military presence and financial support for the rebels. After a year-long war, people in Donbas are not prepared to be governed by Kiev, but many are starting to resent the fighters who have seized power in their region, and who divide Russia’s humanitarian aid among themselves. If Russia withdraws, the rebel governments could fall. This may explain the fresh buildup of Russian troops and weaponry reported by observers along Russia’s border with Ukraine.

The infighting among the separatists has already started. On May 23rd Alexei Mozgovoi, a rebel commander who challenged the Moscow-backed government in Luhansk and insisted on “the struggle for independence”, was blown up in his car. His killing coincided with Russia’s abandonment, at least for now, of its project to create a large Russian enclave in Ukraine.

“The Kremlin wanted to conduct this war on the cheap,” says Alexander Baunov of the Carnegie Moscow Centre, a think-tank. The cost of restarting the war would be high. Russia would probably be hit with a fresh round of sanctions, which could bring down its banks. It would also have to send large numbers of regular troops to Ukraine, which most Russians do not support. The Kremlin’s hope is that Ukraine will simply implode under the weight of its ➤

► economic problems.

But as Mr Kerry has learned, Mr Putin will not leave Ukraine alone. If all else fails, Russia will escalate, as its wargames in the region are meant to show. A full war would require greater mobilisation of the Russian public, control over all spheres of social life and broader repression. The Kremlin has already suppressed all independent political activity in the country. In the past week it has moved beyond politics.

On May 23rd Mr Putin signed a law on “unwanted foreign organisations” in Russia. Two days later, the justice ministry listed two of the country’s most respected foundations for science and education as “foreign agents”. One, the Liberal Mission, is led by Yevgeny Yasin, an 81-year-old former economics minister. The other, called Dynasty, supports natural science and education. It is financed by Dmitry Zimin, an 82-year-old scientist, philanthropist and founder of the country’s most successful telecommunications company, Vimpelcom. Dynasty steered clear of politics, seeing its goal rather as fostering a class of enlightened, independent-thinking men and women. The message from the Kremlin could not have been clearer: no activity independent of the state is welcome in Russia any longer. ■

Poland's new president

Youthful conservatism

WARSAW

Voters long scared of the far right have grown bored of the centre

SINCE coming to power in 2007, Poland's centrist Civic Platform (PO) party has notched up an unbroken string of victories in national elections. Voters unsettled by the conservative Law and Justice (PiS) party's erratic performance in power from 2005 to 2007 apparently deemed it unelectable. That equation changed on May 24th, with the upset win of Andrzej Duda, the 43-year-old PiS candidate, in Poland's presidential contest. His defeat of the incumbent Bronislaw Komorowski by 51.5% to 48.5% points to widespread fatigue with PO. With a general election due this autumn, the question is whether Mr Duda won because of his own strengths as a candidate—or whether Polish voters are shifting from the centre to the right.

The heavily favoured Mr Komorowski, who ran a complacent campaign, was shocked after finishing second in the first round on May 10th. He made hasty efforts to recover before the run-off, scheduling a nationwide referendum on a proposal to switch the electoral system from party lists to single-member districts—a demand



Who says the campaign is over?

made by Paweł Kukiz, a former rock star who won 21% of the vote in the first round. Instead, Mr Komorowski dented his own credibility. Another desperate electoral gambit, to allow retirement after 40 years of work, was quietly withdrawn after his defeat.

Mr Duda, a little-known member of the European Parliament before PiS tapped him for the presidential race, proved a talented and energetic campaigner. (Indeed, the candidate did not seem to know when to stop: at 7am the morning after his election, he appeared at Warsaw's central metro station to hand out steaming cups of coffee to passers-by.) Mr Duda presented himself as a moderate conservative, steering clear of the edgy nationalism critics associate with PiS.

Mr Duda's calls for a more dynamic foreign policy also met with approval. Poland has become less visible on the international stage since the departure of Donald Tusk, the former prime minister who left to become president of the European Council, and his outspoken former foreign minister, Radek Sikorski. Mr Duda echoed PiS's Eurosceptic slant and strong opposition to adopting the euro. But for the most part, he called for dialogue with opponents, promising that “the doors of the presidential palace will be open”.

Poland's presidency is officially non-partisan, and Mr Duda has already announced his resignation from PiS. Centrists and liberals are concerned less about Mr Duda than about who stands behind him. Their chief worry is Jarosław Kaczyński, the veteran PiS leader and a former prime minister. (Mr Kaczyński's twin brother, Lech, served as president before dying in a plane crash in Smolensk in 2010.) Critics fear that a PiS victory this autumn would herald a return to the domestic and

international paranoia (particularly towards Germany) that marked its previous term. Mr Kaczyński's response to Mr Duda's victory has been evasive, prompting suggestions that he feels threatened by the younger, more popular politician.

Meanwhile, Mr Duda's win presents a daunting challenge to Ewa Kopacz, the PO prime minister. Polish voters seem tired of the ruling party; Mr Duda won 60% of the under-30 vote. Faced with the smiling president-elect, PO's well-worn strategy of scaring voters with the prospect of PiS's return is less convincing. If Mr Kukiz, the former rock star, forms a political movement this summer, polls suggest he will take more votes from PO than from PiS.

Mr Komorowski's loss has revealed cracks in the ruling party, which will only deepen over the summer. What was once its key asset, a promise of stability after the uncertainty of the post-communist years and two years of incompetent PiS government, is no longer enough, says Aleksander Smolar, head of the Stefan Batory Foundation in Warsaw. PiS will not be revitalised by just one new young star. But PO now “lacks leadership, a programme and the ability to offer hope,” says Mr Smolar. These qualities are hard to come by, and the clock is ticking. ■

The French right

Republicans in name aussi

PARIS

Nicolas Sarkozy is back, and wants to redub his party à l'américaine

NEW parties are constantly sprouting up in Europe's fertile political landscape. It is more unusual to find established parties taking on new names. Yet this is what Nicolas Sarkozy, the former French president, plans to do at a rally in Paris this weekend. As part of his bid to run again for the presidency in 2017, the irrepressible leader of the centre-right UMP is rebranding the party Les Républicains (The Republicans).

Mr Sarkozy's party makeover is part of an improbable political comeback, an effort to reinvent himself as a fresh force. When the ex-president returned last year from the shortest political retirement in recent history, taking over a party tainted by in-fighting and financing scandals, he wanted a clean break. He overhauled the top jobs and promised a primary to select a presidential candidate. And he picked a new name and logo. These go to a vote of party members on May 28th-29th.

The new name is not to everybody's taste. Some find it baffling that a party descended from Charles de Gaulle, who ►

► marked his distance from the United States and pulled France out of NATO's integrated military command, should go for a name with an American flavour. It was proof, sniffed Florian Philippot, deputy leader of the populist National Front (FN), that Mr Sarkozy, who had close ties to George Bush when in office, was "totally subservient to Washington".

The Atlanticist Mr Sarkozy dismisses such concerns. For one thing, the French right has undergone numerous reinventions under the Fifth Republic, from the Rally of the French People (RPF) under de Gaulle, to the Rally for the Republic (RPR) under Jacques Chirac, another former president. The acronym UMP itself is only 13 years old.

For another, Mr Sarkozy hopes that the new name will refresh the right and undermine his rivals at a time when identity politics is on the rise in France. The concept of republican values—a belief in liberty, secularism and meritocracy under a strong French republic—appeals widely. Indeed, it is partly a swipe at the left, which grumbles that Mr Sarkozy is stealing a term that belongs to all. A judicial attempt by left-wing groups to prevent his using the word "republicans" was dismissed by a Paris court just days before the party voted. "The republic is a common good," complained Christian Paul, a Socialist deputy. "It shouldn't be appropriated." Mr Sarkozy has the FN in his sights too. Since the phrase "republican values" is often used as a byword for resisting the challenge of radical Islam, the new name may speak to those tempted by the far right.

Even if the relaunch succeeds, however, Mr Sarkozy will have his work cut out. He faces a number of outstanding judicial investigations. And securing the party's nomination for 2017 will not be a shoo-in. Most polls suggest that Alain Juppé, a patri-

cian former prime minister who appeals to the centre, is his closest rival. One poll even suggests that Mr Juppé would beat him in a run-off. Others make Mr Sarkozy the favourite. But there is much guesswork at this point, since the vote will be open to all supporters of the centre-right.

For now, Mr Juppé remains the Paris establishment's favourite. Having backed Mr Sarkozy in 2007, business and the conservative elite then tired of the hyperactive former president. But they are not representative of the party. It is Mr Sarkozy who gets flag-waving party members in the regions going, and fills up municipal halls. The higher the turnout, the greater his chances. Besides, the elite's disdain may be to his advantage. Mr Sarkozy may have hobnobbed with world leaders, and earned big money from lecture tours in the Gulf—but he loves nothing better than playing the role of outsider, sneered at in the parquet-floored salons of Paris. ■

Spain's regional elections

Scattered support

MADRID

Voters angered by corruption split a two-party system into a four-party one

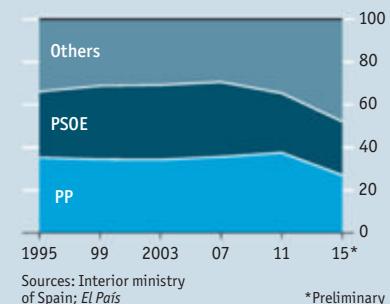
THE regional and municipal elections in Spain on May 24th were billed as the latest test of the idealistic new parties that have emerged all across southern Europe in the wake of the euro crisis. Like Greece's Syriza and Italy's Five Star Movement, the left-wing Podemos and liberal Ciudadanos parties promised to give a voice to voters infuriated by corruption and economic hardship, and to shatter the political status quo. They have done so, transforming the two-party system that has dominated Spain since democracy was reintroduced in 1978 into a four-party one. They have also made the country a lot harder to govern.

The conservative Popular Party (PP) of Mariano Rajoy, the prime minister, was able to claim a sort of victory: when all the regional and municipal elections were tallied, it finished first. But its share fell to just over a quarter of the votes. The opposition Socialists (PSOE) of Pedro Sánchez claimed to have launched a comeback, but they were beaten by the PP almost everywhere. Podemos was relegated to third place. Ciudadanos fell short of predictions that it would become Spain's new kingmaker.

The two main parties' decline (see chart) would have been even steeper had Podemos run candidates under its own brand. Instead it backed a mosaic of ad hoc "popular unity" groups. There are now few jurisdictions left in which a single party

Out with the old

Spanish municipal elections
Party share of national vote, %



will be able to govern alone. Most of the 13 regional parliaments chosen this week, and the country's main town halls, will need two, three or even more parties to form governments. This will require Spain to learn a new culture of coalition politics.

The greatest changes came in Spain's two biggest cities, which both look set to be governed by broad, Podemos-backed coalitions. Ada Colau, a former housing-rights activist, will probably become mayor of Barcelona. In Madrid, Manuela Carmena, a 71-year-old former judge, appears to have ousted the PP. Madrid and Barcelona will become the experimental laboratories for a new form of radical left-wing politics, featuring direct internet-based democracy and so-called "citizens' bail-outs" of those who have suffered from Spain's economic woes.

The upshot of the elections is that Spain is turning to the left. In most of the regions, only coalitions led by the PSOE are plausible. The PP has lost control of most of the big-spending regions it governs, putting the government's deficit targets at risk. Yet because the insurgent parties are so fragmented, it is not clear what their gains will mean for government policy. And it is hard for Podemos to claim a national mandate when so many voters picked Ciudadanos, in many ways their ideological opposites.

The next contest will come in Catalonia, which will vote for its regional parliament in September in a battle coloured by demands for independence. Meanwhile, months of coalition bargaining await in the regions. The upstart parties may be reluctant to make compromises as they look towards the general election that must be held by January. The obvious alliances are between PP and Ciudadanos or between PSOE and Podemos. But voters who chose the upstart parties in protest against the old dinosaurs will not welcome such pacts; in Andalusia, where the Socialists and left-wing parties won an election in March, coalition talks are still dragging on. For anyone looking to Spain's elections for a message about the future of European politics, it seems to be that it will involve even more deal-making than it used to. ■



It's only a name

Charlemagne | Part of the furniture

Some parties may fade, but Europe's populists are here to stay



STROLLING around the European Parliament in Brussels recently Charlemagne asked his companion, an MEP's assistant, if the success of anti-European parties in last May's elections had changed the feel of the place. "Well, for one thing you see posters like that," she said, pointing up at an image of Marine Le Pen gazing grandly from a prominent office window. Ms Le Pen's far-right National Front (FN) won the European elections in France, as did the United Kingdom Independence Party in Britain. Other Eurosceptic parties did well elsewhere. The results should not have been a shock. Dissatisfaction with the European Union dates back at least to 1992, when French voters registered their *petit oui* of 51% in a referendum on the Maastricht treaty. Across the EU, public support for the union has fallen from 65% to 50% since.

But the second phase of discontent came in the form of new (or revived) populist parties. Outfits opposed to immigration or euro-zone bail-outs began to flourish in northern Europe around five years ago. (One of them, Timo Soini's Finns party, entered government in Finland this week.) More recently anti-austerity parties have emerged in the south—including the leftist Syriza, which has led the Greek government for four troubled months.

Many still hope the populist threat will fade. Mariano Rajoy, Spain's prime minister, thinks he can ride to re-election later this year on the back of an economic recovery, despite the pounding that his Popular Party (PP) took at regional and local elections this week. Mr Rajoy's optimism, which not everybody in his party shares, is partly inspired by the success of the Conservatives in seeing off UKIP at the British general election. Indeed, UKIP's single-seat flop, as well as Ms Le Pen's recent quarrel with her father, the FN's founder, have led some to suggest that Europe's populist moment has passed. That seems hasty. UKIP's showing said more about Britain's electoral system than about its own failings, and the FN feud could yet help Ms Le Pen by distancing her from her father's toxic and outdated politics.

Fractious, amateurish and often over-reliant on a charismatic leader, some populist parties may melt away once they try their hand at governance. (It will be fascinating to watch Mr Soini grapple with the compromises of coalition.) But others have shown staying power. Geert Wilders's Party for Freedom is now part of the political furniture in the Netherlands, after a spell propping

up a minority cabinet between 2010 and 2012.

Overall, the populists may represent even more of a danger to the centre-left than to the centre-right. That is because right-wing populists such as UKIP and the FN fish in the pond of working-class voters, whereas centre-right parties feel little threat from radical leftists. (The Spanish Socialists fear the fate of Pasok, the centre-left Greek party that has been decimated by Syriza's rise.) But populists make life harder for everyone. The idea of "natural" parties of government, like Ireland's Fianna Fáil or the Dutch Christian Democrats, looks a bit quaint.

There is little consensus over how to deal with the challenge. Indeed, Europe's populist successes often function as a kind of Rorschach test for observers. For anti-austerians they are what you get when you squeeze economies beyond the breaking point. For social conservatives they are the fruit of untrammelled immigration. For liberal reformers they are the inevitable result of sclerotic economies that fail to grow or create jobs. And so on.

There is an element of truth in all these claims. But not all parties that attract the term "populist" are alike, or even similar. The radical leftists of Podemos in Spain profess an inclusive pro-Europeanism worlds apart from the nostalgic insularity of the Finns.

Moreover, says Mujtaba Rahman at the Eurasia Group, a consultancy, the populists' strongest impact will often be indirect. Last year UKIP seemed to be driving Britain's EU policy despite lacking any seats in parliament. France's ambivalence over the EU's plan to resettle refugees across Europe is in part driven by fear of Ms Le Pen. One worrying outcome of the populists' rise, predicts Catherine Fieschi at Counterpoint, a research group, will be the growth of "Coliseum politics", where voters are asked to give the thumbs-up (or down) to apparently straightforward propositions, often in referendums.

All the questions, none of the answers

Yet populists can also help keep the established parties honest. Voters troubled by immigration, bail-outs or austerity need channels for their concerns, and mainstream parties have often failed to provide them. That is what makes Mr Rajoy's response so dreary. Podemos may be led by Gramsci-wielding ideologues, but many of the youngsters who make up much of its base are motivated by a more homely concern: that they will never enjoy the living standards of their parents. *Que pasa? Aún no tenemos casa!* ("What's up? We still don't have a house!") runs a favoured chant.

A more thoughtful response comes from Frans Timmermans, a former Dutch minister now safely insulated from voters as the first vice-president of the European Commission. The problem with Eurosceptics, Mr Timmermans says, is not that their assessment of Europe's deficiencies is wrong, but that it is often right. For many, particularly the jobless young, the EU has come to represent little more than managed decline. The politicians who have overseen its growth have little to say to those that resent it.

That is partly because they must show fealty to European law and economic reality. But that limits their options. Italy's prime minister, Matteo Renzi, inadvertently put his finger on the challenge this week. Interviewed after an electoral surprise in Poland, he said: "The wind in Greece, the wind in Spain, the wind in Poland...blows in opposite directions, but all these winds say that Europe must change." Wonderful advice, if anyone can work out how to follow it. ■



A big moment for Erdogan—and Turkey

ANKARA, ISTANBUL, MUGLA AND VAN

Foreign policy is a hubristic disaster and the economy is on the slide, but that won't stop the ruling AK party founded by Recep Tayyip Erdogan (above) from winning

CRITICS of Turkey say its democracy is under threat, but it doesn't look that way at election time. Villagers are on the streets in their hundreds, city-dwellers in their hundreds of thousands, to listen to politicians' pitches. The country is covered in bunting. In recent elections turnout has been over 80%—higher than in most other European countries—and, although allegations of ballot-rigging are frequent, voting is mostly fair.

The likely victor in the general election on June 7th is the ruling Justice and Development (AK) party, founded by the charismatic Recep Tayyip Erdogan, long-serving prime minister and now president. Polls suggest AK will get over 40% of the vote.

In electoral terms, AK has been a wild success. Since the party was set up in 2001, it has won seven consecutive general, local and presidential elections, plus two referendums. In the 2011 general election its vote share was close to 50%. Mr Erdogan won the 2014 presidential election in the first round.

But AK's impact on the country has been more ambiguous. Turkey has had a strong decade economically, but it now faces stagnation and high unemployment. Abroad, Mr Erdogan's foreign policy has been a comprehensive failure. The government's peace process with the Kurds is on a

knife-edge. And Mr Erdogan is bent on changing the constitution into a strong presidential system. Because this election will determine whether he can, it matters a great deal to Turkey's future.

Rating the economy

AK's most powerful pitch is that it came to power after a string of squabbling coalitions drove Turkey into near-bankruptcy and an IMF bail-out in 2001. Since then, GDP growth has been spectacular, inflation has been tamed, the banks have been strengthened and foreign investment has soared. Turkey, which this year chairs the

G20 group of big countries, claims to be on course to become one of the world's ten biggest economies within ten years. It has an investment-grade rating and, since 2005, has been negotiating to join the EU.

But growth has slowed sharply, to a forecast 3% or even less this year. That means Turkey has no chance of denting unemployment, which averages 11%. Dani Rodrik, an economist at Princeton University, notes that the sources of Turkey's growth—short-term borrowing and a rising current-account deficit—are also worrying. At almost 6% of GDP, the current-account deficit in 2014 was the largest in the OECD club of mostly rich countries. The lira has sunk by almost 40% against the dollar in the past two years.

Turkey's dependence on property and construction (it is Europe's biggest cement producer) is another weakness. Huge public-sector projects include a third bridge and a tunnel across the Bosphorus, a new Istanbul airport, a "crazy canal" linking the Black Sea to the Sea of Marmara, a 1,100-room presidential palace for Mr Erdogan in Ankara and a vast mountaintop mosque in Istanbul. The tower blocks sprouting up around Ankara and Istanbul could presage a property bust.

Mr Erdogan has not improved investors' confidence by repeatedly attacking the central bank for keeping interest rates too high. The president seems to believe, perversely, that high interest rates cause high inflation. His assaults on what he calls the "interest-rate lobby" have undermined the central bank's prized independence. It is no surprise that the credit-rating agencies are re-examining Turkey's rating.

The president seems uninterested in ►



► the structural reforms that an economy caught in a “middle-income trap” needs. Turkey is strong in basic manufacturing such as white goods, furniture and cars, but weak in high tech. Labour-force participation is low, especially among women. Turkey scores lowest in the OECD for rigid product-market regulation and it comes 55th in the World Bank’s rankings for ease of doing business.

The Turks are coming

With the economy weakening, Mr Erdogan’s assertive foreign policy was partly designed to shore up support at home. As Sinan Ulgen of EDAM, a think-tank in Istanbul, argues, “Erdogan has hijacked foreign policy for domestic purposes.” The president’s rhetoric has taken on an increasingly anti-Western tone. He has pandered to sectarian Sunni feeling and to Turks’ prickly nationalism, caricaturing opponents as traitors working for Western interests and talking of foreign plots. Israel, America and the EU have all been implicated in such plots. Turkey has switched from being an ally of Israel to one of its harshest critics.

Mr Erdogan saw the turmoil after the Arab spring as an opportunity for Turkey to play a bigger role in the former Ottoman empire. In Egypt he supported the ousting of Hosni Mubarak and his replacement by the Muslim Brotherhood’s Muhammad Morsi, and in Syria he backed the Sunni rebels against Bashar Assad, who belongs to the Alawite sect. Many Western leaders saw AK as a moderate model for a new generation of Islamist leaders.

But Mr Erdogan was reluctant to support the Kurds against Mr Assad because they want to carve out a separate state in the area where Turkey, Syria and Iraq meet. His interests were more aligned with those of another bunch of rebels, who are enemies not only of Mr Assad but also of the Kurds, and, like the Turks, are Sunnis: Islamic State (is).

Last summer, when Kurdish forces were besieged by is in Kobane, Turkey failed to help them. The Turks flatly deny assisting is, but rumours of covert aid persist. Until recently they did little to stop jihadist fighters crossing into Syria. And they still refuse to let the Americans use Incirlik air base, in the south-east, to bomb is targets in Iraq and Syria.

Three years ago, Mr Erdogan’s foreign policy won plaudits from the West and the Middle East. Now its different strands have failed. Reluctance to support Syria’s Kurds has won Turkey opprobrium in the West. When Mr Morsi was toppled in a coup and Mr Assad remained defiantly in charge, Turkey ceased to look like a model for the Arab world. It is now in the awkward position of having no ambassadors in Egypt, Israel, Libya and Syria, as well as having withdrawn its ambassadors to Austria and the Vatican in a row over the pope’s refer-



ence to the 1915 Armenian genocide.

A foreign policy that was supposed to boost Mr Erdogan’s popularity seems now to be doing the opposite. Some Turks fret that their country is becoming more isolated. The direct cost is high: Turkey has taken in 1.7m Syrian refugees. The continued progress of Islamic State just across the border in Iraq frightens many Turks. Problems with the Kurds abroad makes it harder to negotiate with them at home.

Seats for the Kurds?

Mr Erdogan deserves praise for trying to reach peace with Turkey’s 15m Kurds. By negotiating with Abdullah Ocalan, the jailed leader of the PKK, Turkey’s Kurdish guerrillas, he has done more to deal with the Kurds’ grievances than any previous Turkish leader. The PKK has observed a ceasefire for two years. But an attempted amnesty for PKK fighters a few years ago generated a fierce reaction among Turkish nationalists when the guerrillas returned in triumph and in uniform. Further talks with Mr Ocalan could prove fruitless unless the government is willing to offer genuine devolution of power.

Whether it does may depend in part on whether the pro-Kurdish party wins seats in the national assembly. According to the constitution, a party running nationally must win at least 10% of the vote before it gets any seats. The pro-Kurdish HDP is hovering close to that figure in the polls.

If the HDP wins seats, it will be a big step towards bringing the Kurds into the mainstream. If it does not, AK will pick up most of their seats, the Kurds will feel unrepresented and there will be a risk that the peace process breaks down. And Mr Erdogan will have a greater chance of winning his ultimate prize: a new system of government with a strong presidency. To create that, he needs a new constitution. If AK gets a three-fifths majority (330 seats), it can pass a new constitution that has to be put to a referendum; with a two-thirds major-

ity (367 seats), it can have a new constitution without a referendum.

Constitutional change is not necessarily a bad idea. As Ahmet Davutoglu, the prime minister, points out, the current constitution was written in 1982 by the generals who ruled Turkey and wanted to limit the powers of civilian governments, and there have been many clashes between presidents and prime ministers. When in 2007, the army tried to block the presidency of Abdullah Gul, a co-founder of AK, the government changed the constitution to allow the direct election of the president.

Yet seen against the background of his recent behaviour, Mr Erdogan’s plans for a strong presidency are troubling. He has dismantled checks on his power. His approach is majoritarian and divisive: so long as his party wins elections, it can trample any critics. Critical newspaper groups have been subjected to capricious tax fines. Columnists have been fired. Turkey had more journalists in jail than any other country until the middle of last year, when a clutch of 40 were let out. Reporters Without Borders, a Paris-based group, ranks it 149th of 180 countries for press freedom, above Russia but below Venezuela.

The authorities have often tried to close off access to critical websites and social media. In the second half of 2014, Turkey filed 477 requests to Twitter to remove content, five times more than any other country. And since Mr Erdogan became president, 105 people have been indicted for insulting the head of state.

Attacks on the media and a harsh crackdown on the protests in Gezi Park in Istanbul two years ago deepened a rift with the supporters of Fethullah Gulen, a Muslim preacher. The Gulenists, formerly Mr Erdogan’s allies against the army and the secular establishment, have now become enemies. The battle with them intensified after tape recordings of AK officials taking bribes were leaked. Mr Erdogan promptly reassigned hundreds of policemen, prosecutors and judges who were looking into cases of alleged graft.

The smell of corruption is growing. The government passed laws to give it greater control over both the judiciary and the police. Efforts to pursue corruption probes against senior AK figures have in effect been neutered. Transparency International, a watchdog, places Turkey 64th in its corruption-perceptions index, below such places as Cuba and Saudi Arabia.

Turkey is at a fork in the road. In one direction is a stronger autocratic president better able to crush critics at home and challenge Turkey’s Western allies abroad. In the other is a more conciliatory parliamentary government that is readier to reform the economy and engage opponents at home. As some Turks as well as Kurds have realised, a good way to promote the second is to have the HDP in parliament. ■



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The productivity puzzle

Under the bonnet

Britain's stall in productivity is more serious than that of any rich-world peer. A closer look reveals different industries travelling at very different speeds

FROM the outside, Britain's economy looks as if it is ticking over nicely. Last year it grew by 2.8%, more than any other economy in the G7 group of rich countries. Employment has never been higher. And yet a nagging problem bothers its policy-makers. Ask any economist what he sees as the biggest risk to the country's growth prospects and the reply is the same: "productivity". GDP per hour worked is lower now than in 2007, and flatlining (see chart 1). Mark Carney, the governor of the Bank of England, says that forecasting when productivity growth will return is the trickiest call he has to make. Having steadfastly ignored the issue during the election campaign, George Osborne, the chancellor of the exchequer, now promises a "productivity plan" in his first budget of the new parliament, due in July.

The wonks and policymakers are right to be worried. Productivity improvements are an important source of economic growth and rising living standards. And although economists across the rich world are wondering how to pep up their countries' productivity, Britain's stall is uniquely serious. American workers' output per hour is 9% higher than in 2007; even in France it has increased by more than 2%. Compared with G7 peers, Britain's post-crunch productivity performance has been remarkably poor.

But economic averages only reveal so much. While nationwide productivity has

stagnated, the experience has varied dramatically by sector. The Economist looked at every industry making up at least 1% of the economy, and found that since 2009 some have been immune from the productivity illness—and others are particularly afflicted by it.

Planes, trains and automobiles

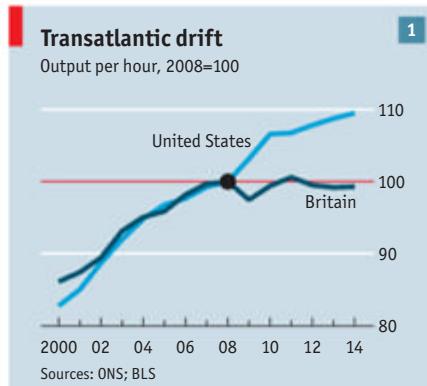
The slump has had two separate phases. When the economy stumbled into a year-long recession in 2008, many firms decided that, rather than fire workers, they would keep them on and weather the storm, to avoid costly rehiring later. Employing the same number of people while producing less meant that output per hour fell. As expected, when the economy began to recover so did output per hour, rising

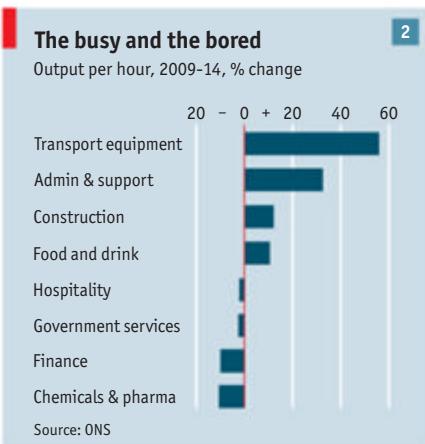
by 3% between 2009 and 2011.

Then something mysterious happened. Contrary to most forecasts, productivity froze. Growth continued, but instead of getting more from their existing workforce, employers went on a hiring spree. As a result Britain added 1.3m jobs between 2010 and 2014. The Bank of England used to assume that in the short-run productivity was closely linked to demand, which the bank steers using interest rates. Today, amid strong demand but stagnant productivity, the bank says it is powerless to do much about the issue.

Lift the bonnet of the economy and it emerges that the fastest-improving part is the transport-manufacturing industry. The 345,000 workers making cars, planes and trains produce 56% more in an hour than they did in 2009. Whereas from 2005 to 2009 the car industry made 9.3 vehicles per employee per year, from 2010 to 2014 it managed 11.5. Over that period Britain's car industry—which includes firms such as Nissan, Jaguar Land Rover and Mini—benefited from investment in new technology, improved supply-chain efficiency and better management, says Mike Hawes of the Society of Motor Manufacturers and Traders, an industry body.

Technological advances, aided by collaboration between firms, universities and government, are making manufacturing more efficient. Rolls-Royce, an aerospace company, has halved the time it takes to manufacture fan discs and turbine discs used in jet engines, using methods developed at the Advanced Manufacturing Research Centre (AMRC) at Sheffield University. The AMRC was established in 2001 and now forms part of a network of government-backed "catapult centres", whose aim is to forge links between academia and industry. Such links are crucial for success in manufacturing, says Hamid ►





Osborne is that the improved productivity will start to translate into higher wages.

The contrast with the worst-performing industries is stark. Productivity in finance and insurance is 10% lower than in 2009. That partly reflects artificially high productivity in the boom years, when the sale of overvalued financial instruments and dangerously high leverage delivered bumper profits. It is also partly down to a heavier regulatory burden on banks, which has caused the ranks of legal and compliance officers to swell. The benefit of this—reduced risk of another crash—does not show up in productivity statistics.

A more surprising underperformer is the chemicals and pharmaceuticals sector. Some argue that manufacturing industries are inherently likelier than service industries to make productivity gains, since they are more intensive users of technology, which delivers productivity windfalls as it evolves. The chemicals and pharma sector is currently an exception. It is hugely productive, with output per hour of £72 per worker. But it has stalled badly, with hourly output dropping by 11% since 2009. Real wages are down by 4% and employment has fallen by more than 5%. That causes pain in local hubs: chemical firms employ 50,000 workers in the north-west of England, according to UK Trade and Investment, a government body.

One possible cause of the chemical crash is a failure to invest. Following the 2008 crisis Britain's bruised banks cut their corporate lending; firms' bond-market borrowing became dearer too. As investment became more expensive some firms hired cheap workers instead of buying pricey machines, according to John Van Reenen and João Paulo Pessoa of the London School of Economics. Neither investment



nor lending has recovered (see chart 3). That means many Britons, toiling with out-of-date kit, have scant chance of becoming more productive.

Spectacular performance in high-tech manufacturing and stagnation in finance may look like a case for tilting the economy away from services. But despite recent trends, financiers remain one-fifth more productive than car and plane makers. If manufacturing grew at the expense of finance, overall productivity would fall.

A change of gear

The trick is to find what works, and mimic it. Stronger industrial clusters would help. Firms can cut costs by sharing infrastructure, as chemical firms in northern England have done, using a system of pipes to transport chemicals cheaply and safely. Hubs also help to attract both talent and finance. Developing pharmaceuticals is a risky business in which the fate of a firm may hang on a single patent. In a city like Cambridge, where there are plenty of pharma startups, it is easy to attract talent: workers know that if their firm goes to the wall, another will be hiring soon.

Productivity gains are there in Britain if you look closely enough. But if the outwardly impressive economy is to continue motoring along, firms, people and capital must be freed to move more quickly from unproductive sectors into fizzier ones. Lighter planning rules would enable productive industries to grow: Oxford, for instance, has one of the world's leading medical schools, but its tight "green belt" of land that is off-limits to developers makes it hard to find space for life-sciences firms to flourish. A social-housing system less reliant on waiting lists would make workers more footloose. And more streamlined bankruptcy laws would allow money to flow out of failing businesses and into growing ones more quickly (the World Bank rates Britain's insolvency framework 11 out of 16; America and Germany both score 15). Until reforms such as these are passed, Britain will continue to grind forward with the hand-brake on. ■



► Mughal, Rolls-Royce's director of manufacturing, as they create a "sandbox" environment, allowing experimentation that would never be viable for a single firm.

Some companies are confident that the productivity gains will continue. The investment cycle in manufacturing—especially in aerospace—can be decades long, so the impact of catapult centres, which were launched only in 2011, is yet to be fully felt. Engineers brim with excitement about the potential for still more efficient production, even in low-volume, labour-intensive manufacturing. Meggitt, an aerospace manufacturer, is developing an "intelligent workbench", which uses lasers and screens to help guide engineers through the construction process. The firm collaborated with the AMRC (and got some taxpayer funding) to produce a prototype. Keith Jackson, the firm's head of technology, says that without the tie-up Meggitt could still do such projects—but more slowly, and possibly abroad.

Some low-tech industries seem to have overcome the productivity problem, too. The "administration and support" sector—which includes outsourcing firms like Capita, which lets other companies farm out anything from travel planning to entire HR departments—saw the next-biggest rise in productivity. Output per hour dipped by 6% between 2008 and 2009 but has since risen by 32%.

Even now, hourly output is only around £22 (\$34), meaning that admin workers are still far less productive than those in sectors such as IT (who generate £42 per hour) or finance (who generate £62). This means that even their relatively low average wages of £12.50 an hour gobble up 58% of the value that they create, suggesting that there is little headroom for pay rises.

Yet the sector provides a counterexample to the argument that low productivity has been caused by employment growth. Firms have managed to increase both their productivity and their staffing levels: the sector has been a jobs powerhouse, with employment rising by more than 300,000 (close to 25%) since 2009. The hope for Mr



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[World, here I come]

Bagehot | Liz Kendall's high-stakes workout

Would that Labour heeded the painful messages of its most promising wannabe leader



FROM behind automatic doors and beneath pavement vents across urban Britain wafts a tangy cocktail of sweat, chlorine and mortification, usually accompanied by energetic music and the clangs and thuds of weight machines. Catering for Britons' sedentary lifestyles, gyms are forever opening in converted offices and basements. They are usually staffed by reassuringly intimidating fitness trainers who bark motivational phrases at their wobbly charges: "If it's not hurting, it's not working", "Find an excuse or find a way", "Winners never quit".

Bagehot was reminded of these emporia, and their cruel-to-be-kind employees, in a recent conversation with Liz Kendall. The Labour Party MP for Leicester West has long practised and preached the healthy life. She runs almost every day. As shadow health minister she has championed preventative health care; promoting dieting, exercise and stop-smoking programmes, for example. She exudes the flinty cheeriness of a fitness instructor. Her entreaties to her party resemble those gym mantras: "Winning is too important", "Be the best we can be", "What matters is what works".

Ms Kendall's party is in poor shape. Ed Miliband, its recently defenestrated leader, disowned the centrism of Tony Blair's New Labour, trying instead to win the general election from the left. The new political map of Britain casts an excoriating verdict on that attempt: Labour is largely absent from southern and suburban England, where it won under Mr Blair, and holds just one seat in Scotland. It needs a 12.5% swing from the Conservatives (more than Mr Blair achieved in his 1997 landslide victory) to win a majority at the next election, in 2020. Until recently the two clear frontrunners in the race to replace Mr Miliband were Andy Burnham, the maudlin tribune of the party's soft left, and Yvette Cooper, a machine politician and the most experienced of the crowd. But now Ms Kendall—younger, more junior and hitherto little-known—is gaining nominations and momentum.

Partly, her tough message is the reason. Where others hedge, Ms Kendall and her team describe the recent election as "catastrophic". She urges her party to ditch the "fantasy" that Britons are left-wing. Raised in the middle-class, southern suburb of Watford, she well knows the people Labour must target if it is to win again and exudes the sort of hard-headed practicality that ap-

peals to such voters—mostly avoiding the jargon and circumlocutions that alienate them yet infect the speech of many politicians.

What's more, she has the makings of an answer to the existential question before Labour (and struggling centre-left parties across Europe): how to make society fairer when money is tight? Ms Kendall's solution, honed during her career in think-tanks, as an adviser to the Blair government and in a series of recent essays, is reform of the state. She envisages decentralised public services run by employees, citizens and voluntary groups, and is relaxed about private-sector involvement. Speaking to her, your columnist's impression was of a sceptical social democrat with a liberal's doubts about central government: she pooh-poohs Westminster's fusty rituals and mocks politicians' and civil servants' faith in the power of speeches, regulations and dictats to get things done.

Ms Kendall's team is confident that she can win the leadership contest, arguing that—following a candidate-selection-fixing scandal in 2013—the leftist trade unions that made Mr Miliband leader can no longer issue voting papers to their members in envelopes endorsing one candidate. Their members must now opt-in as "affiliates" to vote in the election, where before they were automatically affiliated. Moreover, note the Kendallites, the party's unambiguously dismal result should shock it into listening to their candidate's big ideas.

Stuck on the sofa

Yet for all the party's flab, surprisingly few in it embrace the sort of workout that Ms Kendall offers. As *The Economist* went to press, some 20 of Labour's 232 MPs had publicly backed her (though more were expected to do so). Harry Leslie Smith, an influential activist and supporter of Mr Burnham, has accused her of "anti-worker claptrap" and advised her to join the Tories. Even some sympathetic to Ms Kendall's critique of Mr Miliband's policies seem reluctant to echo her stark language. And looking like a winner is no guarantee of Labour's affections: Neil Kinnock, who led it to two election defeats, is more popular among its ranks than Mr Blair, who presided over three stonking victories.

Moreover, Unite, Britain's largest union, boasts it is signing up 1,000 of its members as Labour affiliates every day. Critics accuse it of withholding their contact details from leadership candidates, so as exclusively to promote its preferred choice to them. Partly for that reason, that candidate, the indulgent Mr Burnham, still stands a better chance of leading Labour than the remedial Ms Kendall.

It remains to be seen whether she has the heft of character and depth of experience required to clear the hurdles before her. This is not to disparage her. Those hurdles are high. Ms Kendall became an MP only in 2010, has no experience as a minister and relatively little in the broadcast media. That she nonetheless remains Labour's best chance illustrates both her personal appeal and the strength of her analysis.

But it also betokens the lack of more experienced figures capable of hauling the wheezy party out of its comfort zone. When he resigned in 2007 Mr Blair sponsored no challenger to his rival and successor, Gordon Brown. Senior Blairites drifted away from the party as Mr Brown, then Mr Miliband, edged it away from New Labour. Younger ones, like Ms Kendall, are energetic but still developing, so would ideally spend another parliament emerging as national figures before running for the leadership. In politics, as in physical exercise, a good warm-up is crucial. ■



Ethiopia's economy

Neither a sprint nor a marathon

ADDIS ABABA

Africa's most impressive economic managers suffer from excessive caution

NOWHERE in Africa is modern China more of a lodestar than in Ethiopia, which on May 24th held an uneventful election with a predetermined outcome: another term in office for the long-standing ruling party. The continent's second most populous country and fastest-growing big economy has close intellectual links with China's Communists and often sends officials to their party school in Beijing. There Ethiopians imbibe the gospel of industrialisation overseen by a strong state that exerts tight control over an ethnically diverse population with a history of strife.

But all is not well in the relationship. When a new Chinese ambassador arrived in Addis Ababa in February, he presented an unexpectedly awkward message to his hosts. La Yifan told the ruling elite—behind firmly closed doors—that it must discard the isolationism of the past and open up an economy in which the flow of money and information is still restricted. Banking and telecoms are almost antediluvian (see chart). Investors are frustrated. Trade lags expectations. After years of praising the government, the Chinese are now singing from the same hymn sheet as Ethiopia's Western critics.

The problem is a lack of courage. Many in the Ethiopian government, ruling party and security apparatus acknowledge that only further reforms can sustain the goals of economic growth and political stability. But they are slow to enact them.

The government's main priority is in-

dustrialisation. But endless red tape and restrictions on finance deter investors. Officials point to Huajian, a Chinese shoemaker that has gone from employing 600 locals to 3,500 in a few years. But Ethiopia needs a hundred Huajians. Without faster growth of industry, the country will struggle to absorb labour it hopes to free up from modernising subsistence farms that provide a living to 80% of its people.

The government is trying to help industry by building roads, railways, power stations and dams—following the Chinese playbook. These efforts have kept the official GDP growth rate above 10%, although outside experts reckon a more realistic tally is 7.8%. Inflation has dropped to single digits. But no progress has been made towards joining the World Trade Organisation in

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the past three years. And the prospects for attracting desperately needed foreign equity remain dim.

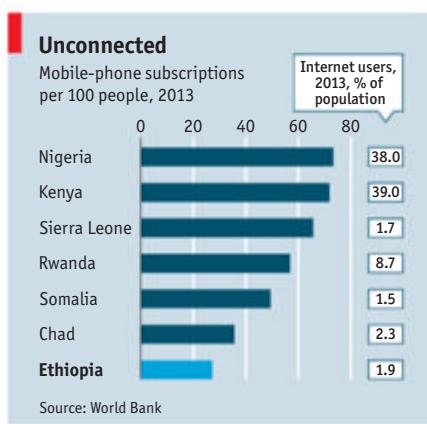
The fear of being overthrown looms behind the elite's reluctance to reform. In some ways it is a victim of its own success. Discipline and administrative sophistication have given the elite access to coercive tools that many counterparts on the continent can only dream of. But now it finds it hard to imagine life without them.

The situation has become worse not better since the death in 2012 of Meles Zenawi, the prime minister and architect of the country's resurrection after a bloody civil war between 1974 and 1991. By force of personality, intellect and ties forged in battle he could on occasion shift the system forward. Admittedly, he hated the private sector and civil society. But at least he removed logjams. After his death the government pulled off a peaceful transition of power. The deputy prime minister, Hailemariam Desalegn, took over as planned.

The new leadership is much more collective. The prime minister is no Meles, whose legacy as it turns out included masking how divided the regime has always been. Before ministers make decisions now they often need to seek the consent of the old guard. And ethnic Tigrayans, of whom Meles was one, still control the army, security services, telecoms and foreign affairs. It will take at least another decade for them to retire or die.

The new prime minister is a reasonable and, to some extent, reform-minded man. But he is a relatively weak figure. He is probably going to be confirmed as party leader at a congress of the ruling EPRDF in September, but his tenure is not assured. Few have forgotten why Meles chose him: as a political leader from the ethnically fragmented south of the country he is no threat to the more dominant groups.

One senior member of the Chinese ➤



► community in Ethiopia describes, with some frustration, what he sees as the country's big problem: that in China the central government dominates the regions but in Ethiopia everything is federal. Business parks are built by regional rota, for example, not in the best locations. Furthermore, Mao's maxim that "the party controls the gun" is neglected; the securocrats are a law unto themselves.

And lastly, although the senior leadership in Ethiopia is very capable, the country lacks China's talented mid-level administrators. Overall, many Chinese see a country that is dotted with too many powerful barons.

What the Chinese won't say but many Western observers do is that political repression also weakens the system. Young people are angry and jobless. Outlets for their frustration are quickly shut off. Sensible opposition leaders are pushed into exile or prison, ceding the field to hotheads. Universities have grown more than ten-fold but there are insufficient jobs for all these bright new graduates.

Ethiopia is stuck thanks to its paranoid elite. The country will be able to limp on for a while, given its impressive growth rates. It may even get further boosts from new infrastructure like hydropower. But Ethiopia is missing out on becoming something far more impressive. ■



Have jerry can, will queue

For a country that churns out roughly 2m barrels of oil a day, this is a scandal. The chief cause is Nigeria's inability to process its crude. Corruption and mismanagement have left its four state refineries to rot, forcing this fuel-guzzling country to import up to 80% of its needs.

At the heart of the rot is a controversial subsidy scheme under which the government pays wholesalers the difference between the open-market cost of fuel and a fixed pump price of 87 naira (\$0.43). It is billed as protecting the poor, who see cheap fuel as the sole perk of their country's oil riches. In practice the subsidy is a mechanism for corruption by complex networks of retailers, workers at the Nigerian National Petroleum Corporation (NNPC) and government officials. They embezzle billions of dollars by overstating their imports and pocketing the difference. At its peak in 2011, it was reckoned to cost the government \$14 billion annually.

The latest shortage began when importers slowed deliveries, saying the government owed them \$1 billion in backdated subsidy payments. Without those, they said they could no longer afford to import fuel. Critics responded that they were trying to bleed the government dry ahead of a transfer of power to the incoming administration of Muhammadu Buhari on May 29th, amid speculation that he may reduce or indeed terminate the subsidy.

Mr Buhari, who inherits the crisis, is ironically one of its fathers: he set up the NNPC during his time as petroleum minister in the 1970s. In 2012 the outgoing government tried to eliminate the subsidy but backtracked on reform in the face of violent protests. It had the perfect opportunity to take a second shot earlier this year, when oil prices were at their lowest. Yet President

Goodluck Jonathan tried to curry voters' favour by cutting prices even further.

Those getting fat off the scheme will fight—perhaps literally—to save it. An investigation into subsidy payments launched by Ngozi Okonjo-Iweala, the finance minister, in 2011 "led directly to the kidnap of her mother," her spokesperson claims. Reforms are not popular with the masses, either. Although subsidies disproportionately benefit the rich, who drive bigger cars and buy more fuel, prices for petrol, transport and food would all rise.

Yet Nigeria's popular new president has more political capital than his predecessor. Citizens are better informed about the theft surrounding the scheme. A phased withdrawal that is explained carefully to voters and balanced by social grants or investment in infrastructure might work.

Abolishing the subsidy might also give local refining a boost. Official prices are now so low that no refiner can compete. Tight government finances may force the change. Roughly \$5 billion was allocated to subsidies in 2014. This year's budget makes provision for a fraction of that amount. Low oil prices left a dent in government revenues. Foreign reserves have fallen; a crude-oil savings account is all but empty; and the currency has tanked. A cash-strapped government can no longer afford such a corrupt and costly racket. ■

Oil in Nigeria

Problems at the pump

LAGOS

A fuel crisis in Nigeria highlights the desperate need for subsidy reform

HOW does a big oil producer end up with no fuel? The irony of that predicament is not lost on citizens of the country with sub-Saharan Africa's largest oil reserves. They endure hours-long queues at petrol stations and buy on the black market. Yet few recall a scarcity as severe as the one that peaked this month.

Drivers turned to greasy hawkers who demanded up to six times the official price for their cans of contraband. Traffic petered out in Lagos, a clamouring city of some 20m people. Local airlines cancelled flights and international carriers began diverting through other West African capitals for fuel. Since diesel and petrol are also needed to generate electricity (mainly using backyard generators, since government networks are pitiful), darkness descended on homes. Shops and offices closed and radio stations went off the air. Banks shut early, and mobile-phone companies warned of network outages. Africa's largest economy ground almost to a halt.

South Africa's economy

Dark days ahead

JOHANNESBURG

Africa's second-largest economy is in a huge mess

THERE is little in the way of bright news about South Africa's economy—and not just because power cuts are plunging neighbourhoods into darkness several times a week. According to figures released on May 26th, annual GDP grew by a mere 1.3% in the first three months of this year, a crawl compared with the 4.1% achieved in the fourth quarter of 2014. Unemployment is soaring. Even using a narrow definition, it stands at 26.4%, the highest since 2003.

"The numbers are saying 'something has to be done, and done quickly,'" says Pali Lehohla, South Africa's statistician-general. But where to begin? Power shortages under Eskom, the failing state utility, have damped manufacturing, drought has hit agriculture and tourism, a rare boon, has been hampered by much-criticised new visa requirements. Rating agencies have warned that South Africa is dancing dangerously close to junk status, though no immediate downgrade is likely.

Joblessness is particularly worrying. ■

The expanded rate, which includes "discouraged" workers who have simply given up trying to find a job, rose to 36.1% in the first quarter of 2015. Cees Bruggemans, an economist, says South Africans are doomed to "a life of discouragement".

Even many of those with jobs are unhappy. Strikes are hurting mining. Talks between unions and gold-mine bosses are due to begin in early June. But with unions opening the bargaining by demanding that basic pay for unskilled mineworkers be doubled, prospects of an early settlement seem poor. Last year similar demands at platinum mines sparked five months of labour unrest. A strike by 1.3m public-sector employees has been averted, but only at the cost of a 7% wage increase, with the money coming from emergency funds.

The weak economy is stoking social unrest and public violence. Foreigners, seen as competition for scarce jobs, were targeted in a recent spate of xenophobic attacks that left at least seven people dead. The IRR, a think-tank in Johannesburg, says that protests have nearly doubled since 2010. Many relate to the provision of basic services such as water and electricity. Inequality remains high. A report by the Boston Consulting Group, a consultancy, placed South Africa 138th of 149 countries for its ability to turn the country's wealth into well-being for its people.

So far the government of President Jacob Zuma has shown little sign of being able to improve matters. The African National Congress, the ruling party, is bogged down in internal political battles, not least over whether to pursue capitalist or socialist economics. The government's much-touted National Development Plan, a market-friendly strategy to encourage investment and growth, is largely ignored. Even by the ANC's own standards, it is failing: only 2% growth is expected in 2015 when the economy needs to expand by at least 5% a year to reduce unemployment.

Yet instead of addressing the economic crisis when he appeared in parliament soon after the poor numbers, Mr Zuma cracked jokes and mimicked the leader of the opposition, giggling: "he he he...hai". ■

The wrong way

South Africa's:

GDP, % change on previous quarter*

6

Unemployment rate, % (narrow definition)

27



The state of the caliphate

The fortunes of war

GAZIANTEP

Islamic state has made some gains, but is far from winning

IF SENTIMENT in the towns in or bordering the so-called "caliphate" of Islamic State (is) is anything to go by, the jihadists are winning the war. "Is is here to stay," a doctor in Falluja says of the group's grip on Anbar, Iraq's largest province. It is a sharp reversal from just a few months ago, when the campaign against is seemed to be going quite well.

Then, Syrian Kurdish fighters had defeated is in Kobane. In Iraq the jihadists had been pushed out of 25% of the territory they had grabbed in their blitzkrieg advance a year ago and been expelled from Tikrit, Saddam Hussein's hometown. There was even talk of an offensive later in the year to retake Mosul, Iraq's second-biggest city. But after the retreat of Syrian regime forces from Palmyra, the black flag of is now flies over the ancient city; while Ramadi, the capital of Anbar province, fell on May 17th. The idea that is was in retreat has thus taken a severe jolt.

Barack Obama describes the loss of Ramadi as a mere "tactical setback". But a blame game has since broken out. America's defence secretary, Ash Carter, complained that the collapse of the Iraqi security forces against numerically inferior opposition was due to a lack of "will to fight". Domestic critics of Mr Obama, such as John McCain, chairman of the Senate Armed Services Committee, talked of a half-hearted and failing military effort. They all have a point.

The capture of Ramadi is not a game-changer. It had been under attack for many months and it is quite possible that an attempt already under way by Iraqi forces and their Iranian allies to retake the city will succeed. In April media screamed that is was poised to enter Damascus after it popped up in Yarmouk, a Palestinian area on the outskirts of the capital. With much less fanfare, the group disappeared—one Syrian says the capital feels safer than it has done for months. In recent days Iraqi forces have recaptured Husayba, a small town in Anbar, and halted is's approach towards Habbaniya, a military base.

In any case the group's recent successes owe more to the weakness of the forces opposing it than to its own strength. The regime of Bashar Assad in Syria is looking wobblier than at any time since 2012. Its army fled Palmyra. Although Iraq's Shia militias put up a good fight in places, its Shia-dominated and often badly led army is reluctant to fight and die for Sunni terri-



tory. Unless it improves the jihadists may advance further. The government remains reluctant to arm the Sunni tribesmen who might defend their homes.

The recent gains by is also do little to address its weaknesses. It needs to generate huge funds to maintain its pretension to be a caliphate, yet its income streams, such as those from illicit oil sales, ransoms and looted antiquities, are all vulnerable to concerted pressure and windfalls from conquest are dwindling.

Its top-down structure leaves it vulnerable to "kill or capture" raids by American special forces (like one in Syria on May 15th that resulted in the death of Abu Sayyaf, the outfit's financial brain). A more concerted air campaign could also set it back. Western forces are managing a meagre 15 strikes a day (compared with the 50 a day NATO carried out against Qaddafi's less formidable forces in Libya). Mr McCain says that 75% of sorties fail to fire a weapon or drop a bomb, because targets are not identified. That might change if America provided forward air controllers. Were American military advisers and trainers embedded with Iraqi forces when they go into action it would stiffen their resolve.

The Iranians also need to reflect on their strategy. Propping up the increasingly fragile regime of Bashar Assad is a failing policy that serves only to strengthen is. As for the Iraqi government of Haider al-Abadi, it ought to honour its promises of inclusivity. Sunni tribal fighters in Ramadi, denied weapons and military support by a mistrustful Baghdad, are hopelessly outgunned. America could do much more to help. But, above all, it is Iraq's poisonous sectarianism and the Syrian regime's brutality that feeds is. ■

Oman's foreign policy

A country apart

MUSCAT

A tiny sultanate that is not afraid to stand alone

THE term *khususiyah* is often cited by monarchs in the Gulf to justify their ways. They use it to mean the unique character of a culture, and also to dismiss demands for political and social reform. Like the idea of exceptionalism in America, *khususiyah* has become a cliché in the Middle East. But in Oman, many believe that it helps explain the country's independent foreign policy.

Sitting at the south-eastern tip of the Arabian peninsula, Oman is surrounded by countries locked in a sectarian cold war and prone to meddling in each other's affairs. But the little sultanate has a policy of non-intervention, and in turn expects its own sovereignty to be respected.

Take its relationship with the Gulf Cooperation Council (GCC), of which it is a member. Oman has resisted efforts to turn the six-nation block into a political and economic union, which it fears would be dominated by the Saudis. It has opted out of the group's military adventures too, despite having once proposed a unified army. Oman's well-equipped soldiers did not join other GCC forces in crushing protests in Bahrain (another member) in 2011; nor has it joined air strikes in Syria or Yemen.

Oman cannot ignore its neighbours altogether, in part because most have more oil. Oman relies on the black stuff for around 80% of its income, so it has criticised Saudi Arabia for keeping prices low and prodded members of OPEC to cut output unilaterally. (Oman is not a member of the cartel.) It also leaned on GCC aid in order to deliver more jobs and higher salaries in response to protests in 2011.

More recently it has bolstered its friendship with Iran. Sultan Qaboos (pictured), Oman's authoritarian leader, turned to Iranian troops to help put down a communist-backed rebellion in the province of Dhofar in the mid-1970s. Now he intends to rely on Iranian gas as Oman's reserves dry up: a pipeline is planned that would supply Oman and allow it to export some.

Oman is reportedly a source of some of the contraband smuggled into Iran, but that illicit trade may end and be replaced with more lucrative legitimate commerce if Iran is able to reach a nuclear deal with the West. The negotiations over an accord can be traced back to Sultan Qaboos's successful effort to broker the release in 2011 of American hikers arrested by Iran. He then offered secretly to host meetings between officials from the two countries. Those



Sultan Qaboos, a mediator amid meddlers

talks led to an interim nuclear deal in 2013.

Omanis take pride in their country's role as mediator. The sultan supported Egypt's pursuit of peace with Israel over objections from other Arab countries. Now Oman is pushing for peace in Yemen, with which it shares a long and closely watched border.

Yet the greatest threat to Omani stability may come from within the country. For eight months beginning in July of last year Sultan Qaboos received treatment for an undisclosed illness in Germany, forcing Omanis to imagine life without him. It is not easy. He has ruled for 45 years, has no heir and holds every important position in government. Oman's next ruler may struggle to gain legitimacy, while facing demands for reform from an increasingly young population. Stability abroad may be the least of the new sultan's concerns. ■

Israeli politics

Cross channels

JERUSALEM

Binyamin Netanyahu is taking an unhealthy interest in media regulation

ONE of Israel's proudest claims—and one that has helped shore up support in Western capitals—is that it is a beacon of democratic politics in a region with precious little of the stuff. Although its democracy is not flawless, Israel has a fiercely free and irreverent press. The media have brought down ministers and generals, including forcing the resignation of Yitzhak Rabin as prime minister in 1977, when *Haaretz* revealed that his wife had an illegal bank account. Yet this proud tradition of holding leaders to account is under threat.

Even as Binyamin Netanyahu worked against the clock to assemble a governing

coalition in May, he ensured that the leaders of parties who joined it committed themselves to supporting unspecified "sweeping reforms" in the media sector that would be brought in by the communications minister. This clause in the coalition agreement was made non-negotiable. Not made clear at the time, however, was that Mr Netanyahu had no plans to appoint a communication minister—since he has kept the portfolio for himself.

The implications of this are now becoming clear. Relations within Mr Netanyahu's previous cabinet were poisoned by a proposed law that might have reduced the circulation of *Yisrael Hayom*, a daily freesheet owned by Sheldon Adelson, an American casino mogul. It slavishly supports the prime minister and his policies and was seen as so partisan and influential that some Knesset members want to force it to charge a minimal price. Mr Netanyahu has since ensured that members of his new coalition are barred from voting in favour of such a law.

But the new communications minister has even grander designs. Channel 10, an independent and financially strapped broadcaster which screened critical documentaries on Mr Netanyahu's financial affairs, said that he had hiked its licensing fee to about \$4.3m, four times the sum recommended by his bureaucrats and maybe enough to force it off the air. Two prospective investors whose support was crucial to saving the channel from bankruptcy have bowed out, citing "changes in the regulatory climate."

Further steps are now being mooted. These include cancelling the state-owned Israel Broadcasting Authority's right to charge a fee from the viewing public, forcing another struggling terrestrial channel to break up into two and allowing cable and satellite channels to broadcast news.

Mr Netanyahu believes that the local press is dominated by the left and out to get him. In private he has expressed his desire to "even the picture." He is not totally wrong. Most Israeli journalists are of a more liberal bent than the Likud government, and the largest media group, *Yediot Achronot*, has relentlessly criticised the prime minister.

The opposition leader, Yitzhak Herzog, last week accused Mr Netanyahu of "learning the tricks of [Turkey's president] Erdogan." This is an unfair comparison: unlike Turkey, Israel hasn't imprisoned dozens of journalists. A more useful comparison might be to Italy under Silvio Berlusconi. Mr Netanyahu does not have *il cavaliere's* deep pockets, but some of his patrons do.

The prime minister's office insists that his sole motive is to open the media industry to competition. Yet small independent media companies tread a precarious path and criticise the prime minister, who is also their chief regulator, at their peril. ■



California's drought

All the leaves are brown

SACRAMENTO

Farmers have been raiding groundwater to survive a four-year drought. Better solutions are needed

PARCHED fields, shallow lakes and wilting trees testify to California's four years of drought. From Palm Springs to Palo Alto, lawns of luscious green are now an ugly brown. Scrubby grassland grows in once-fertile fields. The Golden State is short of more than 1.6m acre-feet (2 billion cubic metres) of water even before summer's start. But at the Sacramento County Fair last week, children encased in inflatable spheres bobbed across giant paddling pools and pampered pigs were sprayed from mist bottles. "It's not so bad this drought, we'll get through it," said one young goat-keeper.

Together with the San Francisco Bay, river systems and engineered channels near Sacramento (known as the Sacramento-to-San Joaquin Delta) form the largest estuary on America's Pacific coast. It is the hub of California's water supplies. Rights to its waters were snatched up in the wake of the gold rush and, even in a particularly savage drought (see chart), it is hard for the state to curtail water use by those who have held them for more than a century. Some lucky farmers have therefore quenched thirsty crops as their rights permit; many of those farther south have seen their lands scorch instead.

So the offer on May 22nd by Delta farmers to reduce their water use by a quarter came as a pleasant surprise. At the beginning of April California's governor, Jerry

Brown, had ordered city-dwellers to cut water consumption by a quarter. The farmers' offer seemed a step towards fairness.

It came with a catch, of course. In return, the state must guarantee it will not restrict use of the farmers' remaining supplies in the future. But the concession is welcome anyway: not counting what is set aside for the environment, 80% of water used by Californians is for agriculture.

Felicia Marcus, who chairs the State Water Resources Control Board, calls the deal "pragmatic". She says farmers would rather cut back now than risk reductions later. But it will not be easy to check up on their efforts. Meters are not in general use

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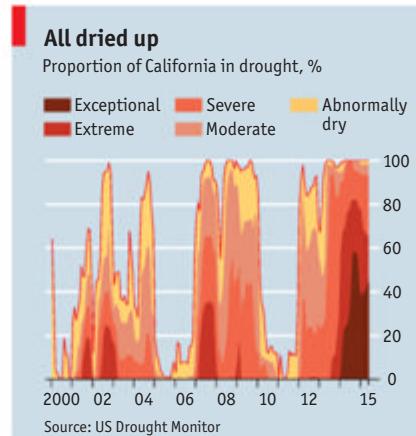
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and some rights-holders need report what they do with water only every three years. Shawn Coburn, who grows tomatoes, grapes and almonds in Firebaugh, doubts the intentions behind the offer: "Those guys are blowing so much smoke up people's asses it's not even funny," he says.

Roughly two-thirds of California's rain falls in its northern regions, but two-thirds of water use by its 39m residents is in its central and southern areas. Since there has been little precipitation for four years the state's 1,400 reservoirs have just a year's supply left. New Melones Lake, the state's fourth-largest reservoir, is less than a fifth full. Ruddy rings below the tree line of its steep sides show how far it has fallen.

Locals are not too worried. Vicki McFall, who owns a still-thriving flower shop in nearby Angels Camp, says the lake was much lower during the six-year drought that ended in 1992. "We're all more conscious about water now, though," she admits, "I only give my nursery plants water I've already used for stems and bouquets." Ellen Hanak, from the Public Policy Institute of California, remains calm too: "The end is not nigh. We are used to having a highly variable climate and our economy can deal with that."

California has survived dry spells throughout its history. But the length and severity of the current drought may be a result of modern environmental factors. Recent studies agree that a region of high atmospheric pressure, known as a blocking ridge, has been disrupting wind patterns off California's coast for the past three winters, diverting seasonal storms northwards. Scientists from Stanford University believe greenhouse gases have made the formation of such a blocking ridge more likely. Using computer simulations and statistical models, they found the chances of



► the ridge forming were three times higher in the presence of modern greenhouse-gas concentrations than those found just before the industrial revolution.

Barton Thompson of the Stanford Woods Institute for the Environment says he worries more about California warming. Since the 1980s average temperatures in the state have been higher than they were in the 50 years before; 2014 was the hottest year on record. A changing climate sees warm and dry periods more often occur together in California, according to another Stanford study. This makes the severity of droughts worse. Extra heat means that moisture evaporates from the soil faster, so plants need more watering. And less snow falls: the water content of the Sierra Nevada mountains' snowpack, which acts as a natural water-storage system until the

spring thaw, was just 5% of its April 1st average last month. "Droughts will be more frequent in years to come and they will be worse," reckons Mr Thompson.

As surface sources of water have dried up, farmers and others have turned to groundwater to replace their missing supplies. As much as 65% of the water used in the state last year may have been pumped to the surface—up from 40% during average years—according to the California Water Foundation, an environmental group. It replaced about three-quarters of lost surface sources. "The pumping cannot go on as it has for the past four years," believes Ryan Jacobsen, a farmer in Fresno who also runs his county's Farm Bureau.

Well-raiding has led to subsidence and damage to underground layers of sand and clay that might otherwise have held more

water in the future. It also means salt water can enter aquifers on the coast. Yet California was the last Western state in America to embrace laws for managing groundwater use: legislation was passed in September 2014. And its effects will not come quickly. New management plans for underground sources have until 2040 to become environmentally sustainable.

Going nuts

Meanwhile, guzzling groundwater makes good business sense for many farmers. California is the nation's largest farm state, with sales of farm products worth \$48 billion in 2012. It grows more than a third of America's vegetables and two-thirds of its fruit and nuts. Health fads for protein-rich diets, perhaps inspired by those of the state's own film stars, make its farmers "a tonne of money," according to Mr Coburn. Irrigating orchards of thirsty almonds and pistachios used 3.8m acre-feet of water in 2010, 54% more than a decade earlier. But the value of the nuts was \$4.4 billion that year, meaning farmers turned over \$1,200 for every acre-foot of water they sprinkled. Alfalfa, a crop that slurped up 5.2m acre-feet of water—more than any other—feeds cows, not celebrities.

Abandoning thirsty crops could solve many of California's water woes. Agriculture contributes just 2% of the state's economic output and employs 3% of its workers. Nevertheless, Mr Jacobsen asks where Americans would get their fruit and vegetables without the bounty of the Central Valley. "Farmers are just borrowers of water. The consumers of their products are the ultimate beneficiaries," he says, "and the scale on which we do things here means that middle-class people can afford to buy them." It is precisely the area's desert-like natural conditions that boost yields thanks to the long, dry growing season. Few consumers think about how much water has been used to grow the food they buy.

What else can be done? California's cities provide some lessons. The amount of water used by residents of Los Angeles and San Francisco is lower than it was in 1980—despite surging populations. But cities can have their fruit and eat it too. Rich urban areas can afford to buy extra water when needed. They can also pay for costly desalination plants (as Santa Barbara has done). Tiered pricing, under which consumers pay more above certain usage levels, can discourage water waste too—but their legality was successfully challenged in a state appeals court in April.

Some urge setting up more water-trading markets, to help the flexibility of supplies. Others want to turn Central Valley lands into a solar-energy hub. Ms Hanak sees better data as a priority. "For the centre of the world's technology economy," she says, "we have a pitiful information system at the state level about water." ■



Texas floods

Pray for a proper policy

SAN ANTONIO

The Lone Star State would do well to plan for floods

IN 2011 Rick Perry, then Texas's governor, and now a presumed Republican presidential candidate, devised a policy to help tackle a severe drought. "Under the authority vested in me by the Constitution and Statutes of the State of Texas," he formally did "hereby proclaim the three-day period from Friday, April 22, 2011, to Sunday, April 24, 2011, as Days of Prayer for Rain in the State of Texas."

It is not clear whether Mr Perry's successor, Greg Abbott, will now call for prayer for the end of rain. But given the weather the state has endured Texans might think him justified. Between May 23rd and 26th, a holiday weekend, parts of Texas and Oklahoma were deluged with as much as 11 inches (28cm) of rain. Large chunks of Houston and Austin were flooded, as were tens of smaller cities. At least 19 people were killed across the two states; thousands of homes were flooded and hundreds of cars left abandoned, piled up in a foot or so of murky water on the motorway.

The flooding is the worst in central Texas in over a decade—possibly the worst since 1981, when a flood, also on the Memorial Day holiday weekend, killed 11 people in Austin. Since then, however, Texas's population has surged from less than 15m to almost 27m. Newcomers have filled up hastily built subdivisions across central Texas. Not all are well prepared for extreme weather.

Texas has no centralised flood-control programme: it leaves that responsibility to cities and counties. But cities which are strapped for cash do not always build infrastructure. In 2012, of 27 Army Corps of Engineers flood-reduction projects in the state, only 12 received federal funding—largely because of a lack of money from local sponsors. It does not help that most of Texas's major rivers and flood-plains are not well mapped.

Over the next three decades, Texas's population is expected roughly to double again. Without planning, prayer might be the best option available.

Cities versus suburbs and states

Texan tug-of-war

SAN ANTONIO

In Texas, politicians line themselves up against the state's big cities

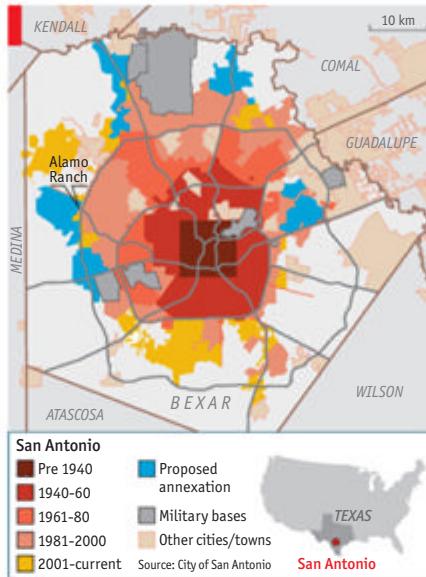
ALAMO RANCH, at the edge of San Antonio's outer ring road, is hardly a glamorous place. New strip malls stretch along access roads; neon signs advertise a Walmart, a Target and a Men's Wearhouse. Yet it is here that Richard Cash, a local who runs a party-equipment rental company, is fighting a suburban war. Sitting on the patio of a branch of BJ's, a chain restaurant and bar, he denounces the city above the hum of traffic. "We moved out here for a reason: we don't want to be part of San Antonio," he says. "We don't want our tax dollars being poured into downtown projects we won't benefit from."

Mr Cash is the head of a local committee which is trying to incorporate Alamo Ranch—which sits on San Antonio's border—as its own city, in an attempt to head off a proposed annexation by the city proper. He has little hope of success. But in his battle, he has plenty of allies, including many state politicians. Increasingly, America's biggest divide is not so much between red states and blue states but between cities, suburbs and rural areas. Nowhere is this more clear than in Texas.

San Antonio, much like Austin, Houston and Dallas (Texas's other big cities), is run by Democrats; Julián Castro, Barack Obama's housing and urban-development secretary, was previously the city's mayor. The state at large, however, is a Republican stronghold: as well as the bulk of the congressional delegation, the GOP controls both houses of the legislature and the governor's mansion. Nationally, Republicans control both houses of 30 states, against a figure of just 11 for Democrats. Yet the biggest city in America with a Republican mayor is San Diego in California.

In Texas, where power has long been devolved downwards, and government is generally distrusted, this has created a scramble by state politicians to pull power back upwards again. In the latest session of Texas's state legislature, which meets for five months every two years in Austin, a series of bills were proposed to rein in cities: limiting annexation rates, capping taxation powers. Most failed, but on May 18th Greg Abbott, the governor, signed a law to prevent cities from banning fracking. That was inspired by the case of Denton, a university town near Dallas where 60% of voters opted in a referendum last November to outlaw the practice within its city limits.

Mr Abbott argues that cities are bringing about a "California-isation" of Texas. In



January he accused them of introducing "a patchwork quilt of bans and rules and regulations", which will undermine the low-tax, low-regulation economic model which draws so many people to Texas in the first place. The problem, he argues, is as bad as federal overreach (that too concerns Mr Abbott: in April he ordered the state to "monitor" military exercises which some conspiracy theorists believe are a federal plot to conquer the south-west).

Yet despite these attempts, the reach of Texan cities is actually widening. According to the Census Bureau, five out of ten of the fastest-growing cities in America are in

the Lone Star State. Thanks to an unusually permissive annexation law, in Texas cities can chase the sprawl outwards, incorporating neighbouring land: San Antonio is adding 66 square miles (171 square kilometres) to its existing 465 (see map). Its population could increase by 1m from its current 1.4m by 2040. Some rural and suburban residents who thought they had escaped the city are clawed back into it—and often compelled to pay higher property taxes.

City leaders say this is fair: people who live at the edge of big cities benefit from the urban environment and so they should contribute to it. "It's annexation that's made Texas cities healthy and grow relative to north-eastern and Midwestern counterparts," says Bennett Sandlin, head of the Texas Municipal League, which lobbies for cities. He points to economic failures in places like St Louis and Detroit as evidence for what can happen when a single city government isn't in control.

But it upsets plenty of Texans such as Mr Cash. "People don't want to have a city council issue diktats down to them," says Jess Fields, a researcher at the Texas Public Policy Foundation, a conservative-leaning think-tank. He argues that cities are expanding because they need newer, richer taxpayers to cover their overspending and their hefty municipal debts. A law that would have introduced new restrictions on cities' annexation powers narrowly failed in the state's Senate.

If Texas genuinely is turning into a new California, Texas's Republicans have a lot more municipal activism to look forward to. There, Los Angeles recently opted to introduce a citywide minimum wage of \$15. San Francisco maintains a citywide rent-control scheme. Though they may be controlled by Democrats, Texas's cities are by comparison bastions of free-market enterprise. And confrontation does not always work. California's Republicans spent a lot of energy resisting change—and there are not that many of them left. ■



More annexation on the horizon

Capital punishment

Killing it

CHICAGO

Nebraska's ban is another sign of the decline in support for the death penalty

“**W**E WOULD have ended any other government programmes that inefficient and costly a long time ago,” says Colby Coash, a Republican lawmaker in Nebraska. Mr Coash is one of 32 legislators in Nebraska’s unicameral parliament who, in a bipartisan effort, voted for a bill to ban the death penalty. On May 26th Pete Ricketts, the Republican governor, vetoed the proposed bill, but a day later the state house overrode his veto.

Nebraska is about to become the 19th state to ban capital punishment and the first conservative state to do so in more than 40 years. (New Mexico, Connecticut, Illinois and Maryland abolished the death penalty in the past six years, but they were all then led by Democrats.) The state has not executed any prisoner since 1997, when it used an electric chair to do so, a method it subsequently declared illegal. Ten prison inmates are on death row; an 11th died of natural causes on May 24th.

A growing number of Republicans have recently taken up the cause of banning the death penalty in Nebraska and other states. They argue that it is inefficient because it does not deter murderers, more expensive than imprisonment for life thanks to the costly trials and lengthy appeals, and at odds with Christian morality. The evidence seems to back their arguments. The murder rate in New York continued to go down after the state abolished the death penalty; Texas executes more people than any other state, yet does not have a lower murder rate than some states without capital punishment. A report of the California Commission on the Fair Administration of Justice showed that it costs, on average, \$90,000 a year more to keep an inmate on death row than to put him into a maximum-security prison to serve a life sentence without parole. And although the Old Testament says “an eye for an eye, a tooth for a tooth”, the New Testament teaches that it is better to show compassion and mercy than to obey the law.

Marc Hyden of Conservatives Concerned about the Death Penalty, a lobby group, views it as “antithetical to conservative principles”. The trend against capital punishment is part of Americans’ increased scepticism about government power, he says, as there is no greater power than the right to kill a citizen. And more Americans worry that innocent people could die because of the death penalty. Since 1973 more than 150 death sentences



Ricketts overridden

have been reversed.

Governor Ricketts refutes many of these arguments, which he says are both incorrect and do not apply to Nebraska. He argues that lawmakers are out of touch with Nebraskans, who, he says, overwhelmingly support the death penalty. He considers it an important tool for public safety and the only appropriate punishment for the most heinous crimes. In a statement after his veto, he claimed that a ban would not yield any fiscal savings because the costly trials for horrendous crimes will continue with or without the death penalty; and the bill would be “cruel” to the relatives of victims.

“Nebraska is a microcosm of what is happening in America,” says Robert Dunham, head of the Death Penalty Information Centre. Support for the death penalty is at an all-time low. In 1994, 80% of Americans backed it; only 56% do so today, notes Mr Dunham. Moreover, the Pew Research Centre found that young people are less keen than their elders on capital punishment, and blacks and Hispanics solidly oppose it, so in the near future the abolitionists are likely to be the majority.

Will other conservative states follow Nebraska? Although a divisive topic, it seems to encourage some lawmakers to work together across party lines, as was the case in Nebraska. But it will not be easy. Ernie Chambers, an independent senator who sponsored the bill and who is one of only two African-Americans in the Nebraskan parliament, has introduced bills to ban the death penalty every year since he was first elected in 1970. “The moon was in its seventh house and Jupiter lined up with Mars,” said Mr Chambers after senators overwhelmingly voted for the ban. The age of Aquarius might not dawn quite yet in other conservative states. ■

Preventing juvenile crime

The witching hour

NEW YORK

How longer school-days can keep kids out of trouble

AT CRESTON ACADEMY in the Bronx, around 50 students between the ages of 11 and 14 are dancing in sync to salsa music. “Do the Suzy Q,” yells their instructor. “Now the rumba!” Elsewhere in the building children are acting in plays, dribbling basketballs and learning how to cook. In this mostly Hispanic neighbourhood known for gangs and poverty, over 200 students are participating in free after-school activities provided by Good Shepherd Services, a charity that helps vulnerable youths in the Bronx and Brooklyn. “We’re having fun,” says Samira, a “Salsa Scholar” on break from the cha cha.

By staying in school until after 5pm, these children are also staying out of trouble. Violent crime by or against young people peaks between 3pm and 4pm on school days, according to national FBI statistics. By 10pm, when adults commit most crimes, young people are half as deviant as they are at 3pm. Nearly a fifth of all crimes involving young people take place between 3pm and 7pm on weekdays.

Cities nervous about juvenile crime often introduce a mandatory curfew to keep kids off the street between 10pm and 6am. A new juvenile curfew in Paulsboro, New Jersey, punishes violators with fines of up to \$1,000. Baltimore introduced one of the strictest curfews last year. Yet there is little evidence that curfews reduce crime. In Denver, Colorado, for example, where police punish teens who stay out late, “most juvenile crime occurs after school, not late at night,” admits Commander Matthew Murray of the Denver Police Department. Nationally the rate of juvenile violence in the hours after school is five times that in the standard curfew period.

Mandatory ones can be costly to enforce, says Michael Males of the Centre on Juvenile and Criminal Justice, an advocacy group. In Philadelphia, for example, where a strict curfew keeps teens under 18 off the street by 10.30pm on weeknights, curfew and loitering stops made up around 70% of all juvenile arrests, according to the most recent FBI statistics. Officers also appear to enforce curfews unevenly. In 2011 young African-Americans were 269% more likely to be arrested for violating curfew laws than their white peers, says the Sentencing Project, another advocacy group.

Analysts reckon that after-school programmes are a better way to keep youths in order. A study from the University of California at Los Angeles assessing the per-

► formance of LA's BEST, a programme that serves 28,000 students across Los Angeles, found that regular participants were less likely to commit crimes, even years later.

Advocates claim that after-school programmes produce other benefits, from improving student behaviour to encouraging better attendance at school. But here the evidence is more mixed, according to a review of existing research published recently in the *Journal of Youth and Adolescence*. Some do indeed raise grades and enhance student performance, but programmes

vary greatly in quality and are rarely informed by rigorous studies about what works best.

Still, parents want more of them. Around 10.2m students took part in after-school programmes around the country in 2014, but this number would nearly triple if supply met demand, claims the After-school Alliance, a lobby group. "We're over-enrolled, but we make it work," says Chante Brown, the programme director at Creston. "Because if they're not in this building, forget about it." ■

out, beaches disappeared, businesses and homes were damaged or destroyed. The summer after the storm saw a drop in visitors, but by last summer most businesses were up and running again. Boardwalks and roads were rebuilt and homes reconstructed. Businesses reopened after extensive renovation. Many beaches have had sand refurbishment; some have been widened. Because of Sandy, some communities, unable to rely on the beach, had to reinvent themselves, hosting festivals and concerts to draw in crowds.

But signs of Sandy remain. "For sale" signs are common, as are empty beach-front properties. The owner of one very sandy waterfront empty lot on East Avenue in Mantoloking is asking for \$3.4m. A 22-foot (7-metre) new dune stands between the lot and the beach. Mantoloking was hit especially hard by the storm. Most of the homes in the town were damaged, 10% had to be demolished. The Army Corps of Engineers has designed a wall of defensive sand dunes to protect against future floods and storm surges. Dune-building is already under way in some areas, but some oceanfront property owners have refused to sign the necessary easements; it might spoil the view. Others worry that their private beaches may become public. Chris Christie, New Jersey's governor, has threatened the holdouts with compulsory purchase of the strip of land in front of their homes.

Mr Christie, like many New Jerseyans, holidays at the Shore and has done since he was young. People have a sentimental attachment to it. Most beachgoers are repeat visitors. Ms Long says people from the area tend to stay put, "I live in vacation land. I'm not going anywhere else." ■

Tourism in New Jersey

A Shore thing

OCEAN COUNTY, NEW JERSEY

A wave of people and spending is about to hit the Jersey Shore

THE water was a bit cold, but people still flocked to the New Jersey Shore for Memorial Day weekend, the start of America's summer season. Point Pleasant beach was packed. The crowded boardwalk was difficult to navigate. A steady stream of people lined up at the Jenkinson's arcades and boardwalk attractions, which have been entertaining visitors since 1926. By early afternoon, an even longer queue snaked outside Martell's Tiki Bar, an ocean-front bar. Toned millennials, clad in little more than bikinis and board-shorts, eyed each other. Beachgoers tired of baking in the sun practised their swing at the batting cage or had a go at the bumper cars. Some devoured salt water taffy and water ices, local summer delicacies. Loud squeals of delight emanated from kids' amusement rides like the miniature train and swings.

Crowded beaches and boardwalks are exactly what New Jersey likes to see. Last year tourism accounted for \$36.4 billion of its GDP, or about 6.6% of the state's entire economy. Tourism there generated \$4.6 billion in state and local tax revenues in 2014, including \$1.4 billion in sales taxes. About 508,000 jobs, nearly 10% of New Jersey's total, are in the tourism industry. And nearly half of tourism spending is at the "Shore". The struggles of Atlantic City—gambling has fallen off and four of its 12 casinos closed last year—have led to worries about tourism revenue. Without it, each New Jersey household would pay an additional \$1,460 in taxes annually.

Luckily, the Shore, weather permitting, should see a strong tourism season. Tourism officials and Stockton University forecast 4-5% increases in revenue at most Shore towns. Already, many communities have seen strong weekends over Easter and Mother's Day. Lower travel costs help: petrol costs about \$1 less a gallon than it did

last summer. Most beachgoers drive to the Shore from other parts of New Jersey or else from New York and Pennsylvania.

Dina Long, the mayor of Sea Bright, says the town has sold out of beach badges, which are needed to access the beach. It has had to issue temporary vouchers. The rental market looks good. Diane Wieland, who heads Cape May county's tourism department, says rental income there is up by 9% over last season. Prices all along the Shore have rebounded since Superstorm Sandy in 2012. Pricey houses going for \$10,000 a week are just as likely to get snapped up as the \$1,500 rental.

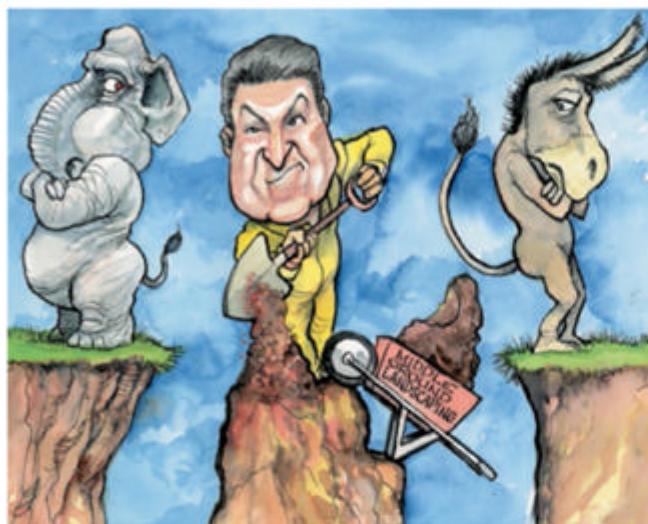
Sandy slammed the Shore's 127 miles (204km) of beach. Boardwalks were wiped



Sun, sea, sand—and dollars

Lexington | Mr Manchin stays in Washington

A centrist Democrat sees a chance to move beyond Senate gridlock



EVER since Joe Manchin, an old-style centrist Democrat from West Virginia, arrived in the Senate in 2010, he found himself puzzled by colleagues who adore the institution, when its partisan paralysis drives him to despair. He spent much of this year weighing whether to quit Washington and head home to run for his old job of governor in 2016. He even commissioned a poll which showed him winning a gubernatorial contest handily. As he pondered, he confronted a veteran senator with a (not wholly serious) hunch. Is there some hidden club in this place, and that's why you'd sell your souls to stay, Mr Manchin asked him: because if so, I haven't had the secret handshake? His colleague murmured about the Senate being more productive in the old days, when members were less afraid to cross party lines. "Well it sure as shit isn't working well now," Mr Manchin observed.

Now 67, the senator was born to a family of shopkeepers in a small mining town where "By God, they didn't like slackers". He climbed the political ladder in a state where party labels are trumped by a shared faith in the Bible, guns and coal. Arriving in Washington he set about wooing colleagues from left and right. He moored a houseboat on the Potomac as his home, hosting dinners for senators who otherwise rarely mix. Tea Party firebrands and tribunes of the left bonded on its decks, toasting the sunset and munching pizza or his wife's spaghetti with meatballs. Yet back in the Senate, these efforts achieved little. A low point came when colleagues snubbed Mr Manchin's response to the school massacre in Newtown, Connecticut, in 2012. It was a modest bill that would have expanded the number of gun-buyers checked for histories of crime or severe mental illness, crafted to win bipartisan support after it became clear that bolder plans backed by President Barack Obama were doomed. Still it failed.

So the Washington village was abuzz when he announced in April that he was staying put. This week, with Congress in recess, he hit the road in West Virginia to explain his decision to voters. Watching him was a semi-cheering experience.

The bad news is that the senator is mostly betting that Washington gridlock will ease after the next presidential election in 2016, whoever wins the White House. Personally, he would have left Washington in a "heartbeat", he says. But with big changes possible next year that would have felt like failure. Mr Manchin is

frustrated by Mr Obama, sorrowing that the president makes policy fights personal, breaking a cardinal rule of Manchin-politics by questioning Republicans' motives and morality. The West Virginian puts still more hope in the retirement of his party's Senate leader, Harry Reid, a ferocious partisan who delights in thwarting Republicans at every turn. Mr Manchin hopes to see Senator Charles Schumer of New York become party leader. Though Mr Schumer is to his left on many issues, he is a deal-maker, Mr Manchin says approvingly. With the Senate likely to remain finely balanced, centrists should be in high demand.

Meeting editors from the *Intelligencer*, *Wheeling News-Register*, a newspaper, Mr Manchin pondered America's crumbling bridges and roads. He wondered aloud about recruiting colleagues willing to risk a debate on funding infrastructure in new ways, perhaps through a half-percent national sales tax. Maybe those planning to retire might prove brave enough. He hailed the nine other ex-governors in the Senate, calling them a problem-solving bunch. Alas, he admitted later, next year's elections are already bogging down the Senate, as Republicans running for the White House posture, and Democrats seek votes that make them look compassionate and opponents heartless. Demonising the other lot is not Mr Manchin's way. In an age when Democrats and Republicans excel at stoking the partisan anger of core supporters, he is at pains to respect those who disagree with him.

The good news is that voters respond to this approach. Like so many states to its south, West Virginia—an impoverished slice of the Appalachian mountains, home to 1.9m people—has taken a sharp Republican turn in recent years. In 2012 West Virginia overwhelmingly rejected Mr Obama even as it re-elected Mr Manchin. It helps that he has a talent for political theatre. Like many senators he trundles around his state in a hulking four-wheel drive. Unlike most, his is not shiny black but white and announces in large letters on its sides and back: "Mobile Office of Senator Joe Manchin. For Official Use Only", transforming a comy car into a rolling advertisement for probity.

Drugs are killing rural Americans: where is the Senate?

The senator also sees a cause worthy of a fight. West Virginia faces epidemics of prescription-drug abuse and heroin. No state has higher rates of death by overdose. This week he held his first public meetings devoted to drugs. Mr Manchin nodded to conservatives who want more prisons built. Some people need to be in jail, indeed "some need to be under the damn jail," he thundered. Those on welfare should be tested for drugs, he added. But then he suggested, gently, that long sentences for non-violent drug offences had been tried for 20 years and have not worked. He invited ex-addicts to talk about effective treatments. Hushing a meeting of police chiefs, federal agents, clergy and students, a mother talked of trying to save her daughter from addiction. "It was like trying to stop a train with the palm of your hand," she said.

Mr Manchin has already helped to make addictive painkillers harder to buy. He dreams of a tobacco-style campaign against pharmaceutical companies and wholesalers that, he notes, sent at least 200m prescription opioid pills to West Virginia, just in the years 2007-12. Let both parties take credit for acting if they like, says Mr Manchin: drugs affect Republican and Democratic states. Presidential candidates barely mention the epidemic, because it defies easy solutions. That gives senators—politicians with the time to debate knotty problems, and the clout to clear bureaucratic logjams—a chance to be useful. He hopes they take it. ■

Technology Quarterly

May 30th 2015

Flying into the future

Inside tomorrow's airliners





**FROM A
PIECE OF
HISTORY**

**TO A
GLIMPSE OF
THE FUTURE**

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From seating to lighting and entertainment, things will be different for whatever class you fly. The cover image, by Factorydesign, a London design agency, presents one idea of the interior of a future airliner, page 8

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Made to measure

Factory automation: A robotic sewing machine could throw garment workers in low-cost countries out of a job

HUMAN hands are extremely good at making clothes. While many manufacturing processes have been automated, stitching together garments remains a job for millions of people around the world. As with most labour-intensive tasks, much of the work has migrated to low-wage countries, especially in Asia. Factory conditions can be gruelling. As nations develop and wages rise, the trade moves on to the next cheapest location: from China, to Bangladesh and, now that it is opening up, Myanmar. Could that migration be about to end with the development of a robotic sewing machine?

There have been many attempts to automate sewing. Some processes can now be carried out autonomously: the cutting of fabric, for instance, and sometimes sewing buttons or pockets. But it is devilishly difficult to make a machine in which fabric goes in one end and finished garments, such as jeans and t-shirts, come out the other. The particularly tricky bit is stitching two pieces of material together. This involves aligning the material correctly to the sewing head, feeding it through and constantly adjusting the fabric to prevent it slipping and buckling, while all the time keeping the stitches neat and the thread at the right tension. Nimble fingers invariably prove better at this than cogs, wheels and servo motors.

"The distortion of the fabric is no longer an issue. That's what prevented automatic sewing in the past," says Steve Dick-

erson, the founder of SoftWear Automation, a textile-equipment manufacturer based in Atlanta, where Dr Dickerson was a professor at the Georgia Institute of Technology.

The company is developing machines which tackle the problems of automated sewing in a number of ways. They use cameras linked to a computer to track the stitching. Researchers have tried using machine vision before, for instance by having cameras detect the edge of a piece of fabric to work out where to stitch.

The Atlanta team, however, have greatly increased accuracy by using high-speed photography to capture up to 1,000 frames per second. These images are then manipulated by software to produce a higher level of contrast. This more vivid image allows the computer to pick out individual threads in the fabric. Instead of measuring the fabric the robotic sewing machine counts the number of threads to determine the stitching position. As a consequence, any distortion to the fabric made by each punch of the needle can be measured extremely accurately. These measurements also allow the "feed dog", which gently pulls fabric through the machine, to make constant tiny adjustments to keep things smooth and even.

Dr Dickerson patented the idea in 2012 and won a \$1.3m research contract from DARPA, a US Department of Defence research-and-development agency. The military interest in sewing arises from a

► 1941 requirement that the department gives preference to American suppliers when buying uniforms. Bill Lockhart, a SoftWear Automation executive, says last year the project began successfully stitching together pieces of fabric robotically and that one machine being developed is now able to stitch a perfect circle—something that only a highly skilled human operator would dare to attempt.

But neat stitching is only part of the sewing process. Most garments are assembled from various different pieces of fabric: 20 or more sections typically for a pair of jeans. This means a robotic sewing machine also needs to be able to pick up material, feed the appropriate sections to the sewing head and remove them when complete. To do that, the company has developed a materials-handling system which it calls LOWRY. This uses a vacuum grip to pick up pieces of fabric and move them to another machine, which might cut, stitch, add buttons or carry out other finishing tasks. LOWRY is programmable, so can switch easily from working with one size of material to another.

A stitch in time

Although the first LOWRY will be delivered to an American factory later this year, commercial versions of the firm's robotic sewing machines capable of automating the more difficult tasks in making garments will not be ready until next year.

Frank Henderson, the boss of Henderson Sewing, an Alabama-based textile-equipment firm, and an investor in SoftWear Automation, reckons that robotic sewing will be attractive to American fashion brands wanting to bring production closer to home and produce garments rapidly to catch new trends. Inditex, a "fast fashion" Spanish company, whose brands include Zara, famously does this by making many of its garments manually in Europe to speed up its time-to-market. With designs and samples shuttling to and from Asian factories, it can take months before new clothes finally turn up in other American and European stores—by which time they can be out of fashion.

Jack Plunkett, of Plunkett Research, a market-research company, says pressure on Asian clothing manufacturers to keep wages low while improving working conditions is leading many to look at automation, too. On that point, SoftWear Automation's Mr Lockhart says a Bangladeshi company has already expressed interest in the firm's technology.

But it is not only the production of garments which could be increasingly automated. Nike is now using a technology called Flyknit to make some of its trainers. Flyknit uses a computer-controlled knitting machine to automatically weave strands of polyester yarn into the shape of the upper part of a shoe, instead

of having it manually stitched together from individual panels, the way most trainers are made in Asian factories. Nike has not said how far it intends to take the technology, but it has the potential to produce customised trainers for individuals and to do so locally—perhaps even within stores.

Shoemakers are already using 3D printers, which build up material additively, to make prototypes of shoes. Exotic clothing and shoes made with 3D printers are becoming regulars on the catwalks at many of the world's leading fashion shows, although the materials they are printed from tend to be various sorts of plastic, which can make the garments somewhat clunky and shoes a bit clog-like. However, researchers are working on ways to print more flexible materials. One such project involves a collaboration between Disney, Cornell University and Carnegie Mellon University. Their 3D printer uses layers of off-the-shelf fabric to make soft objects, such as cuddly toys.

The real test of how successful robots will be at making clothing and shoes will depend on how efficient and reliable they will be, and how fully they can automate the process. If time-to-market and customisation are priorities, then the robots might win—even if some manual intervention in production is required. But for mass-produced lines, where every cent matters, any human involvement could keep manufacturing offshore. The lesson from industrial automation in other sorts of factories, though, shows that robots keep getting better and cheaper. It may be a while coming, but the writing seems to be on the wall for sweatshops. ■



letters and symbols.

The idea is to make greater use of a process called multi-factor authentication. The password is, as security folk put it, "something you know". It can be made more robust by being paired with "something you have", which could be a device or app which receives or generates a unique code, known as a token, with a short period of validity. Such gadgets are already widely available in online banking for users to generate a code when accessing their account. A code can also be texted to a user's mobile phone when logging into their e-mail on a computer.

The token (which might be exchanged wirelessly between, say, a phone and a payment terminal) could be paired with "something you are", such as an analysis of a user's voice, his iris or a fingerprint. As more smartphones and computers now come with biometric systems which can take such measurements, it is becoming easier to link the something-you-have with the something-you-are, thus leaving the password out of the process.

To enable the wireless transfer of a security token, devices are being fitted with near-field communication (NFC) chips. As these chips use less power than Bluetooth, NFC works over a shorter range: just a few centimetres. Devices need to be close or touching to communicate, which is ideal for contactless smartphone payments, such as Google Wallet and Apple Pay. During the transaction the user can confirm his identity by holding a finger over the phone's fingerprint reader.

Other sensors in the phone can be enlisted to help confirm identity during mobile payments. One idea is to tap into a phone's GPS system, a bit like the way banks use location data to spot payments and cash withdrawals being made in places that fall outside a customer's typ-

Passé words

Cyber-security: Technology is finally making strides in reducing the need to remember lots of complicated p@ssw0rd\$

PASSWORDS are the bane of a life enveloped by information technology. And they are proliferating wildly as more and more devices and online services demand them. But passwords are easily lost, forgotten and stolen. Though cheerful reports of the password's imminent demise have been made before (perhaps most famously in 2004 by Bill Gates when he was the boss of Microsoft), all have turned out to be premature. However, new ways are emerging to remove, or at least reduce, the reliance on tapping out awkward combinations of numbers,

ical spending behaviour. And a profile can be built up of the phone itself to ensure it is the device it purports to be and not one that has been cloned.

A consortium of firms called the Fast Identity Online Alliance (**FIDO**) is looking at various approaches to strengthen multi-factor authentication. It has built a roster of impressive members, including hardware firms such as Lenovo, Samsung and ARM, which makes many of the chips used in mobile devices; payments firms PayPal, Visa and MasterCard; and e-commerce giants such as Alibaba.

FIDO has two approaches, one of which offers the ability to do away with passwords altogether. Both rely on public-key cryptography, which is a bit of applied mathematics that already underpins a lot of the web's security infrastructure. This form of encryption creates two intertwined cryptographic keys—vast strings of numbers—one public and safe to share and one that is private.

Who goes there?

Any person or website in possession of the public key can verify that a digital signature has come from someone in possession of the private key, but cannot guess what that key is. Similarly, using only the public key, a person or service can encrypt a document in a way that only the possessor of the private key, which is associated to a specific device, can use.

The idea is that a device would, on request, create a pair of keys, public and private. It would pass the public key to, for example, an online retailer, which then associates the key with a user's account. On the next login, the identity check works both ways: a faked version of the retailer's website will not have the public key the **FIDO** software is looking for, so the user would be alerted that something is amiss. And the retailer can check that the login has been performed by the holder of the associated private key.

Permitting access to **FIDO** via a device's built-in security features, such as a finger-print reader or other biometric scan, adds the something-you-are to the **FIDO** key's something-you-have. So a password is no longer required. Nevertheless, security people are cautious, so provision is being made for an optional PIN number if needed, but as an auxiliary measure.

FIDO's other standard, Universal 2nd-Factor Authentication (**U2F**), demotes the password rather than replaces it. **U2F** would be incorporated into a small physical token, like a dongle which could be plugged into a computer's USB socket or linked to it with NFC. Yubico, a Californian company, already makes versions of these. On sites that support it, only a simple PIN might be needed as a first step to entry. While that PIN might be guessed or disclosed, security is beefed up by a sec-

ond step of tapping a button on the device, or tapping it against a smartphone, to trigger cryptographic keys.

This sort of thing has been tried before, but unseating the password only to replace it with devices, apps and other procedures risks making things just as troublesome. And **FIDO** is not the only dog barking up the tree of safer solutions. Yahoo recently introduced another way to avoid remembering passwords: American users can now set their accounts so that when they go to log in a one-time on-demand password is texted to their phone.

Some passwords and PINs may not, then, disappear completely. They might still be required on occasions to, say, update a person's account details. But multi-factor authentication will at least help deter hackers and thieves from breaking into phones, computers and other devices by making that more difficult, says Markus Jakobsson, an American researcher who studies how computer systems are used. Having to get hold of—or trying to clone—a piece of hardware and copying someone's fingerprints are complications that should keep most users safer. ■



No way for fish

Marine controls: How to prevent Egypt's enlargement of the Suez Canal making it easier for Red Sea creatures to colonise the Mediterranean

INVASIVE species are a menace. In the Mediterranean, poisonous pufferfish frequently turn up in fishermen's nets. Summer swarms of stinging jellyfish close beaches as far west as Italy. And in the east, rabbitfish are eating most of the algae that native species rely on. Along with some 350 other non-indigenous species of marine life, all three migrants arrived from the Red Sea via the Suez Canal.

Marine experts are concerned that even more invasive creatures will turn up in the Mediterranean now that Egypt has started work on doubling the capacity of the Suez Canal with enlarged, deepened and new waterways. Egyptian officials have said the work will not add to the problems and are due to present an environmental-impact assessment to the European Commission. But Europe's administrators have been lackadaisical about seeking controls to stem the invasion, says Argyro Zenetos of the Greek government's Hellenic Centre for Marine

Research in Athens. What, in any case, could Egypt do about it?

There are a number of technologies employed to deter aquatic migration. America's Mississippi River basin is infested with bighead and silver carp imported from China in the 1970s to stock ponds. Voracious eaters, they deprive native species of food. To keep them from getting into the Great Lakes through the Chicago Sanitary and Shipping Canal, stretches of it are electrified. The voltage trails off from a peak of about 2,000 volts in the centre of some electrified sections to zero about 22 metres either side. This gradient creates a zone of increasing discomfort sufficient to cause fish to turn around.

Electrified systems are used in other parts of the world and to keep fish out of the intake pipes at power plants. Smith-Root, an American firm, has electrified a spot in the Puntledge River near Courtenay, British Columbia, to discourage seals from decimating the juvenile salmon that

congregate there (bigger animals feel the jolts more than small fish).

Another method is to create a curtain of bubbles. Produits Étang.ca, a Quebec manufacturer, pumps high-pressure air through submerged plastic pipes that have been drilled with microscopic holes. This throws up a dense, turbulent curtain of bubbles. Most fish are spooked and jellyfish avoid bubbles lest they fill their umbrella. A three-pipe bubble curtain for an enlarged Suez Canal would cost less than \$1m, air compressors included, reckons Mario Paris, the firm's chief executive.

But bubbles do not stop all species. To make them scarier, Ovivo, another Quebec firm, illuminates bubbles with flashing bright lights and installs underwater speakers to produce loud noises. Although it seems a bit like an aquatic disco the constantly changing lighting and sound sequences are scientifically calculated to be as obnoxious as possible to various aquatic species. The combo works well enough to mostly keep Chinook salmon, a species not typically afraid of bubbles, out of a pumping station that draws water from the Sacramento-San Joaquin River Delta in Tracy, California.

The Panama Canal, which was built in the early 1900s, uses locks to lift vessels to Gatun Lake, an artificial expanse of water that was created to reduce the amount of digging. Being a freshwater lake it provides a barrier which prevents marine species from moving between the Pacific Ocean and the Caribbean Sea. If a competing canal is ever completed across Nicaragua, as the government intends, a natural lake will also be used as a freshwater barrier against migrating species.

The Suez Canal does not use locks as the sea levels at either end are similar. However, few organisms survived passage for about 80 years after it opened in 1869. This was due to a natural barrier, the so-called Bitter Lakes, a former salt pan. The lakes, though, no longer draw enough extra salinity from the ground to hinder the passage of sea creatures.

This leads some scientists to propose recreating a highly saline area. Noa Shenkar, a zoologist at Tel Aviv University, who organised an international workshop last year to discuss such ideas, says pumping brine from a desalination plant could create such a stretch. The typical salinity of the Red Sea is around 40 parts-per-thousand (ie, every kilogram of water contains 40 grams of salt). If some of the Suez Canal was raised to just 44 parts, marine organisms would be repelled or killed, she adds. Chad Hewitt, a marine ecologist at the University of Waikato in New Zealand, suggests digging a section of the canal through another salt pan. If experts conclude Egypt should install some sort of barrier, then turning the clock back may be the answer. ■

A charged view

Solar power: Using glass to make electricity out of sunlight could turn buildings and cars into their own power stations

WITH so much glass in buildings, cars and the screens of mobile devices, it is understandable why researchers would like to come up with transparent solar cells which could generate electricity and top up batteries.

Solar cells work by absorbing the photons in sunlight and converting them into electrons, which are gathered by electrodes to flow into a circuit. Most solar cells are opaque to absorb all the light they can to maximise their efficiency. So, to look out of a window or use the screen of a smartphone, a layer of solar cells has to let some light through. Yet the more transparent the cells, the less energy they produce—or at least that is how it works with traditional solar technology based on semiconducting materials such as silicon.

An alternative is to make solar cells from substances that absorb light only at wavelengths which are invisible to the human eye, such as those in the infrared (IR) and ultraviolet (UV) spectrum. That would allow visible light to pass through. One company working on this is Ubiquitous Energy, a spin-off from the Massachusetts Institute of Technology (MIT) in 2011. It is developing solar cells using transparent organic materials that absorb IR and UV wavelengths.

Taking light from only part of the spectrum would reduce the percentage of sunlight's energy that can be converted into electricity. Ubiquitous Energy is hoping, some think optimistically, to exceed 10%. That compares with 20-25% efficiency for a typical non-transparent

solar panel.

Last year a team at Michigan State University led by Richard Lunt, formerly at MIT, displayed a variation of the approach using extremely small organic molecules, which Dr Lunt describes as "exceptionally transparent to the human eye". These molecules absorb specific non-visible wavelengths of light and then glow at a different IR wavelength. This glowing light, which is also invisible to the eye, is guided to the edge of the glass where it is converted to electrical energy by thin strips of photovoltaic cells. The arrangement, known as a transparent luminescent solar concentrator, allows most of the glass to be kept clear of solar components. The first version had a power efficiency of only about 1%. But it is early days and the researchers hope to boost that considerably.

Rolling it out

It should be possible by using materials that absorb non-visible wavelengths of light to produce thin-films of solar cells cheaply using industrial processes that make large rolls, says Rutger Schlatmann, director of the Competence Centre for Thin-Film and Nanotechnology for Photovoltaics, a Berlin-based industry research group. But as he points out: "It is visible light that carries by far most of the energy." That means, however good they are, transparent solar cells may never rival solar panels designed to capture the maximum amount of light. Nevertheless, what they can trap could still be useful.

Semi-transparent solar cells can be used to produce coloured or tinted glass, which helps when shading is required. Heliatek, a company based in Dresden, Germany, uses organic materials to make solar-cell films which are up to 40%

transparent. With a solar efficiency of over 7% they can produce electricity-generating tinted glass in buildings and car sunroofs.

One development that is attracting a lot of interest is the use of a family of crystalline materials called perovskites, which could allow semi-transparent solar cells to be made relatively cheaply in large rolls. A group at Brown University in Providence, Rhode Island, recently reported they had made ultra-thin films with perovskite crystals that are capable of a solar efficiency of over 15%.

Oxford Photovoltaics, spun out of the University of Oxford in 2010 to commercialise thin-film solar cells, reckons perovskites are good for over 20%. The firm calculates that if a 35-storey office block in London was clad with perovskite cells they could generate almost 60% of the building's energy consumption. When electricity bills are high or batteries are running low, every bit of juice counts. ■



Your phone on steroids



5G networks: Proposed new networks promise ultra high-speed connections for mobile users

NEW MOBILE networks come along once every decade or so. Starting around 1980, the first generation of cellular phones relied on analogue technology. When the second generation arrived in 1991, wireless networks began to go digital. By 2001, the third generation dumped circuit-switching, which uses direct connections, for more efficient packet-switching, which moves data around in blocks. Around 2010, fourth-generation networks embraced IP (internet protocol) technology wholeheartedly, providing mobile devices with broadband access to the internet. Given past experience, the next generation is due in 2020.

Mobile-phone companies are now discussing what to include in their proposed fifth-generation (5G) networks. There is a feeling of urgency as heavyweights from outside the traditional phone business, such as Google and Facebook, are moving into this area. One thing 5G networks must do is meet the growing demand for ubiquitous and instantaneous connectivity. That requires future networks to have a “latency” (ie, response time) of no more than a few milliseconds. The speed at which two devices can begin to communicate with one another over today’s 4G networks is about 50 milliseconds, and around 500 milliseconds for the still widely used 3G services.

Another requirement is a data rate of at least one gigabit per second (1Gbps) to start with, and multiple gigabits thereafter. Today’s 4G networks, based on a standard called long-term evolution (LTE) technology, can manage 10-100 megabit per second (mbps), depending on conditions. Most mobile carriers are still rolling out their LTE services; only a few have started to install the latest LTE-advanced equipment (true 4G as opposed to the half-baked versions some have been marketing as the real thing). The peak bit rate of LTE-advanced is claimed to be 1Gbps. In the real world, however, it is more like 250mbps. Given the tenfold improvement between generations in the past, an average 5G download speed of 1Gbps seems realistic—with the chance of up to 10Gbps as the technology ripens. This is likely to increase even further the diversity of mobile devices on offer (see page 12).

Two are better than one

Two technical features—carrier aggregation and MIMO (multiple input/multiple output) antennae—are responsible for giving LTE-advanced its big boost over earlier 4G iterations. Neither technique is particularly new, but both are expected to play a central role in helping 5G fulfil its promise.

First, carrier aggregation. This is a way of boosting download speeds by plucking signals from a number of local base stations, instead of simply the most powerful one in the vicinity. These different channels—often with different frequencies—are combined into what is effectively a single fat pipe capable of delivering data at a far higher rate than would otherwise be possible.

Given the global shortage of radio spectrum, most telecoms firms have snapped up frequencies wherever they can. As a result, few of their chunks of spectrum are contiguous. Fortunately, carri-



er aggregation also allows mobile operators to patch together their disparate blocks of spectrum. This is going to be even more important when 5G arrives around 2020 in a still more crowded wireless world.

Much the same goes for MIMO. This works by transmitting two or more data streams via two or more antennae, and having the receiving antennae process all the incoming signals instead of just the strongest one. Today’s MIMO devices tend to have three or four antennae on both the transmitting and the receiving ends. But what if each end had tens of antennae or even hundreds? That would translate into a significant increase in download speed, and a far more efficient use of the available radio spectrum.

Which spectrum that will be, though, has still to be decided. Today’s wireless devices operate in the crowded 700MHz to 2.6GHz part of the radio-frequency compass. It is not as though once 5G hits the airwaves chunks of spectrum used today by 4G and even 3G networks will suddenly become vacant. Mobile carriers will still have to continue their older services for the millions of subscribers who do not immediately upgrade to the latest devices—and may not do so for years to come.

The obvious answer is for 5G to migrate from today’s very-high frequencies (VHF) to either the super-high (SHF) band between 3GHz and 30GHz, or even to the extremely high (EHF) one at 30-300GHz. Current occupants of these rarefied frequencies (also known as “millimetre waves” because of the wavelength) include satellite television, microwave relay links, air-traffic control radar, radio astronomy and amateur radio.

In most regions of the world, a chunk of spectrum around 60GHz has been designated for use by the public without a licence. With their latest standard (802.11ad), the Wi-Fi community plans to exploit this band for streaming ultra-high-definition video around the home. In typical configurations, it should beam more than 6Gbps over modest distances. At least in the laboratory, Nokia, a Finnish networking firm, has achieved speeds of 115Gbps using such frequencies.

As always, there are drawbacks. One is that such extreme frequencies are easily blocked by walls and even people moving around. They also get absorbed by the atmosphere, although the absorption effect only becomes significant at distances greater than 100 metres or so. By going to 70GHz and above, atmospheric absorption disappears, but rain can still cause the signal to fade.

All of which suggests that 5G will need base stations closer to users than current cellular towers. As it so happens, that is already a trend. So far, microcells—no bigger than a Wi-Fi modem—have been used mainly inside buildings to overcome poor reception. To handle 5G’s needs, hundreds of them will be required to fill the gaps between existing base stations. With the tiny antenna boxes attached to lampposts and the sides of buildings, few people will ever notice them, let alone object to their presence—as is so often the case when new cellular towers are planned. So it is not just faster networking speeds that are promised, but less angst over the towers that phones connect to. ■



Flying into the future

Airline interiors: How technology is changing the passenger cabin for whatever class you fly

THE twinkling stars above the passengers gradually fade away as the night sky lightens and the sun begins to rise. It is an illusion, as it has long been daylight outside. But the projected image has a purpose: gently to awaken those on board and help their body clocks adjust to a new time zone. As the airliner begins its descent to New York, the ceiling and walls turn transparent to provide a panoramic view of the Manhattan skyline. And on lining up to a runway, the aircraft's seats automatically change shape, becoming more upright and firm to provide additional support for the landing. Welcome to JFK airport, sometime in 2050.

This vision of what it will be like inside an airliner of the future comes from Airbus. The European aerospace giant got its engineers to look at how flying might evolve from the passengers' perspective. The fuselage has a "bionic" structure constructed from composite materials which mimic the bones of those masters of flight: birds. The composition of bone consists of fibres, which are light but also immensely strong when arranged to carry tension where it is needed. The structure saves space and also helps to reduce the aircraft's weight, so it burns less fuel.

The upper part of the bionic cabin is

covered with what Airbus describes as a "biopolymer membrane", a sort of tough plastic coating which can be electronically controlled to turn opaque or transparent on command, thus eliminating the need for conventional windows. This too helps to make the fuselage light and strong.

The traditional rigid divisions into first, business and economy classes have gone. This is thanks to the transforming seats. Made from "memory" materials which can morph into a different shape and then return to their initial form, they adapt to the size of an individual's body—and their travel budget. The more you pay, the more space and comfort the seat will provide. This would enable airlines to configure seating according to demand. And that means there will no longer be any need to upgrade passengers from cattle class if the rear is overbooked.

The technological elements that could make this concept become reality can already be seen in new aircraft and in cabin designs that are much closer to production. How the experience of flying will change depends, however, as much on the unforgiving economics of air travel as on the imagination of the designers.

Producing the interior of an aircraft is a costly business—not least because in order

to provide a distinctive product most airlines want something different, so the insides are custom-built. As a result carriers will spend some \$10 billion this year, up by 5% from 2014, on cabin interiors for new and refurbished aircraft, estimates ICF International, a consultancy based in Virginia. Making that kind of expenditure pay depends on what flyers you have in mind.

In the battle for passengers, the price of the ticket is usually the most important thing. Given a choice, air travellers always say they want more room and extra comfort, but are usually not prepared to pay any more money for them—or at least not a lot more. The emergence of various forms of a new airline class, often called "premium economy", is an answer. But there is a widening gulf between the luxury of first and business classes, and the austerity endured by hoi polloi at the back.

The differences are most apparent in the amount of space a passenger gets. The seat pitch in standard economy (measured as a point on one seat to the same point on the seat in front) is typically between 78cm (31 inches) and 82cm. Spirit Airlines, a budget American carrier, has trimmed the pitch of its standard-economy seats to just 71cm. At the other end of the spectrum Abu Dhabi's Etihad Airways is offering a nearly 12-square-metre three-room first-class suite with a shower called "The Residence" on its Airbus A380s. It comes complete with a private chef and a butler trained at the Savoy Hotel in London.

Turn left...

It is in the business-class cabin that airlines are spending most heavily, however, because it is more profitable for them. One seat manufacturer reckons that this year airlines will install in new and refurbished ►

► aircraft roughly 2,000 new seats in first class, but 50 times as many in business.

Business class has already changed a lot in recent years. It can provide the same or a better level of comfort than that available in the first-class cabin less than a decade ago. For a start, if a business-class seat does not extend into a fully flat bed, the airline's offering is no longer "even in the game", says Blake Emery of Boeing, America's biggest aircraft manufacturer.

The result is that business seats are turning into areas of personal accommodation. These spaces will get more sophisticated and specialised. Teague, a Seattle company which has designed interiors for all models of Boeing's airliners, worked with Nike, sleep experts and professional coaches to design a concept called the "athlete's plane". It includes a training room and a sleeper pod (pictured below) to enhance relaxation. The effects of air travel on the body's natural rhythms means that athletes travelling over multiple time zones are statistically more likely to lose against a home team, says Teague's Devin Liddell.

Powerful computer-aided design and simulation provide designers with more ways to explore the clever engineering required to create as much room as possible in a confined space. Paperclip Design, a Hong Kong company, has come up with the closest thing yet to a morphing seat. Called Butterfly (also pictured below), it is composed of units of double seats with the aisle seat offset backwards. In premium economy both seats would be used, but the cabin could be upgraded quickly to business by having the inboard seat left empty to flip over as a sleeping platform.

Another approach involves positioning

seats at various heights to gain space. Jacob-Innovations, a Massachusetts firm, has a design called StepSeat that lifts every other seat about 18cm allowing extra room for them to recline. A more radical arrangement is a series of stacked cocoons called Air Lair (illustrated on the next page). It offers a third more passenger capacity, says Adam White, head of Factorydesign, its London creator. So far, airlines have tended to shun these so-called 3D-seating set-ups because they think that some passengers, for reasons of status, will not want to sit on different levels.

Developing and designing a new business-class sleeper-seat or pod can take two years or more, and top-of-the-line models might cost up to \$350,000 each, once they are stuffed with electronics. The price is partly explained by the standard required to protect passengers from a seat breaking in a crash. This was raised in 2009 by America's Federal Aviation Administration from withstanding a deceleration of nine times the force of gravity (9g) to 16g. Although this means that seats and their fittings have to be made stronger, the use of lightweight composite materials, such as carbon fibre, allows thinner seats to meet what has now become a global standard.

Carbon fibre is already widely used to make aircraft fuselages and wings. It is stronger than steel but lighter even than aluminium. That strength comes from the powerful links between carbon atoms—similar to the toughness imparted to a diamond. The fibres are woven together and arranged in position using detailed computerised stress-analysis for maximum strength. The fibres are then embedded in a hard resin. Carbon technology is advanc-

ing rapidly, with even greater performance characteristics claimed for single-atom-thick layers of graphene. Such work may well lead to the advanced composites needed to make bionic fuselage structures.

... turn right

New lightweight technologies are also having an impact in the back of the aircraft. Last year Air Méditerranée, a French carrier, removed the 220 economy seats in an Airbus A321—it bought them for about \$300,000 in 2006—and replaced them with a new, lighter version. The skinny seat (pictured on the next page) is made by a Paris startup called Expliseat and weighs just 4.2kg (9.3lb) compared with the 12kg seat it replaced, says Air Méditerranée's Christophe Costes.

Expliseat's seat-frame is constructed of titanium and carbon fibre. The "titanium seat", as it is named, cost Air Méditerranée nearly three times as much as each aluminium one it replaced, but this will be more than compensated for by fuel savings. Expliseat's lightest seat weighs just 3.9kg. Air Tahiti, which has also bought the company's seats, reckons the weight savings will allow some of its turboprop aircraft operating off short runways to carry 55 rather than 50 passengers, says Benjamin Saada, Expliseat's co-founder.

That hints at how the space savings from thinner seats are likely to be used in economy: not to provide more legroom but instead to pack in an extra row or two of seats. Some new aircraft will also have smaller lavatory cubicles as a result of more petite plumbing. All this helps seating "efficiency", the industry's euphemism for density. Shrinking the seatback pocket ►



Teague's bed for weary athletes and Paperclip Design's transformer seats



Two can be company sharing an armrest and seats that are slimming down

► and placing tray stowage higher on its seats has already helped Germany's Lufthansa increase seating on its Airbus A320 fleet from 150 to 168, says Samuel Engel of ICF International. Tallying the additional seats packed into all aircraft in its fleet, Lufthansa gained the equivalent capacity of 12 new A320s, he adds.

It could be worse. Some carriers have flirted with standing room. Spring Air, a Chinese budget carrier, has proposed installing such a scheme to increase capacity on its aircraft by 40%. In 2012 Michael O'Leary, never one to miss making headlines, promoted the idea of a padded backrest for standing passengers on Ryanair, the Irish discount carrier which he runs. Avointeriors, an Italian seatmaker, produced a downward-sloped perch called Skyrider but got no takers. Public reaction, says Ermanno De Vecchi, the firm's boss, was, in essence, "sitting on a saddle crammed in like a sardine? Forget it." Safety certification for "standing" seats would, in any event, be highly improbable.

If more space in the economy cabin is unlikely, passengers on all budgets will see some benefits from the changes to cabins. First, technologies that reduce weight and therefore fuel consumption should help to lower fares further. Even the padding in the seat cushions is changing with improved materials. New types of foam and fire-resistant coverings have been developed to produce lighter cushioning. This has resulted in a fall in the weight of a typical seat's cushioning from 1.8kg a decade ago to less than half a kilo now, according to Avointeriors. Mark Hiller, head of the aircraft-seating division of Recaro, a German firm, says that in 20 years the company has cut the overall weight of its seats by 20% on three separate occasions. Each kilo of weight shed from an aircraft reduces its annual fuel bill by at least \$100, he adds.

Second, new designs may help address some of the most common irritations of economy-class travel. Having a passenger



drop his seat backwards into another passenger's space is a great cause of angst. (Hence the brisk sales of a \$22 gizmo called the Knee Defender, now banned by some airlines, which attaches to a tray strut and prevents the seat in front from reclining.) James Lee, the boss of Hong Kong's Paperclip Design, has come up with a fixed-position seat in which the back cushion can be lifted forward from the bottom and kept inclined by stuffing a briefcase or jacket behind it. This "anti-technology" seat, adds Mr Lee, has the benefit of doing away with a reclining mechanism. Expliseat's titanium seat also remains upright.

Elbows at war

Another annoyance is the battle over a shared armrest. But Mr Lee has an answer for that, too. He has patented a design with two flat surfaces at different heights, providing room for two elbows (pictured above). Having knees pushed into passengers' backs is a further frustration. Expliseat embeds a taut sheet of a secret polymer into the rear cushion to absorb the

shocks of impacting knees. The material is lighter and softer on the kneecaps than the rigid plastic shields which are sometimes used, adds Mr Saada. Teague's Mr Liddell says one area where more innovation is needed is to make the dreaded middle seat more inviting—especially in economy. At the moment, he adds, for passengers the middle seat is "your sentence for waiting too long to book".

The third improvement is likely to be the ambience of the cabin. BAE Systems, a British firm, recently made its first sale of a set-up called IntelliCabin that features LED lighting designed to induce calm, improve sleep and charm flyers with illumination schemes like an artificial sunset for dinner, says Jared Shoemaker, head of cabin technology. A Boeing team of engineers, psychologists and marketing people are also concocting LED-lighting schemes to make cabins appear roomier—"to essentially distract people from the discomfort" of a tight squeeze, says Boeing's Mr Emery. Accentuating ceiling curves with sky-blue light generates a "sense of space expanding above" ►



Airborne pod life

► and bathing vertical surfaces in white light creates an illusion of greater width.

When Boeing's 787 was introduced in 2011 it pioneered a number of enhancements. The aircraft is fitted with large "electrochromic" windows that trap a thin gel between two panes of glass. An electrical current is applied to darken the gel, allowing passengers to choose from five transparency settings. The 787 also improves the air in the cabin. Airlines have long kept air dry because humidity corrodes metals. But that is less of a problem with the 787's largely carbon-fibre fuselage. This means the air can be more moist. And because carbon fibre is stronger than aluminium, cabin pressure can be maintained at a higher level, closer to what it is on the ground. The 787 also pumps air into the cabin electrically rather than having it bled from the compressors in the jet engines, which risks fumes entering.

The goggle box

Augmented reality might help ease the journey, too. Epson, a Japanese electronics firm, has created goggles, called Moverio BT-200, which project images onto a lens that appears to be a screen five metres away. Some of the first versions are being tested by a South Korean airline. The goggles could be used to watch films, which in the future are likely to be beamed wirelessly around the aircraft's cabin, eliminating the need for lots of bulky in-flight entertainment equipment.

Video screens made from thin films could be used on the back of skinny seats and placed on cabin walls to provide an enhanced view of the outside and, eventually, as a replacement for windows. The view would be relayed to the screen by exterior cameras.

The Centre for Process Innovation, a British technology group, is exploring the use of organic light-emitting diodes (OLEDs) to make the thin-film screens. OLEDs use a luminescent layer of organic compounds to emit light in response to an electric current. Matthew Herbert, a manager at the centre, says that in less than a decade production technology will be inexpensive enough to mass-manufacture flexible OLED displays for use in aircraft. Using such screens instead of windows would reduce weight and improve the strength of the fuselage. One company, Spike Aerospace of Boston, is proposing to replace windows with screens in a supersonic executive jet (see box). Step by step, the vision of that New York-bound flight in 2050 is moving closer to reality. ■

Watching the world go by

Executive jets faster than the speed of sound are ready to fly off the drawing board

SUPersonic travel for airline passengers came to an end on October 24th 2003 when a British Airways Concorde completed the last scheduled flight from New York to London. With the ability to cruise at 2,160kph (1,350mph, or around Mach 2—twice the speed of sound) the fastest a Concorde made it across the Atlantic was a shade under three hours, compared with the seven or eight hours it takes in a subsonic airliner. A number of things did for Concorde, including heavy fuel consumption, its sonic boom restricting speed over land and a fall in passengers after an Air France Concorde crashed in Paris in 2000, killing all 109 people on board. No replacement aircraft has ever emerged. But a supersonic executive jet may be a different matter.

One contender is the s-512, which is being developed by Spike Aerospace, a Boston company. Instead of windows it will have a "multiplex digital cabin"—a thin-screen video display either side of the passenger compartment that would be fed with a live view taken by six exterior cameras (a pair of conventional windows would be retained). The inte-

rior effect would be dramatic although, as the company points out, for much of the time there might be little to see apart from clouds or the stars in a night-time sky. On those occasions films could be shown instead—or even a PowerPoint presentation for workaholics.

Using video windows would make the jet lighter, quieter inside and less expensive to build, says Vik Kachoria, Spike's chief executive. The s-512 could carry 12-18 passengers at Mach 1.6 and, unlike Concorde, would have the range to fly from Los Angeles to Tokyo in just six hours. Although at an early stage in its development, Mr Kachoria says the company has received \$5m deposits for several of the roughly \$100m jets, which it hopes to start delivering in 2020.

Advanced aerodynamics and its relatively small size should reduce the sonic boom of an executive jet. Aerion, a company based in Nevada, is hoping to make a Mach 1.6 executive jet called the AS2. Throttled back to around Mach 1.2, the company reckons it could fly over land without the boom ever reaching the ground. In 2014 Airbus agreed to collaborate with Aerion on the project, which aims to have a prototype ready for test flights in 2019. If supersonic travel does return, it looks like being more exclusive than Concorde ever was.



The view from the executive suite

Ready to runcible

A guide to alternative smartphones: Want to be different? There are now many handset brands to choose from, besides the ubiquitous iPhone or Galaxy



IS IT a clock? Is it a rock? It's a Runcible. That is the name of what I might be the strangest-looking smartphone ever designed. Styled after an old-fashioned fob-watch, it takes its name from the works of Edward Lear, a 19th-century British poet who invented nonsense words. Its Californian (where else) creator, Monohm, bills it as an "anti-smartphone" that does not dare to distract its user with alerts and beeps and other forms of information overload. Instead of lots of hyperactive apps, for instance, the Runcible provides only a simple summary of its user's social networking.

Runcible is not the only unusual smartphone destined to appear on the market. Google will begin a trial in Puerto Rico later this year of a "modular" device called Ara. Users will be able to update the phone, say with a new battery or a better camera, by replacing one of its plug-in modules. LG sells smartphones with a curved body and a pair of digital eyes on the back that change expression (supposedly to establish "emotional" contact with the user). And the latest model from Yota, a small Russian maker, has a second black-and-white display on the back, which is meant to allow a user to read for hours without draining the battery.

So should consumers expect smartphones to evolve into all sorts of different shapes and sizes? Before the arrival of the touch-screen phones, after all, there was a greater variety of shapes, from clamshell designs to slide-out keyboards. Yet unusual designs, such as the Runcible, are likely to remain rarities for now—activities like typing are suited to palm-sized rectangular devices. If consumers really want an unusual-looking smartphone then they had best wait a few years, says Geoff Blaber of CSS Insight, a market-research firm. To provide really novel shapes, components such as batteries and screens will first have to evolve, perhaps with both becoming flexible. Even then, because of their clout in the market and their economies of scale, it is likely to be Apple or Samsung which pioneer them.

The choice of brands available to consumers is multiplying fast, however. Most of the newcomers are regional brands, which come by the hundreds and not just in China, where the phenomenon is most prevalent; Coolpad, OnePlus and Oppo are among the better-known names. France has seen the rise of Wiko, which is now one of the country's most popular smartphone brands. Af-

rica, too, has its brands, such as VMK, which hails from Brazzaville, the capital of the Republic of Congo.

Although these firms make much of their regional roots ("African technology for Africa" is VMK's tagline), most are combinations of Chinese manufacturing and local marketing. The producers may add nice features (one of Wiko's latest models, called Highway Pure, for instance, is only 5.1 millimetres thick), but their aim is mainly to serve buyers who want to upgrade to a real smartphone, but cannot afford the latest Apple iPhone or Samsung Galaxy. The Highway Pure, with a respectable list of specifications, costs less than \$300; VMK's Elikia 1 costs about \$110. At those prices most of these phones represent good value, and they work perfectly well. (The odd-looking phones are a lot dearer: when the Runcible is launched later this year it is expected to be priced towards the top end; the two-screen YotaPhone 2 retails for \$680.)

The question is whether, and for how long, the regional brands will be available to consumers elsewhere. The competition for cheap smartphones is cut-throat and some of the smaller regional brands will not survive, predicts Francisco Jeronimo of IDC, a market-research firm. Xiaomi, a fast-growing Chinese firm, is one of the big brands, but problems with intellectual-property rights might prevent it from moving as quickly as it would like into markets outside China. That means India's Micromax may become the first big regional Asian smartphone brand to be widely offered to Western consumers. The company is already India's biggest smartphone vendor, according to some analysts, with a market share of 22% compared with 20% for Samsung, its main rival. Micromax boasts an impressive line-up of dozens of smartphone models, ranging in price from less than \$30 to more than \$200.

Call the plumber

Novelty-seekers are not just interested in design and price; they also care about the services that handset-makers offer. Given that, Mr Jeronimo says, buyers should look at brands which view their devices as more of a loss leader and try to make money by offering attractive services. This is Xiaomi's territory. The Chinese company is often compared to Apple and its boss, Lei Jun, feted as a second Steve Jobs, but the better comparison may be to Google and its co-founders. Xiaomi's ambition is to be an online powerhouse, not just a handset-maker. In April Mr Lei predicted the company's services revenue will triple to nearly \$1 billion this year, about 6% of expected total sales of \$16 billion.

Micromax has ambitions in this area as well. One of its most interesting handsets is Yureka, a \$140 budget smartphone powered by Cyanogen, a variant of Android. It allows users to customise and extend Google's operating system and even exchange the online giant's mobile services for other offerings.

"With Android, every phone became the same. And all the data goes to Google," says Rahul Sharma, a co-founder of Micromax. Cyanogen, he says, will allow the firm to become more like Xiaomi by adding differentiating features and services. "If I'm looking for a plumber, my phone should be able to tell me whether a friend already knows one," explains Mr Sharma. And smartphones should come with a selection of services pre-installed which users can pick and choose from, he adds, rather than being offered only a default set from Google. And if that all sounds a bit too sensible, there is always the Runcible. ■



Charge of the lithium brigade

Energy storage: The lithium-ion battery is steadily improving, but new research aims to turbocharge the technology

IT IS hard to imagine modern life without batteries. These storehouses of power open up new vistas, whether connecting people with the world through portable devices or travelling in electric cars. Yet, like many freedoms, the price is vigilance; the constant fretting over the charge meter.

Anyone who has spent time in an airport in recent years can attest that one of the most popular places to wait for the plane is by the rare wall socket or specially built tables festooned with electrical outlets. And for all the promise of the electric car, the distance it can travel on a single charge is limited, adding a new phrase to the lexicon of motoring: "range anxiety".

The inability of power storage to keep up with new technology frustrates many, especially entrepreneurs in Silicon Valley who bemoan the lack of a Moore's law for batteries. This is the name given to a 1965 prediction by Gordon Moore, a co-founder of Intel, that the cost of microchips would continue to fall as the number of transistors crammed onto a given area of silicon would double every 18 months or so. For chipmakers like Intel this turned into a self-propelling prophecy that is—just about—still delivering cheaper computing power.

Batteries have improved, but nowhere near the pace of Moore's law. Most mobile devices and electric cars are now powered by lithium-ion batteries (see box 1). They were commercialised by Sony in the early 1990s and have got steadily better. The batteries are lighter and their capacities have increased several times over the years, as witnessed by ever-thinner laptops and smartphones.

The lithium-ion battery "is almost an ideal battery," says Vincent Battaglia, the head of the Electrochemical Technologies Group at Lawrence Berkeley National Laboratory in California. Lithium is the lightest metal on the planet and it can hold a charge extremely well compared to heavier alternatives, such as lead, zinc and nickel-cadmium. Unlike the latter it does not suffer from a "memory effect", which means lithium batteries do not need to be

run down before recharging.

There are some drawbacks. Lithium is highly reactive—overcharging and manufacturing faults can result in an internal short-circuit causing the battery to heat up and sometimes burst into flames. Millions of laptop batteries have been recalled and some of Boeing's 787s were grounded in 2013 because of fires. Engineers are now better at managing this hazard.

An important measure of a battery's ability is its "energy density"; the amount of energy that can be stored for a given weight or volume. Depending on construction, a lithium battery can store 100-250 watt-hours per kilogram—more than twice as much as a nickel-cadmium one. An electric car with a 24 kilowatt-hour lithium battery has a range of 175km (109 miles) or so.

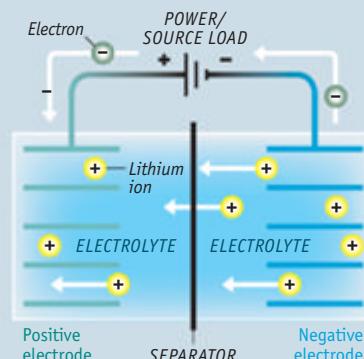
Even though China is now applying its manufacturing muscle to their production, lithium batteries remain relatively expensive: typically around \$500 per kilowatt-hour of capacity. Hence a battery pack for even a small electric car can cost around \$10,000. Many in the car industry believe the range needs to be close to 500km and the cost around \$100 per kilowatt-hour before all-electric vehicles will move into the mass market. That would also allow smartphones and laptops to run for days.

Such a battery would require a step-change in technology. Many researchers are trying, but often run into difficulties scaling up promising experiments into a product that can be mass-produced. Some scientists are not sure if the energy density of lithium-ion batteries can be improved much beyond present levels without significant changes in the materials used to create the electrodes.

Dr Battaglia's team are working on what he describes as "transition metals". These are combinations of manganese, nickel, cobalt and graphite which can be added to a lithium battery's electrodes. Once the right recipe is determined, the idea is that it will increase energy density without having to develop a whole new type of battery. It would, though, be more ➤

Shuffling ions

How a lithium-ion battery works



Ions are electrically charged particles formed when an atom loses or gains an electron. When a circuit is connected to a charged lithium-ion battery, lithium ions migrate from the negative electrode through the electrolyte to the positive electrode, releasing energy in the process. This causes electrons to flow through an external circuit. When the battery is recharged, the ions move back to the negative electrode, where they accumulate.

Source: *The Economist*

► of an incremental improvement.

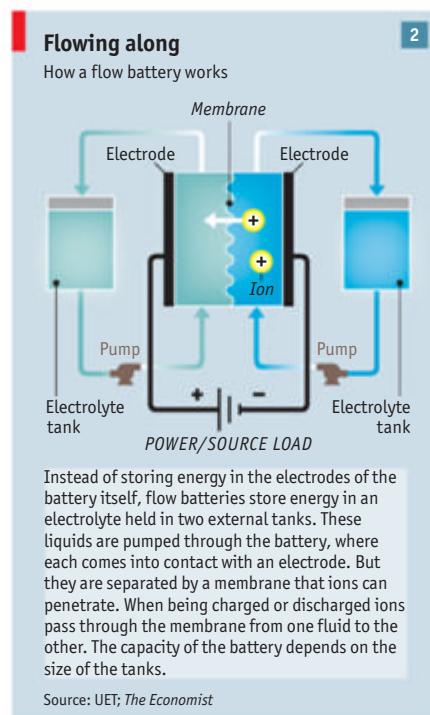
Other researchers are trying for more. Yi Cui and his colleagues at Stanford University are developing thin films—some only atoms thick—to enclose the positive electrode. This would allow it to safely contain more lithium, which coupled with a sulphur negative electrode (sulphur, like lithium, also has a very high energy capacity) would enable a battery to hold about five times as much energy by weight as today's lithium batteries do. A similarly huge increase in capacity is promised with work by Chengdu Liang and his team at Oak Ridge National Laboratory. They are developing a lithium-sulphur battery that has a solid rather than liquid or gel-like electrolyte. This would also make the battery more stable. But both projects face several more years of work even if these batteries can be made commercially.

Tiny solid-state batteries, as those with a solid electrolyte are known, are already found in small devices and sensors, often providing backup power to a microchip. They can be made by depositing materials onto a substrate, rather like the way semiconductors are made. Despite an extremely high energy density, making large solid-state batteries has been too expensive for phones and cars. Nevertheless, some companies hope to change that. Sakti3, a Michigan firm, aims to make big lithium-based ones at the \$100 per kilowatt-hour scale—although it does not say when. Dyson, a British maker of vacuum cleaners, has been sufficiently impressed by the technology to invest \$15m in the company recently. Volkswagen has put money into QuantumScape, a Silicon Valley company also working on solid-state batteries.

In theory, lithium-air batteries would provide the highest energy densities—air, after all, is extremely light. Researchers have been experimenting for years how to make such batteries, but no commercial breakthrough appears in sight.

In some applications, though, weight is less of a problem and here lithium will face competitors. Giant batteries are being developed to store electricity on the grid, which could transform the market for intermittent renewable sources such as wind and solar. The way utilities deal with spikes in demand is to add generating capacity—so called “peaker” stations. If surplus power could be stored fewer such stations would be needed and supplies could be balanced more easily and cheaply.

Less than 0.01% of electricity is presently stored, says Philippe Bouchard, vice-president of business development for



EOS Energy Storage, a New York startup. “Every other commodity supply chain has some form of storage at the point of generation and through delivery,” he adds. Mr Bouchard is pitching his large container-sized zinc-based batteries for storage to New York and Californian utilities. These cost \$160 a kilowatt-hour to store electricity, which the company says makes battery grid-storage financially worthwhile.

Other firms making big batteries include giants like GE in America, South Korea’s LG, Japan’s NEC and startups such as Aquion Energy, which was spun out of Carnegie Mellon University in Pittsburgh and is backed by Microsoft’s co-founder, Bill Gates, among others.

Powering home

Such batteries could also be used by businesses and households. If it were possible to accumulate power overnight, when it is cheap, in a battery and discharge it during the day, when it is expensive, it would save users money. Solar and wind power could be stored this way too, instead of being pumped back into the grid in exchange for a discount on the bill. Such systems might allow some businesses and homes to move, at least in part, “off the grid”.

Smaller versions of grid-scale energy-storage systems would be required for domestic use. One possibility is flow batteries, which generate electricity when a

charged liquid-electrolyte is pumped through them (see box 2). In theory, the capacity of a flow battery is as big as the containers in which the electrolytes are stored—which for a stationary flow battery may not be a problem. Michael Aziz at Harvard University has been working on flow batteries for the grid, but his team thinks they are close to being able to make a safe, relatively inexpensive system, about the size of a domestic heating-oil tank, to fit in the basement of a home.

Many flow batteries rely on pumping pricey solutions that contain metals, but the Harvard team says their system could have a greater commercial potential because it could be made more cheaply than those using metal-based solutions. This is because the battery relies on naturally occurring organic materials known as quinones, which bear similarities to the energy-storage molecules used by plants and animals. At present the researchers need to use bromine, a particularly toxic material, on one of the electrodes to boost performance. “It’s not something I would put in my basement,” Dr Aziz admits. But his team are optimistic they will find a way to use organic materials on both electrodes. Such a battery would be allowed in Dr Aziz’s basement.

It could take several years before flow batteries for domestic use come to the market. But lithium batteries, if they could be made cheaply enough, could compete as a lighter and more compact alternative to batteries made from heavier and cheaper materials for storing energy in buildings.

This is the thinking of Elon Musk, the billionaire founder of Tesla, a Californian producer of electric cars (such as the Model S pictured on the previous page). Tesla is building a \$5 billion “gigafactory” in Nevada in partnership with Panasonic, its Japanese battery supplier. Production should start next year and by 2020 reach the equivalent of enough lithium battery-packs to power 500,000 cars.

Rather than banking on a breakthrough, Tesla reckons steady improvements and the manufacturing efficiencies of its giant factory will reduce battery costs by some 30% and help it sell more electric cars. Some of the batteries, though, will also be offered to businesses and households for energy-storage. In May, Tesla announced the Powerwall battery for this market. A 10-kilowatt-hour version will cost \$3,500 (excluding controls and installation). Even if big innovations in lithium technology fail to materialise, lithium batteries seem to have a bright future. ■



Britain's spaceman

Sir Martin Sweeting: The pioneer of small satellites is laying plans for the infrastructure and services needed for travel to other planets

SOMETIMES a childhood fascination can shape a lifetime. For Sir Martin Sweeting it began with forging a communications device out of two tin cans connected with a taut piece of string. This led to a schoolboy interest in amateur radio, which turned to a passion in the late 1960s at the time of the Apollo Moon landings and intoxicating space imagery from films like "2001: A Space Odyssey".

While studying for his PhD in the late 1970s at the University of Surrey in Guildford, a town south-west of London, Sir Martin made equipment from whatever he could lay his hands on to pick up signals from American and Soviet satellites. In 1985, with £100 (\$150) borrowed from the vice-chancellor, he founded Surrey Satellite Technology (sst), a firm which has pioneered the use of small satellites built from cheap off-the-shelf equipment.

Space used to be the province of superpowers, but the arrival of lower-cost small satellites brought down the price of entering the space business to a level which companies, research groups, developing nations and even some schools could afford. Now Sir Martin is preparing sst for a future in which he plans to provide essential services to a new generation of space travellers.

Before sst, space was not a particularly promising field in flared-trousered 1970s Britain. The country had quit the space race as post-war enthusiasm for rockets had dwindled. Government spending cuts led to ambitious launch systems and manned-flight programmes being abandoned. Deciding that he did not have much chance of joining America's space agency, NASA, Sir Martin started to try some things for himself. With the first microcomputers arriving on the scene he wondered if it was possible to use one to build a small satellite that was reasonably "intelligent" compared with the large and expensive hard-wired satellites that were being put into orbit at the time.

Sir Martin persuaded the university to let him try. "I didn't have any money so had to go around scrounging from industry and anybody else I could think of," he says. With a team of volunteers the satellite was built. It was about the size of a couple of microwave ovens and weighed

72kg. Some of the big satellites that government space agencies were putting into orbit were as large as a London double-decker bus. Through the amateur radio network he managed to persuade NASA to provide a free launch, and in 1981 the microsatellite piggybacked into space as part of a mission to put a large scientific satellite into orbit.

The Surrey satellite was a novel piece of engineering. Besides containing an on-board computer, allowing the satellite to be reprogrammed from the ground, it was also fitted with an early charge-coupled device, a type of sensor which would become the heart of modern digital cameras, and a digital speech-synthesiser extracted from a toy. This meant that besides being able to take pictures of Earth the satellite could "speak" to the world below. The idea was that radio amateurs and schools could use basic equipment to tune in to hear data, such as the temperature, being read out. "Amazingly," says Sir Martin, "to everyone's surprise it worked." In 1984 the team built a second satellite containing a new computer and an updated camera. It too was given a free launch by NASA and, although now not in the best of health with its solar-powered batteries deteriorating, it is still transmitting back to Earth.

The spin-out powers up

After years of begging and borrowing, Sir Martin and a team of four others began sst to see if they could turn the production of small satellites into a business. They were encouraged by interest from a number of countries that wanted to get a foothold in space, including Pakistan, South Korea, Malaysia and Chile. "And because we were linked to a university, we were prepared to train their people and share information with them," adds Sir Martin. Many of those tutored during the construction of the firm's first satellites went on to form the nucleus of other countries' space agencies—and produce overseas competitors that would come to emulate sst.

sst has, nevertheless, maintained what it says is a 40% share of the global export market for small satellites. It has built and launched more than 40 of them, ranging in weight from 3.5kg to 660kg, and has over 20 others in production along with various payloads for other space missions. The company now employs 500 people. In 2009 Airbus bought 99% of the firm's shares from the University of Surrey, which retained 1%. As part of the deal with ►

Some of whizziest components made for terrestrial use might not be up to the rigours of space



► the European aerospace giant, SST continues to be run as an independent company and Sir Martin, who was knighted in 2002, serves as its executive chairman.

Building small satellites from industry-standard parts means reaping the benefits of huge investments by car companies, consumer-electronics firms and others in developing sophisticated components for mass-produced goods. This can limit the abilities of a satellite but it provides economies of scale which are impossible to achieve if making bespoke components. "We were being parasitic, if you like," says Sir Martin.

Besides lower costs, commodity components have become increasing reliable—essential in building a satellite which, once in orbit, may not be repairable. In the early days, this could mean testing individual widgets, such as transistors or capacitors. Hundreds of them might have to be shaken, cooked and abused in various ways to see which ones were best. Nowadays, with modern manufacturing methods, components have been miniaturised and integrated into units, like microchips. So testing can be done on more complete systems. And because tolerances have become much tighter, fewer parts now contain defects. However, even some of the whizziest components made for terrestrial use might not be up to the rigours of space. One of the biggest problems is radiation. Some bits of a smartphone, a common source of miniaturised electronic components and sensors, are not as resilient to radiation as other parts. So knowing which bits to use and which to avoid has become part of the satellite-making art.

In 1998 the company's engineers wanted to see how small they could make a functioning satellite. The result was about the size of a beachball (the 3.5kg one in SST's inventory). It was one of the first of what came to be called a nanosat. Over the next five years or so some 1,000 nanosats are expected to be launched by companies, startups and researchers.

By 2000 SST had reached a turning point. "Before then these small satellites were useful, interesting, but could carry out only a few niche tasks," says Sir Martin. After 2000 technology improved rapidly, providing greater capabilities. "Now our satellites can rival the majority of conventional satellites," he adds. Taking pictures of Earth, for instance, can now be done in high resolution with a small satellite fitted with the latest high-power image sensors and, maintains Sir Martin, at

about one-fifth of the cost of most traditional large satellites.

Some of SST's latest satellites have a one-metre resolution (ie, one pixel on the spacecraft's sensor represents one square metre on the ground). This means it might be possible to identify a shape smaller than one metre, but not in detail. So the satellite could, for instance, easily spot a car. Some big high-end satellites can take pictures down to a resolution of 50cm (the legal limit in America for commercial satellites), although military ones are thought to be able to zoom closer.

The snag is, at some point the laws of physics dictate a more powerful telescope means a bigger and more expensive satellite to transport it. And as the resolution increases the field of view diminishes, so the image produced is a bit like looking at the world through a drinking straw.

As a result there are plenty of uses for satellites with resolutions of 20 metres or so, including the ability to take a picture of an area several hundred kilometres wide. This can, for instance, help in geographic surveys, monitoring deforestation or observing crops. In partnership with groups in other countries SST also operates a constellation of satellites which can rapidly be deployed in the event of a disaster. The lower-resolution ones can, say, reveal the extent of a flooded area, and the higher-resolution cameras take a look at specific problems, such as a bridge that has been washed away. These satellites were used following the Asian tsunami in 2004, Hurricane Katrina in 2005 and after the recent earthquake in Nepal.

To a new wavelength

The company is now developing observation systems that go beyond the visible spectrum. These satellites use synthetic-aperture radar, which can penetrate clouds and work at night. It relies on using algorithms to process radar pulses bounced back from the ground to build a high-resolution image.

SST is also looking at ways to address worries about space debris. There are some 500,000 bits of space junk in orbit, but Sir Martin does not think that putting up more satellites—even 1,000 nanosats—will make much difference. "The real risk is when a satellite fragments," he says. One satellite exploding because of a fault or when it reaches the end of its working life can produce thousands of pieces of debris. Hence there are plans to develop systems that can tip old satellites out of orbit for them to burn up safely on re-

entry. TechDemoSat-1, a one-cubic-metre satellite which SST launched in 2014 to carry out a number of studies, is fitted with a "de-orbit sail" developed by Cranfield University in Britain. The ultra-thin sail will be deployed at the end of the mission to turn it towards Earth.

Other satellites give another hint of where SST is going. The company is building its first small geostationary platform, which instead of orbiting Earth will remain in a fixed position relative to the surface, as telecommunications satellites tend to be. This is for Eutelsat, a Paris-based company, which provides satellite services to telecoms firms and broadcasters. In addition SST is building equipment for Galileo, a new constellation of satellites that will operate a European GPS navigation system.

"The reason we are doing that is we want to learn about navigation payloads," says Sir Martin. The discovery of water deposits, he believes, means that in the coming decades there will be sustained habitation on the Moon and Mars. "We need to play a part in supporting this," he adds. In likening space travel to the Californian gold rush that began in 1848, Sir Martin points out that it was not necessarily those who went to find gold that made money, but rather those who provided the infrastructure: railways, hotels, picks, shovels and the like. So, SST aims to be a service provider supplying, say, a GPS system around the Moon, or communications satellites to relay data from other planets. "We need to be building the expertise up now if we are going to be ready to do such things," he says. It is a far cry from the days of tin-can telephones. ■

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Bucking the system

MONTERREY

With cautious backing from business, a political pugilist challenges the establishment

SWARTHY, with eyes that brood like Sylvester Stallone's, Jaime Rodríguez cuts an odd figure in a room of business executives—and he revels in it. He paces around in black cowboy boots. He tells stories of his impoverished childhood, always quick to throw in a ribald quip: “I’m restless. My mother had ten children (well, my father helped a bit).” He’s mischievously, mad-deningly evasive. When a questioner asks for his plan of government, he replies, “send me a WhatsApp.”

Mr Rodríguez, who calls himself *El Bronco*, wants to make history. On June 7th he has a chance of becoming the first regional governor elected without the support of a political party, thanks to a reform in 2014 that opened the door to independent candidates. He is running in the northern state of Nuevo León, one of nine up for grabs. Opinion polls put him neck-and-neck with his main rival, who is from the Institutional Revolutionary Party (PRI) of Mexico’s president, Enrique Peña Nieto. But he could be pipped at the post.

The elections include nationwide ones for the lower house of Congress. They will deliver a verdict on Mr Peña and the PRI almost halfway through his administration. It is unlikely to be positive. The PRI may remain the biggest party in Congress, but analysts expect turnout to be low. Voters, angry about corruption and violence, are in an anti-party mood. Newspaper columns question if it makes sense to vote. Mr Rodríguez

guez’s unlikely rise is the clearest sign of a national phenomenon.

It could also change how elections are fought. If he does well, similar “lone-ranger” candidates could disrupt the political field ahead of the next presidential election in 2018, some analysts say. That is a particular risk for the PRI, which ruled Mexico for seven decades until 2000 and, Mr Peña hopes, will return to its role as the natural party of government. But it has staged a feeble campaign against Mr Rodríguez, failing to exploit the fact that he was a party stalwart for 33 years, up until eight months ago. He laughs at the connection now, likening the PRI to one of his ex-wives (who recently accused him of assault, a charge he denies). “I’ve shrugged a weight off my back. I’m free,” he says.

Crowds love his salty, irreverent delivery on the stump. But it can also land him in trouble. In one debate, he used hand gestures and the word *huevos* to imply that the only thing needed to sort out Nuevo León’s skyrocketing debt, traffic chaos and urban sprawl is balls. When a rival pointed out that “*huevos don’t think*”, a university audience howled with laughter.

Mr Rodríguez, though sharp of tongue, is a heap of contradictions. So it is a wonder he has managed to climb so far up the polls in Mexico’s richest northern state, where ten or so conservative families control industrial empires from the capital, Monterrey. Few politicians can be elected

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without their tacit blessing.

Until now the peak of his career was as mayor of García, part of the Monterrey metropolitan area, which he took over in 2009 just as the state was engulfed in drug violence. Although he gained a reputation for standing up to organised crime, he does not dwell on such achievements. Instead, the 57-year-old farmer says one of his proudest feats was to offer scholarships to students in exchange for planting and watering trees; another was taking calls from anyone on his mobile phone (in this campaign he says he has received and read about 42,000 WhatsApp messages).

Such populist touches make businessmen nervous. Most think that comparisons to Hugo Chávez, the late Venezuelan leader, go too far, but they worry that Mr Rodríguez resembles Andrés Manuel López Obrador, a Mexican left-wing firebrand. He addresses those fears cryptically, saying he is “neither right, left nor centre.”

Business is seeking to tame him, with some success. At a conference of the Mexican Institute of Finance Executives a respected rival, Fernando Elizondo, was collared in a VIP room and induced to quit the race and throw his support behind *El Bronco*. Many of the participants were ecstatic. *El Bronco* needs a “moral controller”, one speaker said.

Mr Rodríguez admits that voters’ bitter mood has helped him. Like all parties the PRI has been discredited by allegations of corruption, crony capitalism and conflicts of interest. “What none [of my rivals] has understood is that people are sick of the political parties, full stop,” he says.

In Nuevo León, disenchantment may be particularly acute because the PRI governor, Rodrigo Medina, and his father are mired in scandals. The party’s candidate to succeed the governor, Ivonne Álvarez, says that in her government there would be no ➤

▶ “awkward fathers.” Mr Medina, who insists he is innocent, claims to be the victim of a “dirty war”.

Business bosses are also furious about the murkiness of a contract to build an expensive 372km (231 mile) water pipeline, known as Monterrey VI, at a time when the state’s debt is already high. It was awarded to a consortium co-led by an affiliate of Grupo Higa, a construction firm that has provided questionable mortgage loans to Mr Peña’s wife and his finance minister, Luis Videgaray. All the candidates for state governor have promised to review or scrap the project. “It’s a big business for the government and its friends,” says Eugenio Clariond, a Monterrey industrialist and head of the city’s Metropolitan Water Fund, who is a strong opponent.

Mr Peña and Mr Videgaray come in for public criticism from Monterrey’s business elite, despite having launched reforms such as energy liberalisation that may benefit industrial firms. The main source of friction is a new tax regime that has slowed economic growth. The government is also blamed for violence that spills into Nuevo León from neighbouring Tamaulipas.

Whether or not this will translate into a win for Mr Rodríguez may depend on whether the PRI’s political machine rouses its supporters on election day. If he is elected, analysts have doubts about how he would run the state without support from a party in the legislature. But the alternative—feeble, unresponsive parties that leave corruption in their own ranks unpunished—is hardly appealing. As Mr Clariond puts it, a vote for *El Bronco* is one for the “least bad” candidate. Most Mexicans do not have a bronco to back. ■

Graft in Guatemala

Ten-pin bowling

MEXICO CITY

United Nations-led investigations are toppling the country’s leaders

CORRUPTION scandals are two-a-penny in Latin America. But few have inflicted as much damage on an incumbent government as in Guatemala. In May the vice-president quit, the heads of the central bank and social-security institute were arrested and three ministers were sacked. Pressure is mounting on the president, Otto Pérez Molina, to resign even though he has not been accused of anything. He insists he will stay until his term ends in January. “We don’t really know what to do or what’s coming next,” says Eduardo Stein, who was vice-president from 2004 to 2008.

There were three catalysts for the crisis,



Fed up in Guatemala City

which could yet extend to Congress and the judicial system. The first is a history of corruption, which has already reached the highest levels of government. Alfonso Portillo, a former president, was jailed in the United States for bribery and money laundering. Second, the International Commission Against Impunity in Guatemala (CICIG), a United Nations-backed institution, is investigating crimes in conjunction with a tough federal prosecutor’s office. It is not afraid to go after big fish. Third, society is fed up. Thousands have been demonstrating almost weekly in the capital, Guatemala City, more than at any time since the end of the civil war in 1996.

CICIG levelled its most serious charges just as Mr Pérez was agonising over whether to renew its two-year mandate, which he had criticised as a violation of sovereignty. After arm-twisting by the United States, he authorised a new term on April 23rd. At about the same time CICIG secured provisional charges against 22 people, including senior tax officials, allegedly involved in a customs-swindling racket called *La Línea* (named after a telephone hotline used by the purported crooks). It said the ringleader, who has fled, was the vice-president’s former private secretary. The vice-president, Roxana Baldetti, resigned two weeks later.

On May 20th a further 17 people were arrested in a different corruption case, involving a 116m quetzal (\$15m) contract with the Guatemalan Social Security Institute to offer renal-dialysis services. CICIG alleged that the award of the contract to a Mexican group was linked to the payment of \$2m in bribes. Among those arrested were Julio Suárez, who was a member of the institute’s board as well as head of the central bank, and the institute’s boss, Juan de Dios Rodríguez, Mr Pérez’s former chief of staff.

More heads have rolled, and still more may yet do so. On May 22nd the president

fired his interior, energy and environment ministers. Earlier, CICIG sought to impeach a judge whom it accused of negotiating with criminals to grant them bail in the *La Línea* case. Iván Velásquez, CICIG’s boss, says that it is also preparing cases against congressmen and mayors. Guatemalans could lose faith in their institutions, he admits, but in the long run the “purge” will strengthen the rule of law.

Some analysts play down the chances of Mr Pérez resigning. Although, in the words of Mr Stein, he is “a very lonely figure,” the private sector fears instability if he steps down before the general election in September. The American government is said to be keen to see him finish his term.

Yet pressure is mounting for more radical responses. Some civil groups are pressing for the suspension of elections and the naming of a provisional government to oversee reforms, including a new electoral law. On May 26th Moody’s changed the outlook for Guatemala’s credit rating to negative because of its political crisis.

Many think reforms should begin while Mr Pérez is still in power. Oscar Vásquez of Acción Ciudadana, an NGO, says they should include changes to campaign-finance laws and new ways to elect justice officials. They would set the stage for more deep-rooted reforms in the next administration. The elections will be coloured by the public’s anger towards traditional politicians. The winner will be the candidate who exploits that mood most effectively. ■

Colombia’s peace process

Bullet proof

BOGOTÁ

Despite an escalation of violence, the talks continue

IN PRINCIPLE, Colombia’s government and the FARC leftist army both think it would be a good idea to shoot less at one another while they negotiate an end to their 50-year war. In practice, that is difficult. Violence has flared since April, when the FARC attacked an army patrol, killing 11 soldiers. The attack breached a unilateral ceasefire that the FARC declared in December. The government responded by resuming bombing raids on the guerrillas.

The situation has since deteriorated. An attack on a FARC camp in south-west Colombia on May 21st killed 27 guerrillas, including a former member of the negotiating team, and prompted the FARC formally to end its ceasefire. By May 26th another 15 rebels and two civilians had been killed in several skirmishes with the army.

The escalation has angered ordinary Colombians, who are impatient with the ►

► slow pace of the peace talks, which started in November 2012. It has hardened their hostility to the guerrillas. That will make it more difficult for Colombia's president, Juan Manuel Santos, to win political backing for an eventual peace settlement. But it has not disrupted the peace process itself.

The talks resumed in Havana on May 25th. The government strengthened its team by adding the foreign minister, María Ángela Holguín, and Gonzalo Restrepo, a former chief executive of the Éxito Group, a retailer. His role may be to reassure the FARC that business will support a deal.

One reason for the talks' resilience is

that both sides are used to negotiating during bouts of violence, which did not end even during the quietest periods. Military action by the FARC fell by 85% during its ceasefire and civilian deaths fell by 73%, according to the Conflict Analysis Resource Centre (CERAC), a think-tank in Bogotá. Even so, CERAC recorded 21 attacks by the FARC (and suspects it was responsible for another 75). Mr Santos has staked his reputation on concluding a peace agreement (by the end of this year, he hopes). For the FARC, the alternative to peace is further pounding by the armed forces; it no longer hopes for victory.

The presence of Ms Holguín in Havana is necessary because the talks are focusing on the knottiest problem: "transitional justice" for combatants on both sides who may have committed war crimes. The FARC's negotiators have yet to accept the principle that such crimes must be punished, even with milder sentences than would normally be imposed. Colombia's citizens will not accept too much leniency. Nor will the International Criminal Court, as Ms Holguín is joining the discussions to point out. The prospects for peace may depend on whether the FARC's leaders fear jail more than Colombia's guns. ■

Bello | Suffer the children

Latin America fails to protect the rights and lives of its teenage girls

WHEN Pope Francis visits Paraguay on July 10th, he will find a controversy that he might prefer to ignore. A ten-year-old Paraguayan girl is currently 26 weeks pregnant after having been raped by her stepfather. Some six weeks ago she was taken to a hospital by her mother, who asked that she be allowed an abortion. But the Paraguayan authorities, backed by the Catholic church, not only refused her plea; they also arrested the mother as an alleged accomplice in her daughter's abuse, although she reported the crime last year.

This appalling case highlights several of Latin America's abiding ills. The first is child abuse. While the plight of street children and child prostitutes has received a lot of attention, most abuse occurs in the home. Although there is little data, there is no reason to believe it is less prevalent than elsewhere in the world. It may be more so. Bolivia's ombudsman reported that 34% of girls suffered sexual abuse before age 18. Studies suggest that up to 36% of Latin American adult women suffer domestic or sexual violence.

The second affliction is teen pregnancy, which is extraordinarily common given the region's level of development. In Latin America 69 in every thousand girls aged 15-19 gave birth in 2012, according to the UN, a rate that is exceeded only in sub-Saharan Africa. The rate is higher than 80 per thousand in six countries in the region: Nicaragua, the Dominican Republic, Guatemala, Guyana, Honduras and Venezuela.

For very young girls the problem may be worsening. According to the UN Population Fund, over the past 15 years or so six of eleven countries in Latin America for which it has data saw a rise in pregnancies among girls aged 10-14. This is almost always the result of abuse. In Paraguay,



whose population is 7m, there were 680 births to mothers under 15 last year.

Young mothers are four times likelier than those over 20 to die in pregnancy or childbirth, according to the World Health Organisation. If they live, they are more likely to drop out of school and to be poor than if they didn't get pregnant. And their children are more prone to behavioural problems as adolescents, which means they are also more likely to stay poor.

The incidence of later-teenage pregnancy is falling (having risen in some countries in the 1980s and 1990s). But it is declining much more slowly than in other parts of the world, and more slowly than overall birth rates. Why? Pregnancies are far more common among poor, rural girls in families with low educational levels. They may partly be a consequence of lack of opportunity.

But they are also evidence of a policy failure. Only a fifth of adolescent pregnancies in Latin America are intentional, compared with 67% of those in Africa and 54% in Asia, according to Esteban Caballero of the UN Population Fund. In theory, most governments in the region provide contra-

ceptives and sex education to young people. In practice, they are not reaching the most vulnerable groups. And families may resist the message, because of machismo and for religious reasons.

Child abuse and teen pregnancy intersect cruelly with Latin America's rigid restrictions on abortion. Recent years have seen some timid liberalisation. Abortion is now legal in Uruguay and Mexico City. It is allowed in cases of rape, fetal malformation or threat to life in Colombia, in cases of rape in Argentina and in cases of rape and incest in Bolivia.

But not in Paraguay. There, the state has in effect "criminalised access to health care" for the pregnant girl, according to Mónica Arango, a Colombian lawyer at the Centre for Reproductive Rights, a New York-based group. There are similarly extreme bans on abortion in Central America. The consequence is that 4.2m Latin American women have clandestine and unsafe abortions every year; around a million of these are hospitalised as a result of complications, according to the Guttmacher Institute, another NGO. And many teenage girls commit suicide when they find out they are pregnant.

It is the still-pervasive influence of the Catholic church in forming views about women and reproduction in Latin America that is the main reason for the patchiness of contraception and the strictness of abortion bans, and thus for the prevalence of teenage pregnancies and illegal abortions. Catholics have a right to their private views on these matters. The 19th-century battle to stop them imposing these views on others was waged by the likes of Benito Juárez, a Mexican liberal. The clamorous silence of most Latin American politicians on issues of sexual and reproductive health shows that the fight is far from over.



South China Sea

Try not to blink

BEIJING

As China asserts itself as a naval and air power, and as America responds, the risks of confrontation are growing

AMERICAN officials are losing patience with China. On May 22nd the vice-president, Joe Biden, was blunt. He warned naval-college graduates of “new fault lines” emerging between the great powers. China, he said, was challenging freedom of navigation in the South China Sea by re-claiming land on disputed reefs on a “massive scale”. Two days earlier America had signalled its annoyance by sending a surveillance aircraft close to one of the reefs where China is building an airstrip. Such secretive flights are common, but this one was different. The plane also took a crew from CNN, which broadcast the Chinese navy’s testy response through a radio transmission in English: “Leave immediately, in order to avoid misjudgment.”

Chinese officials and state-controlled media have reacted angrily to America’s rhetorical offensive (reinforced by CNN’s dramatic footage of the spyplane mission over Fiery Cross Reef, showing sand being sucked from the bottom of the sea and sprayed onto the island-in-the-making by Chinese dredgers). On May 25th a Chinese foreign ministry spokeswoman called on America to end its “provocative behaviour”. Global Times, a state-owned newspaper known for its hardline views, said war would be “inevitable” if America kept complaining about the island-building. On May 24th the People’s Daily, the Communist Party’s main mouthpiece, warned America that those who “hurt others” could “end up hurting themselves”.

Mercifully, the heated words have not so far been matched by hot-headed military behaviour in or above the sea itself.

Both America and China are anxious to avoid clashes. But in order to make its point, America is considering moves that might be construed by China as threatening. American spy flights, as well as similar missions by its ships, have so far kept at least 12 nautical miles (22km) away from the reefs they are monitoring. That would be the outer limit of China’s sovereign domain if the reefs were islands (ie, permanently above sea) and were indeed Chinese. Now the Pentagon is considering whether to probe these lines.

China has long said it owns most of the reefs and islands in the South China Sea, and has also asserted vaguely defined rights to most of the sea itself. Other coun-



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tries around the sea dispute these claims (Vietnam and the Philippines both say they own Fiery Cross Reef). America takes no position in the sovereignty debate, but it says arguments should be resolved peacefully, without affecting freedom of navigation. China’s warnings to American spyplanes suggest that it is already trying to impose restrictions on military traffic.

Despite America’s increasingly public complaints, there has been no change in the frantic pace of China’s reclamation efforts on several reefs (above is an American spyplane’s photograph of work on Fiery Cross Reef). On May 26th China’s defence ministry released a “white paper” on military strategy. It said the country should build a “modern maritime military force” to protect China’s “maritime rights and interests”, including in the South China Sea. Ash Carter, America’s defence secretary, said a day later that China’s actions in the area showed it was out of step with “international norms that underscore the Asia-Pacific’s security architecture”.

America and China’s neighbours worry that China may eventually declare an “Air Defence Identification Zone” (ADIZ) over the South China Sea—requiring aircraft to identify themselves to the Chinese authorities before entering. In November 2013 China alarmed the region by establishing an ADIZ over the East China Sea, covering islands claimed by Japan (see map). It said its armed forces had the right to take “defensive emergency measures” against those failing to comply. America quickly sent two unarmed B-52 bombers through the zone without notifying China. Some Chinese experts believe that China is unlikely to declare an ADIZ in the South China Sea soon because it would be even harder to enforce over such a vast area. On May 26th, however, a Chinese foreign ministry official said his country would decide whether to establish one partly on the basis of “whether and to what extent the security of airspace is threatened”—a clear warning to America. ➤

► Chinese academics say that testing China's resolve could prove dangerous. Should America sail a naval ship close to one of the reefs it "may very well force Beijing to respond forcefully," says Zhu Feng of the China Centre for Collaborative Studies of the South China Sea at Nanjing University. No Chinese leader, he says, wants to be seen as a "chicken".

Neither, however, does America. It is relieved that China's neighbours are beginning to speak out more forcefully about the problem as well. In April the ten-member Association of South-East Asian Nations (ASEAN), which is usually at great pains not to antagonise China, called the island-building a threat to "peace, security and stability". ASEAN countries welcome America's military presence in the region. But privately they have also been asking the Americans to avoid ratcheting up tensions. No Asian country wants to be forced to make a clear choice between backing America or backing China. For America, staying out of trouble will be tough. ■

Japan and the AIIB

To join or not to join

TOKYO

Will Japan lend its muscle to China's new Asian infrastructure bank?

ALONG with America, Japan was caught by surprise when European countries began queuing up in March to join China's new Asian Infrastructure Investment Bank (AIIB). Officials from Japan's finance ministry had advised Shinzo Abe, the prime minister, that Britain, for one, would never sign up (it was the first major Western country to put its hand up to join). Now that both Australia and South Korea are taking part, Japan is the last big holdout in the region. It is in a quandary.

The next moment when Japan could join will be late next month when founding members are to sign the bank's articles of incorporation. These were agreed at a meeting in Singapore, according to an announcement on May 22nd. Already in March, Japan's ambassador to China had suggested June as a good time to sign up. In early June, Mr Abe's Liberal Democratic Party (LDP) will issue a report setting out arguments for and against joining.

Few dispute that as a member, Japan would help shape the economic development of countries in the region, just as it does already through the Asian Development Bank (ADB), which was founded in 1966 with Japan and America as the biggest shareholders. Even opponents of joining concede that in response to Asia's vast infrastructure-investment needs—another \$8

Wartime history

Conflict zones

TOKYO

A new spat over Japan's wartime history draws in the United Nations

THE industrial ruins of Hashima, off the coast of Nagasaki, were the scene of a showdown in "Skyfall", a James Bond film. Now the battleship-shaped island is the cause of a real-life conflict. Coal from its undersea mines helped fuel Japan's development during the Meiji era of 1868-1912. The government has applied for the island, and 22 other sites, to be granted World Heritage status by UNESCO in recognition of their role.

But the region's lingering resentments over colonial rule by Japan and the horrors that it perpetrated during the second world war have bedevilled the bid. Thousands of conscripted Koreans were forced to work at Hashima and other sites during the war. At a meeting on May 20th with Irina Bokova, UNESCO's director-general, Park Geun-hye, the South Korean president, said that Japan's application had created "unnecessary feuds". China, which is rarely slow to berate Japan for wartime amnesia, has waded in too. A spokeswoman for the foreign ministry said that Japan was trying to glorify colonial history.

Japanese diplomats insist that the bid concerns the Meiji period alone, not events during the war. And several of the proposed sites, including Miike coal mine, carry inscriptions acknowledging the use of forced labour. The history of forced labour is more nuanced than

Korea's objections suggest, says William Wetherall, an American sociologist: many Japanese were also conscripted. "All sides are skewing the past to fit a narrative of extreme victimhood."

UNESCO's World Heritage Committee will vote on Japan's bid on June 28th. But recent talks between Japanese and South Korean officials in Tokyo have brought the two sides no closer together. The Japanese attended only because of pressure from other countries, says one of the foreign officials present. It all seems far from UNESCO's stated mission to "build peace in the minds of men and women".



Ruined, but not past

trillion is required by the end of the decade, according to the ADB—extra heft is needed, well beyond what the ADB, World Bank and IMF could reasonably provide. As an Asian country, and the largest historical contributor to infrastructure development in the region, Japan should welcome the AIIB, says Kenya Akiba, an LDP politician who is working on the report.

Some in Japan argue that taking part would improve strained ties between the two countries. On May 22nd a 3,000-strong delegation of Japanese tourism and local-government officials led by a pro-China senior member of the LDP, began a three-day trip to Beijing. They were warmly welcomed there by China's president, Xi Jinping, in the latest sign that relations are on the mend. Supporters in Japan of their country's membership say Japan could act as a counterbalance to China's influence inside the bank.

Yet officials close to Mr Abe say he continues to view the AIIB with deep suspicion, as a means to expand China's strategic and economic power. Since it would be

almost impossible for America to join the AIIB against the will of Congress, with its many critics of China and abhorrence of funding any new international bank, Japan would be breaking ranks with its ally should it join. It would look especially odd so soon after a trip by Mr Abe to Washington in April that was aimed at strengthening Japan's alliance with America.

Japan is likely, then, to wait at least a few more months—perhaps beyond the expected debut of the AIIB's lending operations early next year. Even so, much talk is going on behind the scenes between Japanese and Chinese officials over how to make the bank's lending standards open and fair. Progress on the Trans Pacific Partnership (TPP), a free-trade agreement that includes America and Japan and other Asian countries but pointedly excludes China, is erratic. Alastair Newton, a political analyst at Nomura, says that if the government decides not to join the AIIB, and no deal is reached on the TPP, Japan could see its economic influence in the region fade further. China would not be upset. ■

Afghanistan

Season of bloodshed

KUNDUZ

The Taliban are waging a fierce new offensive in the north

ON THE edge of a dusty plateau near the northern city of Kunduz, Mohammad Khan and his family shelter in a threadbare tent. From here, he says, he can almost see his house 8km (5 miles) away across a river in Chahar Dara district. But there is a good chance it is now occupied by a Taliban fighter and his family. The area was recently overrun by insurgents who have made big advances in this part of Afghanistan, especially near the border with Tajikistan.

The Taliban, bolstered by foreign fighters, have chosen Kunduz—a city far from the traditional Taliban heartland in Pushtun-dominated areas beside the border with Pakistan—as the focus for their annual spring offensive. Fighting in May displaced perhaps 6,000 families in Kunduz province, after the city itself almost fell to the insurgents in late April. “The army can’t push them back, even with helicopters and heavy weapons,” says Mr Khan.

Because Afghan forces are fighting for the first time without much support from NATO, their casualties are unusually high. The authorities are reluctant to give figures, but a Western military official quoted by the *New York Times* said more than 1,800 soldiers and police officers had been killed and another 3,400 wounded between January and April—65% more than in the same period last year. On May 25th 26 government soldiers were killed during a siege of a police headquarters in southern Helmand province.

Despite such losses, many Afghans say their government is proving slow to respond to Taliban assaults. A full eight months after his inauguration as president, Ashraf Ghani has only just nominated a defence minister, who is yet to be approved by parliament. Not even Kabul feels safe. Two weeks ago, gunmen stormed a hotel in the capital, killing 14 people, including nine foreigners. A week later, a suicide bomber got into the grounds of the justice ministry, killing at least five employees. On May 27th an upmarket part of the city was attacked again. Four gunmen were killed after trying to storm a guesthouse.

The national government has dispatched several thousand soldiers to help in Kunduz, the scene of the worst fighting so far. It has also resorted to less savoury tactics which have been routine since at least 2009, quietly recruiting local warlords and their militias (pictured) to help



confront insurgents. That should help to check the immediate threat, but by adding to already big supplies of weapons on the ground the government risks spreading instability, as rival anti-Taliban groups clash among themselves.

It is not surprising that Kunduz is a scene of such conflict. Commanders from the former Northern Alliance have long fought, often brutally, for turf in the north of the country. For unlucky residents that has meant enduring extortion, harassment and revenge killings. Gradually the authority of the government has ebbed away.

Today a powerful militia commander, Mohammad Omar, claims to control 400 armed men in Khanabad district. He uses the moniker Pakhsaparan, meaning “wall-crusher”, and says he is fighting the Taliban without help from the national army and only \$1,000 a month from the local police



Militiamen on patrol

chief. “I get the rest in taxes from farmers,” he says, without elaborating on his collection methods.

The government denies rearming militias, though it admits to “selective voluntary citizens’ participation” in the fight against the Taliban. Either way, Mr Ghani’s supposed strategy of marginalising powerful warlords while strengthening local government appears to be forgotten.

One fear is that militias, locally called *arbaki*, could revert to rape, murder and other abuses of civilians, as happened during the civil war in the 1990s. That, in turn, could spread sympathy for the Taliban, which at least offer some form of order. “During the day they are *arbaki*, during the night they are thieves,” says Mr Khan, the refugee near Kunduz city.

Another worry is that a new faction of rebels could emerge. There are rumours that fighters under the black banner of the Islamic State (is) are growing more powerful. Displaced villagers tell of seeing armed men in is’s trademark masks and black clothes. They are said to be well equipped, and wealthy enough not to extort money from civilians. Accounts vary as to whether they are with or against the Taliban.

There is little evidence that is has a force to be reckoned with in Afghanistan, nor that those who use its name have formal links with is in the Middle East, which never mentions an Afghan presence. A group describing itself as is claimed responsibility for an attack in the eastern city of Jalalabad in April that killed 30 people. But its connection, if any, with is elsewhere is unclear.

More likely, disaffected members of the Taliban are adopting the is brand because it is well-known and helps attract recruits and funding. Some younger fighters are said to complain that the Taliban lack strong leaders. The group’s spiritual head, Mullah Omar, has not been seen in public since 2001. A former Taliban commander, Mullah Abdul Rauf Khadim, who had been detained in Guantánamo Bay, began recruiting fighters in the name of is this year in Helmand Province. He was killed by a drone strike in February. The Americans all but admitted they did it.

The Taliban would be unlikely bedfellows of is. The Pushtun-nationalist Taliban have little interest in is’s dream of a transcontinental caliphate. They seem ready to countenance political negotiations one day with authorities in Kabul, which is would not. America’s most senior officer in Afghanistan, General John Campbell, talks up the idea that is adherents have been clashing with the Taliban. But a proliferation of factions among the insurgents is hardly a reason to celebrate. On the government side, too, power is also being shared, with militias. That is a recipe for more uncertainty—and, presumably, for more bloodshed. ■

Banyan | Learning from the pioneer

The fate of a southern politician holds a warning for India's prime minister



SSECOND acts are the norm in Indian political lives. After a judge in May overturned her conviction for corruption, Jayaram Jayalalitha, an ex-actress-ex-prisoner-politician, this week began her fifth spell as chief minister of Tamil Nadu, a southern state of 69m people. She celebrated by giving goats to the needy. Arvind Kejriwal, an anti-graft activist reborn as a populist politician, managed just 49 chaotic days as chief minister of the state of Delhi last year. He came back in February to win a landslide election victory, and has since run the state while plotting a grander campaign to become the leader of Punjab. But the most striking tale of political recovery concerns the prime minister, Narendra Modi, who marked a year in office on May 26th. A little over a decade ago he was a pariah, shunned internationally and isolated in his own party after religious pogroms early in his rule in Gujarat state. Now he has no serious rival for the leadership of India and is widely fawned upon.

As he ponders his future, Mr Modi should keep in mind the rise, fall and rise again of yet another politician: Chandrababu Naidu. Mr Naidu runs another southern state, Andhra Pradesh (AP), with 51m people. He and Mr Modi have much in common: both were born in 1950, sport trim white beards, dress nattily and dominate those around them. Both have been feted by investors, local and foreign. As energetic, driven chief ministers they built impressive records with improved roads, cities and electricity, as well as plunging poverty rates. Mr Modi in Gujarat drew in manufacturers, such as carmakers and pharmaceutical firms, plus chemical factories and oil refiners. Today his dream is to create jobs for unskilled millions.

Mr Naidu fared better than Mr Modi in developing service industries and education. In the late 1990s he made Hyderabad, AP's capital, an information-technology hub. He charmed Bill Clinton, who paid a visit while president, as well as companies like Microsoft, IBM and Oracle, which set up operations there. International firms outsourced back-room services to the city, which had an abundance of skilled graduates eager to work for them. When he took office in 1995, for example, Mr Naidu's state had 32 engineering colleges producing a total of 8,000 graduates a year; a decade later there were 230 such colleges, turning out 75,000 of them.

Both Mr Modi and Mr Naidu belong to a welcome category of politicians who ask to be judged by their success in promoting economic development, not by populist handouts (those gifts of goats, laptops or saris, for example, that some Indian politicians like to shower upon voters). Both say they eschew politics that plays up caste, religion or other identities. Mr Naidu reminisces about how in Hyderabad "we created one of the best eco-systems". With its hundreds of foreign companies and, by India's standards, high-quality infrastructure to support them, "everything has come" to Hyderabad, he says. He was—and still is—lauded overseas, as a regular at Davos and a face of IT-friendly, pro-business India. He is also a rare liberal. As an ally of the previous government led by the Bharatiya Janata Party (BJP), from 1999 to 2004, he pushed pro-market policies to lift overall economic growth. "I was a pioneer," he says.

Yet it was Mr Naidu's failings, more than his success, that left the deepest mark on Indian politics. The BJP-led coalition unexpectedly lost power after the national election in 2004, an event that still scars the party. A big reason was that Mr Naidu, a junior ally, stumbled at the polls and could contribute only five seats, down from 29. He was simultaneously thrown out of office in AP. "I was ahead of the times," he says, explaining that he had failed to protect vulnerable sections of the population and thus to "match economic reforms with a human face."

Talk to those who were close to Mr Modi in Gujarat then, and those who surround him now, and all are painfully aware of the parable of Mr Naidu. They say Mr Naidu blundered by thinking only of reforms and of Hyderabad, neglecting the needs of farmers. Mindful of this, Mr Modi, when in Gujarat, rolled out irrigation, a wider electricity grid to villages and promoted an ugly term, "rurban", meaning a drive to bring urban amenities, such as the internet, to the countryside. Innovations like genetically modified cotton helped farmers get much bigger yields.

Today Mr Modi is still nervous that farmers might turn against him. This fear inspired his speech marking his anniversary as prime minister. He has put on hold a land bill that would weaken their property rights. Farmers' suicides have risen in response to financial stress, low crop prices and bad weather. Unseasonal rains have battered crops in the north. More aid for farmers will surely flow. This would be wise politically, even if it would interfere with the market. Mr Modi, facing tough resistance to economic reform in other areas, needs to cover his back.

Second chances, second thoughts

As for Mr Naidu, he is enjoying a second spell in office, having won control of his state again last year. He took over a truncated territory: AP has lost an inland portion that forms a new state, Telangana, which will eventually take in Hyderabad too. He is preparing to build a "world class" new capital, near Vijayawada. He calls the low-lying spot a "prime, central location" near the coast, a "gateway" for trade between India and South-East Asia. A master plan for it has been drawn up by architects in Singapore.

Mr Naidu also sees a parallel between his career and Mr Modi's. He is quick to repeat the lesson he says Mr Modi must draw from his: benefits from economic growth must be felt by "the common man". That is far easier said than done. Mr Modi will have to implement wrenching economic reforms in order to raise the rate of economic growth, while ensuring that enough voters stay happy. If only Mr Naidu himself could work out how to do that, his political life would have several more acts. ■



Also in this section

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Hong Kong politics

Determined

HONG KONG

Local passion is flaring, but China's fears of secessionism are overblown

EVERY year on June 4th, thousands of people gather in Hong Kong's Victoria Park to commemorate the crushing of the Tiananmen Square protests in 1989. The former British colony is the only place in China where large-scale mourning of the bloodshed is tolerated. This year crowds will gather as usual. But a growing number of people now criticise the event, arguing that Hong Kong should fight for its own causes, rather than marking the mainland's struggles. The splintering of the pro-democracy movement in Hong Kong is a product of growing antipathy towards China. Other protest movements increasingly stress a separate identity in the territory too. The governments of Hong Kong and China are watching with alarm.

When Hong Kong reverted to Chinese rule in 1997, Chinese officials hoped that a gradual narrowing of the wealth gap between it and the mainland would help to overcome the misgivings of many Hong Kongers. There has been much evidence since then of the mainland's growing success: millions of rich tourists have been pouring into Hong Kong to shop, China's brightest students have been flocking to local universities and mainland professionals have been taking high-flying jobs in Hong Kong offices. Parts of the mainland increasingly resemble the territory at its southern tip that once glittered alone. Yet the more similar they become, the more that China and Hong Kong are growing

apart—culturally, temperamentally and politically.

Hong Kongers increasingly prize their local identity. A poll last year by the Chinese University of Hong Kong found that just 9% of respondents identified themselves solely as "Chinese", down from 32% in 1997. "Some people think we have gone from being a colony of one country to the colony of another," says Bonbon Chow of City University Students Union.

The failure of Hong Kong's campaign for greater democracy has helped fuel what is often described in the territory as a "localist", or "nativist", movement: a loose array of individuals and groups less rigidly focused on political reform. The deficiencies of the democracy movement became evident to many residents last year, when the Chinese government ruled out free elections for the territory's leader in 2017. Thousands of protesters occupied several main streets for 79 days. But their sit-ins achieved little. The government did not budge. The student movement that led the demonstrations is crumbling.

The public's longstanding qualms about the encroachment of Chinese influence are again becoming evident. Arguments over Hong Kong's policies on housing, health care, education and even transport increasingly bring up questions over how the territory should interact with the mainland. Chan Shu-fai, a former leader of the Hong Kong Federation of Stu-

dents, says "the China factor" has become a driving force in social movements.

The Chinese and Hong Kong governments are torn. They are reluctant to encourage nativists: for officials, fostering a common identity remains an important aim. But they do not want to appear insensitive to Hong Kongers' concerns about issues that affect their daily lives.

In April, after violent protests in Hong Kong against "parallel trading" by mainlanders—buying goods for black-market resale in China—the government of Shenzhen, the mainland city that adjoins the territory, announced plans to curtail unlimited entries for its residents. In 2012 the Hong Kong government scaled back a plan it had to introduce "national education" to local schools after a student movement known as "scholarism" protested against it. Hong Kong's chief executive, Leung Chun-ying, said in January that he still wanted to "reinforce students' interest in and understanding of Chinese history and culture".

The government frets particularly over the spread of localist sentiment on university campuses, where political movements often originate. Students now openly question whether reforming the existing system—the goal of last year's protests—would be enough to protect their local values. A wall poster at the University of Hong Kong shows images of police violence under a slogan, "We decide our own destiny." In February 2014, six months before the protests, the university's student-union magazine *Undergrad* published a cover article titled "Hong Kong people deciding their own fate".

Such words make officials worry that nativism might evolve into outright secessionism, an idea that is anathema to the Communist Party. In January Mr Leung, the chief executive, criticised *Undergrad* for ➤

► advocating self-determination. He warned that such views could cause Hong Kong to "degenerate into anarchy". Mainland newspapers are even more strident: the *People's Daily*, a party mouthpiece, accused "separatists" in Hong Kong of "absurd rabble-rousing".

On May 8th the Chinese government went a step further with the publication of a draft National Security Law. The proposed bill says that "safeguarding China's sovereignty and territorial integrity" is a common obligation of all Chinese, including those in Hong Kong. The specific mention of the territory was a clear signal of China's disquiet. Ironically, China itself promoted the idea of "Hong Kong people ruling Hong Kong" with a "high degree of autonomy" in an effort to win local support at the end of British rule. Now it regards those who trumpet such notions as secessionists.

Overt calls for Hong Kong's independence remain rare. Supporters of it are commonly dismissed by mainstream commentators as belonging to a radical fringe. Most of them do. Members of the tiny Hong Kong Independence Party, which was formed in 2014, brandish the former colonial flag and accuse China of "reducing Hong Kongers to second-class citizens in their own land". A group called Civic Passion disrupts political meetings chanting slogans like "Hong Kong [should] form a country." Independence-leaning views are found on campuses too. "On the Hong Kong City-State", a book by Chin Wan-kan, a professor at Hong Kong's Lingnan University, was published in 2011. It called for a Chinese "confederation" of separate states including mainland China, Taiwan and Hong Kong. But he is an outlier.

Chinese officials are mindful of the long term. In Taiwan, a vigorous pro-independence movement evolved after almost half a century of colonial rule by Japan and partly in reaction to subsequent authoritarian rule by refugees from the mainland. The movement gave birth to the Democratic Progressive Party, which ruled the island from 2000 to 2008 and stands a good chance of coming back to power next year—much to China's displeasure.

Branding demonstrators as separatists, even if wide of the mark, serves China's political interests by discrediting moderates in the eyes of some Hong Kong residents. Portraying unrest in Hong Kong as a direct threat to national sovereignty and security may also help the mainland authorities to deter citizens there from drawing inspiration from the territory's mostly polite and peaceful protests.

Some activists worry that China's fears of secessionism could make it more inclined to put pressure on the Hong Kong government to revive plans to pass a law against sedition and subversion (as it is required to do by the territory's post-colonial

constitution, the Basic Law). These plans were shelved after protests in 2003. Claudia Mo Man-ching, a pro-democracy legislator, frets that merely talking about independence, except to condemn it, may one day be treated as sedition. Denunciation of a movement that barely exists, however, could backfire. Although few Hong Kongers support independence, many are angry at being told not to. ■

(\$6.8 trillion) in investment over the next six years alone.

The decision to go ahead was taken at a meeting chaired by Xi Jinping, China's president and the Communist Party's leader. Reports in state media often link his name with the plan. Compared with his predecessors, Mr Xi has amassed firmer control over the sprawling bureaucracy, and his support is likely to help to push the project through.

Much integration between Beijing, Tianjin and Hebei has already occurred, thanks notably to the building of good-quality roads and high-speed rail since the 1990s. But co-ordination has been patchy. Beijing has been struggling to improve its air quality, even as industries upwind in Hebei spew noxious fumes in its direction. A much poorer place than the capital, Hebei is not keen on closing them. Greenpeace, an NGO, says up to 85% of heavy industry in the province is exceeding emissions caps set by the central government. But officials say the new plan will give priority to environmental protection, as well as improving public services and regional transport, and making the region more attractive to foreign business.

A report by the European Union Chamber of Commerce in China has a mixed assessment of the likely impact. Although the plan may improve transport links to Chinese ports and bring benefits such as unified customs arrangements, it will probably also result in a "whole gamut of problems" for the environment, not least the depletion of the region's already stressed water supplies, the authors conclude. Much of Beijing's water comes from Hebei reservoirs, but it is not enough. The city now takes 2m cubic metres of water each day diverted from the Yangzi River basin in the south.

Some elements of the scheme are clear. Beijing is building a new airport, at an estimated cost of 80 billion yuan just north of the Hebei border (see map). It will play a large role in regional integration. Management of Hebei's two main airports, one in the port city of Qinhuangdao and an international one in the provincial capital, Shijiazhuang, is to be transferred to airport authorities in Beijing. Other goals are vaguer. Officials have said that "non-essential" administrative functions will be moved out of the capital, but they do not specify which. Some enterprises are to be moved from Beijing to Tianjin or Hebei. Details of this are to be announced soon, officials say.

Officials have made clear that they do not want poor people flocking into Beijing from the surrounding countryside. Of the city's 21.5m residents (including those in satellite towns), 8.2m are already migrants; many Beijingers resent having to share health care and education resources with so many outsiders. "Integration" does not mean all are welcome in the capital. ■

Regional development

Big plan, a little fuzzy

BEIJING

The capital and its neighbouring areas are told to co-operate more

FROM the damming and diverting of mighty rivers to the building of huge new cities from the ground up, China's government does not shy away from grand schemes. The Communist Party's highest decision-making body has now signed off on another one: the integration of the capital, Beijing, with the nearby port city of Tianjin and much of the surrounding province of Hebei in a "co-ordinated development programme".

The idea had been under quiet consideration for years, but after the Politburo announced on April 30th that it would move forward, extravagant claims quickly followed. It could turn the region into a "Chinese version of the Rhine-Ruhr", one of Germany's most populous and productive areas, said Xinhua, a state-run news agency. Other reports likened the potential effects to the "powerful boost" enjoyed by Los Angeles when, decades ago, it incorporated nearby counties. An economist at Peking University said it would be "earth-shaking" for the region's population of more than 100m and bring "tremendous economic progress in north-eastern China by 2050". According to the finance ministry, the project will attract 42 trillion yuan





Urban planning

Rus in urbe redux

DESSAU-ROSSLAU

A growing number of cities will have to plan for drastically smaller populations

IN LEIPZIGER TOR, people are giving way to grass, flowers and potatoes. So many prefabricated 1950s apartment buildings have been razed in this working-class district of Dessau-Roßlau, a city in eastern Germany, that the plants receive all the light and rain they need. And the local planners have other buildings in their sights. Some residential blocks are half-empty. An abandoned school is succumbing to weeds. They too will probably be demolished and replaced by meadows.

Many of the world's cities are having to cope with rapid growth. Dessau-Roßlau's challenge is to manage decline. Since 2007 its population has dropped by almost 10,000, to 81,500. Everybody, from the city authorities to the man in the street, reckons the trend will continue. What will Dessau-Roßlau be like in ten or 20 years' time? "Smaller," says Rolf Müller, a longtime resident, as he carries a box of groceries out of an Aldi supermarket.

The condition from which Dessau-Roßlau suffers is increasingly common. From 1950 to 1955 only ten of the world's largest conurbations lost people, according to the UN (see chart). The tally rose steadily over the next few decades, before jumping in the 1990s, as the collapse of communism in eastern Europe and Russia was followed by a colossal migration. Today just over 100

conurbations are losing people. But this greatly understates the scale of urban decline. In many countries, big cities with diversified economies are growing at the expense of cities too small to make the UN's list. Germany has 107 autonomous cities, of which 60 are expected to contract over the next five years. But almost all of the biggest cities will escape decline (see map on next page).

Shrinking cities can be found in the post-industrial rustbelts of the American Midwest, eastern Europe and northern England. But the phenomenon is increasingly Asian. In Japan 20 cities with more than 300,000 inhabitants each declined in population between 2005 and 2010. The two largest cities in South Korea, Busan and Seoul, are both contracting. Even rapidly urbanising countries like China and India have a few declining cities. In 2008 the UN estimated that one in ten emerging-world cities were losing people. The only part of the world where shrinking cities are almost unknown is sub-Saharan Africa. But that too will change.

A city can lose some people and barely notice. It might even have to build more homes, since in many countries more people are living alone. But persistent decline is harmful, especially if the population is ageing as well as shrinking. As factories

and homes are abandoned, the local economy can spiral downward.

Detroit, which has lost more than half its population since 1950, provides a terrible warning. The city filed for bankruptcy in 2013, having failed to raise enough taxes from its diminished workforce to pay its debts and support an army of retired teachers and cops. It has become a husk, plagued by violence and hopeless schools. Its once-vibrant shopping streets have been reduced to selling what George Galster, an urbanist at Wayne State University, calls "lotto, liquor and the Lord".

Cities lose people because of two processes, which often happen at the same time. The first is migration—whether from a city in one country to a city in another, from city to city within a country, or from city to suburb. The cause is often industrial decline. Khulna, a city of more than 1m in Bangladesh, has contracted along with its jute industry. Middlesbrough, in England, ➤

No longer paved with gold

Number of large urban areas* with shrinking populations



Source: UN

*With a population of at least 300,000 in 2014



► has not recovered from the loss of shipbuilding. In many cases, workers do not move far. Detroit is surrounded by successful suburban cities; the overall population of the metropolis has changed little over the past few decades. Seoul has probably lost people to the burgeoning aerotropolis of Incheon, 30 miles (48km) away.

The second cause is demographic change. Though increased life expectancy can delay the moment of reckoning, once a country is largely urbanised, its cities will contract unless it can attract enough immigrants or deliver enough babies to counterbalance the number of deaths. Japan and Russia are already failing to do this, and South Korea is approaching the edge. Japanese women have 1.4 children each, on average; though South Korea's population is younger, its women have just 1.2. Neither country wants mass immigration. Successful cities in such countries will be able to grow by poaching inhabitants from unsuccessful ones. But as the total population falls it will become clear that they are playing a national game of demographic musical chairs, competing for an ever-shrinking number of people. China will soon be doing this, too: the UN reckons its urban population will be declining by 2050.

Ground zero for decline

It is the peculiar misfortune of Dessau-Roßlau to have suffered from swift emigration and steep demographic decline at the same time. After being almost flattened by British bombers in the second world war, Dessau ended up in the German Democratic Republic. It was designated an industrial centre, making chemicals and railway wagons for the communist world. German reunification in 1990 exposed its inefficient factories to crushing competition. As unemployment soared, ambitious young

people fled to western Germany. Fatally for fertility, women were especially likely to move. Dessau-Roßlau now has 31,000 inhabitants aged at least 60 but only 11,000 under the age of 20.

The city at first tried to revive itself by building new homes and offices on a disused Soviet airfield, as well as shopping centres. That is a common response to urban decline, in Germany and elsewhere, and is often encouraged by government tax breaks. But it did not work. As the population continued to plunge, buildings fell out of use. Some were demolished, in piecemeal fashion. The city plainly had two options, neither of which involved growth. It could decline erratically, becoming "like a cheese with a lot of holes", in the words of Heike Brückner, a planner at the Bauhaus Foundation in Dessau-Roßlau. Or it could do something more drastic.

In 2002 the city began to plan for its own destruction. Ms Brückner and others drew a large s-shape through the southern part of the city, an area of closed factories and apartment buildings without lifts. Demolitions would be concentrated there, while the city worked to shore up its more successful neighbourhoods. Buildings would give way to a broad "landscape zone", with grassy meadows cut once or twice a year. Small plots, 20 metres by 20 metres, would be given to all those who had plans to use them.

As is often the way with bold urban schemes, this one did not quite go to plan. Many people were reluctant to leave their basic but cheap communist-era flats. As some apartment buildings were demolished, nearby ones became more desirable, partly because supply and demand were more balanced and partly because the remaining buildings were surrounded by open space. Some enterprising owners spruced up their buildings and marketed them aggressively to displaced tenants. Although many blocks have come down, enough remain standing that it takes some imagination to detect a landscape corridor slicing proudly through the city.

Even so, demolition has worked. Leipziger Tor, the neighbourhood where most buildings have come down, is poor and declining but strikingly short of dereliction. On a fine early summer morning, several people are in the meadows picking wild flowers, amid the odd placard showing where buildings once stood. Inspired by this example, nearby cities are also knocking buildings down. Some are in effect travelling back in time, getting rid of post-war apartments on their fringes while prettifying their medieval cores.

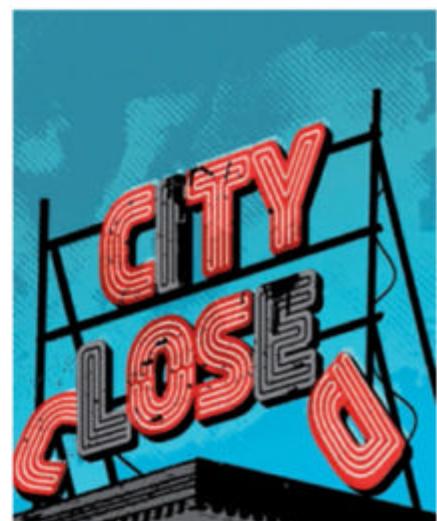
Demolition crews have also been at work in some of the most severely depleted Japanese towns and in the American Midwest, where the process is gently known as "right-sizing". Pittsburgh, once a declining industrial city, has enthusiasti-

cally bulldozed houses and factories, particularly along its waterfront, and replaced them with parks. It has even started to grow again, though that is probably mostly thanks to its thriving universities.

Yet east Germany stands out as exceptionally bold. The extraordinary steepness of its population decline seems to have concentrated minds. It is also unusual in having low rates of home ownership: the average in Saxony-Anhalt, the state that contains Dessau-Roßlau, is under 40%. And, as Michael Voigtländer of the Cologne Institute for Economic Research points out, the rental market in post-communist cities is often highly concentrated—in Dessau-Roßlau three companies own most of the stock. Where there are hundreds or even thousands of landlords, co-ordination is far harder.

A commoner response to population decline is to try to reverse it, if necessary by luring inhabitants from growing cities to shrinking ones. The Japanese government is aiming to create 300,000 jobs outside the big cities, partly by persuading businesses to leave Tokyo. It also has a target for cutting the number of young people who move to the capital every year: big-city living is believed to encourage childlessness. Much of this is wrong-headed, argues Tatsuo Hatta, an economist. Tokyo draws young people because of its growing, services-oriented economy, and they leave when they want children. He thinks Japan should move to a nationalised system for financing old-age care, as in America. That would lead to small cities and towns competing for aged residents.

Across the world, many cities are likely to lose inhabitants faster than buildings. To plan for shrinkage is to admit that people will not come back, which sounds like an admission of failure. But it may be a greater failure to seek fruitlessly to hold on to the past. Cities rise and fall, sometimes several times, changing shape as they go. It is part of their magic. ■



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Football

Polishing up a tarnished trophy

The arrest and indictment of FIFA officials may be a turning-point for football's scandal-hit governing body

SPORT is riddled with graft, from the bungs given to officials who help hand tournaments to undeserving countries, to the betting syndicates that rake in ill-gotten gains from match-fixing with help from unscrupulous players. Football's world governing body, FIFA, more than any other sports organisation, has become a global symbol of this pervasive corruption.

It has been beset by scandal in recent years, connected to, among other things, the distribution of global marketing rights and the awarding to Russia and Qatar of the rights to stage the 2018 and 2022 World Cup finals respectively. Numerous investigations have been held, and several reports penned. But they have failed to stop the rot at the Zurich-based organisation.

That may change after the events of May 27th. Swiss police, at the request of American prosecutors, swooped on a Zurich hotel and arrested seven of the organisation's officials on suspicion of receiving bribes totalling more than \$100m. Among those marched off was a FIFA vice-president, Jeffrey Webb, a Caymanian who heads CONCACAF, the bit of FIFA that oversees North and Central America and the Caribbean—the last of which regions has been at the centre of many palm-greasing allegations over the years. Also arrested were officials from Uruguay, Brazil and Costa Rica, one of whom had been due to join FIFA's executive committee this week.

America's FBI has been probing FIFA's

shenanigans for at least four years. Though no football superpower, the United States would have jurisdiction over any transactions that flowed through its financial system, were paid in dollars or were planned on American soil. Switzerland won't extradite its own citizens but is willing to send foreigners, if certain conditions are met.

The biggest kerfuffles at FIFA have concerned the circumstances surrounding its awarding of the next two sets of finals. But the American investigation stretches back much further. In an indictment unsealed on the day of the arrests, the United States charged nine FIFA officials (including the seven arrested in Zurich) and five others with racketeering, wire fraud and money-laundering that allegedly began almost a quarter of a century ago. Some of the allegations relate to the collapse in 2001 of ISL, a marketing agency affiliated with FIFA. Marketing executives allegedly paid over \$150m in bribes to obtain media and marketing rights to tournaments.

Besides Mr Webb, those charged included Jack Warner, his Trinidadian predecessor. American officials said four of the accused had already pleaded guilty (including Mr Warner's sons). Mr Warner has consistently dismissed allegations against him as "unholy" and "damn foolishness". CONCACAF's offices in Miami were also raided this week. The case was bolstered by the co-operation of a former FIFA official, Chuck Blazer, who wore a wire.

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America's actions should encourage other countries to probe FIFA more assiduously. Tellingly, in a separate case, Swiss law enforcers this week raided FIFA's headquarters in Zurich, seized electronic records and said they had opened criminal proceedings against "persons unknown" on suspicion of money-laundering and other possible offences in connection with the 2018 and 2022 competitions. Ten FIFA members who participated in the voting, including Russia's sports minister, are to be questioned.

FIFA officials had been gathering at the Baur au Lac hotel for the organisation's annual congress. In a vote on May 29th, after we went to press, they were to elect a president. The incumbent, Sepp Blatter (who was not among those arrested or accused) was the strong favourite to clinch a fifth term in charge, thanks to strong support from African and Asian members. The only other contender is Prince Ali bin al-Hussein of Jordan, others having pulled out in recent weeks, citing an atmosphere of autocracy. (Mr Blatter was once dubbed "the most successful non-homicidal dictator of the past century".)

At a hurriedly convened press conference, a FIFA spokesman insisted that the election would go ahead. The raids were, he suggested, somewhat implausibly, part of FIFA's reform process. UEFA, European football's umbrella organisation, called for the vote to be postponed and talked of boycotting it if it were not. If it went ahead, and Mr Blatter were to win, more international opprobrium would surely be heaped on FIFA's tin-eared leaders. The 79-year-old may not have been charged with anything, but he has presided over the darkest chapter of FIFA's chequered history.

The big question for FIFA in the short term, apart from who will run it, is whether it can be made to reconsider awarding ➤

► the next World Cup finals to Russia and Qatar. It should, though it looks unlikely to. The American case does not focus on the voting for those tournaments. Even if the Swiss probe, which does, unearths something, it would have to be highly damning for the 2018 bidding to be reopened; an alternative host would be hard-pressed to get ready in three years. Qatar is more vulnerable, but having survived a variety of scandals already, including one over its treatment of migrant workers, it may yet survive this one.

The longer-term question is what this week's events mean for reform of FIFA. Like most other international sports governing bodies, the organisation has a natural monopoly on its sport due to the daunting barriers to entry for any potential rival organisation. Football associations in rich countries might boycott its tournaments—there has been talk of this within the European federation—but then they would lose the riches that come with hosting international tournaments, including sponsorship deals. Associations in poor countries depend on FIFA's handouts and are most vulnerable to bribes. (The alleged bribing in the Qatari vote was mostly directed at African delegates.)

Switzerland has long benefited from the organisation's presence on its soil—so FIFA still enjoys a favourable tax status and minimal regulation. On their past record, any extra oversight of FIFA by the Swiss authorities in the wake of the investigations may be modest.

Some of the World Cup's biggest sponsors expressed concern at how the scandals had "tarnished", as Coca-Cola put it, the image of the tournament. Visa said that if FIFA failed to make changes, it would reassess its sponsorship. The best hope for reform may well come from the corporations that bankroll the World Cup, as they fear the taint will attach to them.

Change can be effected, as the experience of the International Olympic Committee shows. In the 1990s it had a series of scandals, including one about gift-giving ahead of the 2002 Salt Lake City winter games. It has since improved governance with a series of measures, including expulsions of bad eggs, stricter bidding rules and term limits for committee members. FIFA has introduced some reforms, and a whistleblower hotline, but it remains murky and conflict-ridden.

America receives plenty of flak for stretching the long arm of its law across the world. In this case, many of its critics will be grateful that it has lobbed a legal grenade into an organisation that has got away with too much for too long. Prince Ali called May 27th "a sad day for football". It may yet be seen as a happy one—if the reverberations help to bring about a long-overdue clean-up at the world's most notorious sports organisation. ■

Cable deals in America

Malone wolf

NEW YORK

What a giant deal says about America's media and internet industries

JOHN MALONE is revered as a genius by investors and executives in the telecoms and cable businesses. The boss of Liberty, a cable and media conglomerate, he has struck more deals than perhaps any other tycoon in the world—buying and selling hundreds of firms worth over \$100 billion since the 1970s, often negotiating on his own, using calculations that fit on a napkin. Unusually for an empire-builder he has made his investors a ton of money, and has little interest in the public eye.

On May 26th Mr Malone, pictured, made his biggest bet yet. A cable TV and



Still plenty of dealmaking left in him

broadband firm he backs, Charter Communications, will buy two rivals, Time Warner Cable (TWC), and Bright House, to create a giant worth \$130 billion, including debt. The takeover is the sixth-largest in American history. It will make Mr Malone the world's pre-eminent media baron. Including his radio and foreign operations he will control businesses with triple the operating profits of Rupert Murdoch's empire. Although Comcast, run by another media titan, Brian Roberts, will still be the biggest cable operator in America—with 27m subscribers to Charter's 24m after the deals go through—worldwide Mr Malone's empire will have over 75m subscribers.

By size, the deal is a landmark. But it is also an augury of the future of the internet, mobile and media. One of the cleverest men in American business has made a

giant, expensive bet on an industry whose future is opaque because of murky regulation and fast-changing technology. So, what does Mr Malone see?

One possibility can be ruled out—that at the age of 74 he has gone soft and is making a trophy acquisition. Ever since he left McKinsey, a consulting firm, in 1970, to join the cable industry, he has been single-minded about making money. Between 1973 and 1999 he built up a firm called TCI by buying rural cable-TV operators, consolidating a fragmented industry from a scruffy office in Denver with plastic-laminate floors. Shedding not a tear, Mr Malone sold TCI in 1999 to AT&T for \$59 billion (AT&T later sold it on). His approach has had four elements: complex ownership structures, high debt levels, assiduous tax planning and a refusal to overpay.

The latest transaction reflects all of those characteristics—except the last. Through several corporate layers Mr Malone will control 19% of the new firm's shares and up to 25% of its voting rights. The new firm will be structured so that it should pay no tax for several years, at least. It will have a staggering \$66 billion of debt, initially loaned by banks. Patrick Drahi, a French cable tycoon who runs a firm called Altice (and models his career on Mr Malone's), was also keen on buying TWC. He amassed much financial firepower, but would have struggled to outgun his hero.

What makes the deal unusual for Mr Malone is its stretched valuation. At 9.1 times gross operating profits he is paying at least a fifth more for TWC than he typically does. He is offering 23% more for it than Comcast did in its bid last year, which was scuppered by antitrust regulators. Based on last year's cash-flow figures the deal will make a pitiful 5.6% return on capital, assuming no tax is paid. Like most cable firms TWC has a stagnant top line, with growing broadband sales being offset by declining TV and telephony revenues. So fast growth will not bail out Mr Malone.

How might he justify this price? The most obvious explanation is that Mr Malone thinks the world has not changed much since the 1990s and that the cable industry remains a collection of local monopolies from which ever more juicy profits can be squeezed. America's cable firms have poor service and high prices: the average Charter customer pays at least 50% more per month than one of Mr Malone's customers in Britain or the Netherlands. In Europe cable firms face tough competition in broadband from telecoms operators; in America the telecoms firms have rolled out fixed-line broadband to perhaps just half of homes or fewer.

So, Mr Malone's master plan may simply be to squeeze both customers and suppliers. By being big the new firm can command better terms from television networks: programming represents about ►

► 40% of its costs. The main reason regulators stopped Comcast from absorbing TWC was their worry that such a cable colossus would bully online-video providers such as Netflix. Comcast-TWC would have had over 50% of America's broadband market. Mr Malone's proposed combination would have a market share of less than 30%. As a result it may be waved through by weary federal regulators.

Yet there is a second possible motivation for Mr Malone's deal. Perhaps he recognises that the comfy rules that have governed the cable industry are withering. Customers no longer want to pay cable operators for bundles of TV channels they mostly do not watch, and are shifting to watching video via the internet. Programme-makers are happy to abet them by selling their shows through the web. They are also scaling up, anticipating a consolidation among the cable firms and other distributors they sell to. This is why Mr Murdoch tried (unsuccessfully) last year to buy Time Warner, the former parent of TWC, which makes films and TV shows.

Telecoms firms are elbowing into the TV industry: AT&T is buying DirecTV, a satellite-TV operator; Verizon is moving into internet video. Meanwhile, Google is laying high-speed broadband fibre in some cities. None of this poses an immediate threat to cable. But a once-in-a-generation shift may be commencing. America may eventually end up with a few big, competing giants that offer consumers a range of broadband, video and telephony services, through a combination of fixed-wire and mobile technology. This new world would be less dependent on flogging costly bundles of channels to reluctant punters. And of most interest to Mr Malone, it would be more efficient and profitable, since customers would be buying a range of services from the same firm, and perhaps be more loyal.

Such a shift is happening in Europe—led among others by Mr Malone's European cable unit, Liberty Global. In April it bought a Belgian mobile operator, claiming the cost savings would almost double its target's operating profits. On May 19th Mr Malone said that there was a "great fit" between Liberty Global and Vodafone, which owns mobile networks across the continent. Mr Drahic's firm is taking part too: it recently bought two French mobile operators and Portugal's main telecoms firm, again with a view to boosting margins through cost savings.

Mr Malone's deals ensure that he will remain a powerful figure in the internet business. Perhaps he envisions a European future for America, with his cable giant eventually buying a mobile network. Unlikely? No more so than a 32-year-old with a doctorate in operations research taking over a near-bankrupt cable-TV firm in 1973 and turning it into an empire. ■

Consumer electronics in China

From followers to leaders

SHANGHAI

Why the Chinese will increasingly set the trends in gadgetry

IT IS a courageous foreigner who drives on China's roads. A combination of tens of millions of inexperienced drivers and a general disregard for traffic rules makes them among the world's deadliest. Braver still would be the car manufacturer that dares to put a car loaded with automated-driving features on such roads. Western notions of what is a safe distance between cars mean little in China. How could an autonomous vehicle conceived for orderly Germanic roads cope with such anarchy?

Nevertheless Audi was this week giving journalists demonstrations of hands-off motoring through the frantic Shanghai streets. Its test cars were in town for a giant consumer-electronics fair, where it announced deals with Baidu, China's biggest search-engine and mapping firm, and Huawei, a telecoms-equipment manufacturer, to kit out its connected cars of the future.

The German firm's faith in China's digital boom may be well placed, if this week's convention is a guide. This is the first year that a version of the Consumer Electronics Show (CES), which is held every year with much fanfare in Las Vegas, has been held outside America. Hitherto, trends in consumer gadgetry have typically taken off in America first, followed by the rest of the rich world, and then in emerging markets like China. That may be changing.

Size is one reason. America's Consumer Electronics Association, which stages the CES, forecasts that the Chinese market for electronic goods will grow by 5% to \$281

billion this year, and at current growth rates will overtake America's next year. A big market gives firms added incentive to try out new devices there early.

But there are other reasons besides size to expect the Chinese consumer increasingly to be the trend-setter, rather than the trend-follower, in electronics. First, take autonomous and "connected" cars. The average Audi buyer in America or Europe is in his 50s, but in China he is a digitally-addicted 36-year-old. So models with such advanced options are likely to become widespread in China first. Fully driverless cars, in particular, may take off quicker than in litigious America or risk-averse Europe.

Second, the Chinese have taken to mobile commerce with gusto. Apple is reported to be in talks with Alibaba, a local e-commerce firm, to bring its mobile payment system to the Middle Kingdom. Consumers who have quickly got used to shopping on mobile devices also seem likely to be enthusiastic adopters of smart watches and other wearable devices.

The Chinese people are turning out to have a greater affinity for gadgetry than even the Japanese; and Chinese companies are innovating furiously, producing all manner of devices, one of which may, perhaps, turn out to be the next Sony Walkman. JD, a successful online retailer akin to Amazon, this week showed off a voice-controlled gadget, dubbed the DingDong Smart Speaker, essentially a radio that plays whatever you tell it to—music, news, weather, or whatever. At a gathering of its own in Beijing this week, Lenovo, now the world's biggest computer-maker, unveiled its plans for the first smart watch with two screens—an ordinary one, and one that uses optical reflection to create a much bigger virtual display. It also unveiled plans for a smartphone with a built-in laser projector and infrared motion detector that is capable of projecting what is, in effect, a ►►



Introducing the latest in feather-duster technology

► giant touch screen.

Chinese electronics firms still have a reputation for simply copying Western designs. And there was still evidence of this at the CES gathering in Shanghai: plenty of lookalikes of Google Glasses, Apple Watches and iPads were to be seen at vendors' booths. However, there were also a surprising number of original inventions on display, with a chance of making it in foreign markets. This opportunity is beginning to change Chinese firms' attitudes towards intellectual-property protection. Chinese inventors backed by venture capital, who are hoping to launch their products in America, are beginning to patent them, realising that this boosts the valuation that investors put on their firms.

Consider The One, a brilliantly conceived electronic piano that integrates with music libraries accessed via smartphones and tablets. Many people give up trying to learn the piano because of the tedium of learning to read off manuscripts. The keys on this nifty piano light up in progression, to help pupils figure out which keys to press, and it uses tricks adapted from video games to help pupils eventually wean themselves off the lights and become able to read music. Ask Ben Ye, the firm's founder, whether his hot-selling invention is safe from local copycats, and he says no. So why is his firm paying hefty licensing fees to foreign music publishers, to use their songs? We pay for the intellectual property we use because we want to go global, he says. ■

North Sea oil

Offshore fog

Bloated costs and falling profits threaten the future of North Sea oil

WHEN the North Sea oil- and gasfields were booming, inefficiencies mushroomed. Now, times are tough—and it may be too late for belt-tightening. The offshore industry, particularly the British bit of it, is squeezed between a lower oil price, stubbornly high costs, an ageing infrastructure and a looming bill of many billions of dollars for decommissioning old platforms.

The result threatens the profitable and unprofitable alike. If even a few companies which use the pipelines and terminals shut down, then the bill lands all the more heavily—and perhaps cripplingly—on the survivors. Similarly, if a piece of the infrastructure breaks (or its operator goes bust) then everyone who uses it is in trouble.

Operating expenditures in North Sea oil have doubled in 15 years. Only a fifth of that increase, at most, is because of in-

Under water

North Sea total operating costs

Forecasts, 2014 prices, £bn



creased activity. The biggest reason is inflated costs, reckon consultants at McKinsey, followed by pure inefficiency, such as needlessly high standards and complexity. Poor planning wastes the time of highly paid staff: overlapping safety briefings for example, or waiting for a berth to become available on a rig. Oil companies use bespoke parts, rather than standard ones, making it bothersome to get spares.

Reliability is "awful" says Dan Cole of McKinsey: offshore installations are working only 60% of the time, mainly because of ill-planned maintenance. Embarrassingly for the oil companies' chiefs, their main industry body, Oil & Gas UK, has repeatedly predicted falling costs even as they have soared (see chart).

Even before last year's sharp fall in the oil price, Britain's North Sea operators were in trouble. With their oil fetching \$100 a barrel, an eighth of their production was loss-making. McKinsey reckons that at \$55 (a price it hit in March before recovering to \$62 now), barely half is profitable.

The answer—pushed hard by the British government—is for the industry to copy the lean-production techniques that reshaped other industries, such as carmaking. Officials speak admiringly of Aera Energy in California, owned by ExxonMobil and Shell, which has turned onshore oil and gas extraction there from a Cinderella into a beauty queen. It treats well-drilling as a manufacturing process, managed by a single team from design to implementation.

A study for the Society of Petroleum Engineers highlights Aera's use of just-in-time planning, careful mapping of work processes to cut waste, decentralised decision-making, standardisation, the use of visual tools to keep managers informed, and close collaboration with suppliers. Aera consciously models itself on Toyota, the Japanese carmaker which pioneered lean production. In 2011, Aera won an award for excellence in manufacturing—the first oil company to do so.

That approach will not transplant instantly offshore, where cost and complexity are inevitably greater. But smaller American oil-exploration firms with off-

shore operations, such as Apache and Murphy, have shown what focusing on efficiency can achieve.

Even bigger oil companies do better elsewhere. Production in the Gulf of Mexico is more efficient than in the North Sea. The increased regulatory burden since the Deepwater Horizon disaster in 2011 has not led to a big increase in costs. On one measure of reliability, Norway's oil industry scores one-third better than Britain's, according to McKinsey. One reason is less outsourcing (which reduces complexity); another is exceptionally high labour costs (which stimulate managers to look for efficiencies). The Norwegians' spending on research and development is higher, too.

As big oil companies freeze capital spending and mull an accelerated withdrawal from the North Sea, a wave of restructuring and dealmaking is looming. In theory small, nimble low-cost companies could move in, using innovative techniques to extract the 24 billion barrels of oil (about 40 years' production at current rates) still remaining on the continental shelf, though mainly in smaller deposits. But such firms need guarantees that they can access pipelines and terminals.

Britain is now urgently promoting a "thoughtful, collaborative approach" says Andrew McCallum of the government's new Oil and Gas Authority. The aim is to cut costs, safeguard infrastructure, manage decommissioning sensibly and attract investment. It can impose binding "improvement notices" on errant firms. Tax breaks could be offered too. It may work: bargain-hunting private-equity firms are eyeing the offshore industry keenly. However, once seen as a British success story, the North Sea now looks anything but. ■



Try to keep it pumping



The Washington Post

Exploring the Amazon

WASHINGTON, D.C.

Jeff Bezos is using ideas from his online business to revitalise a venerable paper

NOT long after Jeff Bezos, the founder of Amazon, said he would pay \$250m of his own money for the chronically loss-making *Washington Post*, in August 2013, he sat next to the newspaper's editorial-page editor, Fred Hiatt, at a dinner. It was a perfect opportunity to influence the Post's line, but Mr Bezos reportedly preferred to talk about other things on his mind, such as exploring the dark side of the moon.

Technology, not journalism, is Mr Bezos's passion. So far he has been the sort of proprietor newshounds dream of, with a light touch on editorial matters and a willingness to finance experimentation and bear losses. After years of shrinking ambitions and cost-cutting under its old owners, the Graham family, Posties are experiencing a period of expansion and excitement under Mr Bezos. As other American papers have continued to cut staff, the Post has hired more than 100 newsroom employees since the takeover was announced.

In its revamp, the Post is following some of Amazon's tactics. Much as Mr Bezos has made his e-commerce firm concentrate on building scale first, and worrying about profits later, he is making his newspaper concentrate first on building a broader national and international audience. Its website's traffic in America has doubled since he announced the takeover, to 51m unique visitors in April. It is promoting its journalism more assiduously on social networks, is offering readers curated content from elsewhere on the internet, and is making its web pages load faster.

The Post has introduced a "partner" programme, in which it offers free access to its articles for subscribers of other papers

such as the *Dallas Morning News*, if they sign in with their e-mail addresses. Logged-in readers like these are more valuable to a paper and its advertisers than anonymous ones, because the ads can be tailored to match whatever is known about their interests. So far more than 270 papers have signed on. This resembles how Amazon achieves dominance in its markets by gathering data on customers, the better to sell them stuff. Some newspaper bosses are cautious. "It's a Trojan horse," says one, who thinks publishers are unwise to share their subscriber lists with the Post and its advertisers. Another initiative is to study and predict reader behaviour, so as to offer each website visitor a tailored landing-page, as is the case at a certain e-commerce site.

Mr Bezos has been actively involved in a new app, code-named Rainbow, which presents Post articles in a glossy, magazine-like format. It now comes bundled with most versions of Amazon's Kindle e-reader, and will be available on smartphones soon. Here too, the Post is putting scale before profit: the Kindle version is free for the first six months and \$1 for the next six (the cost is higher on other devices). This move runs counter to the trend at many other papers, which are concentrating on getting readers to pay a full price for their product, on the assumption that ad revenues are in unstoppable decline.

Some insiders are banking on Amazon bundling the Post into its Prime subscription, which offers unlimited free delivery plus online video for a fixed annual fee. "Everyone is expecting it, and we will be disappointed if it does not happen," says a

veteran Post writer—apparently unworried by the risk that making the paper a freebie, in effect, could devalue it in readers' eyes.

In a parallel of sorts with the cloud-computing service that Amazon sells to businesses, the Post is also trying to become a technology provider to the news industry. It is hiring dozens of engineers to build new products, and developing a new content-management system for text articles and video, which it will try to license to others. It has already developed its own ad-server and pay-meter technologies, says Shailesh Prakash, the Post's chief information officer. Given the strained finances of most papers, however, this may not prove to be a source of vast profits.

Contrary to all the grand traditions of journalistic indiscretion, the Post has "adopted a little bit of the Amazon way of not talking about future plans," says Steve Hills, the paper's president and general manager. And abandoning the news business's spendthrift ways, it has also let a bit of Mr Bezos's frugality rub off on it: earlier this year the Post angered many veteran staff by cutting pension benefits promised to them under the Grahams' ownership.

There are several headline challenges ahead. The future of the Post is digital, but the bulk of revenues still come from print advertising, and its print circulation continues to shrink. It still breaks original stories of national importance, as you would expect for the paper that uncovered the Watergate scandal. But some say the Post has become less relevant even within Washington, because there is now so much other news and comment available online. The Post's cautious tone can get drowned out by more opinionated voices.

A severe contest

This is where journalism is quite different from e-commerce: it is a lot harder to monopolise the market in ideas than to dominate the selling of books and baubles. The Post is in a business where competition for attention, and advertising, is far stronger than that Amazon faced when it was establishing itself. Other digital firms, including Facebook and Google, continue to disrupt the news business. Facebook is striking deals with newspapers in which it posts their articles directly on its platform in return for a cut of advertising revenues.

However, there are few better placed to navigate the Post through its difficult transformation than one of the web's original disrupters. Under Mr Bezos there is no pressure to find emergency fixes, and no need to keep reporting financial figures, which gives Posties some comfort. What investors see as Amazon's weakness—a chronic disregard for profits as Mr Bezos chases growth—may be the Post's biggest source of strength for the foreseeable future. Few newspapers can count themselves so lucky. ■

Health care

Bedside manners

Small data from patients at home will mean big cost savings

IN 2008 Jordan Shlain treated an elderly patient with pneumonia. He was worried about her, so he gave her his mobile number—but she didn't use it, and ended up in intensive care. This set Dr Shlain thinking about how to follow up with patients; his simple solution was a daily phone call and a spreadsheet to record the data. One day another patient in his San Francisco surgery remarked, "Dude, you need to turn this into software." He did, and earlier this year Cedars-Sinai Health System, a hospital operator in Los Angeles, adopted a patient-feedback system developed by the firm he set up, Healthloop.

Doctors can use Healthloop to send their patients questions about their condition, by e-mail, text or smartphone app. Its software then works out when intervention by a doctor or nurse is needed. It is efficient and patients like it. These days the idea of finding value in health data is very much in vogue but most attention is being showered on the promise of "big data", in which giant databases on genomics, population health and treatment are crunched in the hope of discovering medical insights. But there is also a great deal going on to improve treatments and outcomes through this sort of "small data"—the collecting and processing of modest amounts of information from an individual patient.

Small data has been used for years, to great effect, in home monitoring. Philips, a Dutch technology company, has long sold versions of its Lifeline medical-alert pendant (pictured). Besides letting its users—generally the frail elderly—call for help, its devices can now detect automatically if they have fallen, and can also monitor their drug compliance. One million patients are using it.

As it gets ever easier to squeeze sensors and processors into small devices, their makers are thinking up all sorts of new ideas for patient monitoring. Liat Ben-Zur of Philips says the company is working with some European hospitals on a home device that will track the heart rate, blood pressure, heart variability and sleep patterns for patients with chronic obstructive pulmonary disease. Similarly, a startup in Chicago, PhysIQ, is developing a chest strap that measures respiration rate and heart rate to monitor patients who have cardiac disease, to alert their doctors to any problems before they get serious.

Such ideas offer the prospect of respectable profits for their inventors. But the fi-

nancial benefits of being able to monitor and receive data from patients in something like real time will be much greater for hospitals and health insurers, who stand to save substantial amounts by intervening earlier. This is especially so given that relatively small groups of patients with chronic conditions account for a disproportionate share of health costs. In America, for example, only 1% of patients account for 22.7% of spending.

America's Affordable Care Act, better known as Obamacare, introduces penalties for hospitals when patients have to be readmitted; and limits the sums hospitals can charge for certain conditions. These measures are forcing hospital operators to make serious efforts, for the first time, to improve the quality of care and keep patients out of the emergency unit where possible. As patient-monitoring systems become more sophisticated and widespread, they could reduce the load on doctors' surgeries by reducing the need for routine check-ups; and help curb the rising cost of medical-malpractice claims.

Many personal monitoring devices now transmit data via the patient's smartphone: Apple's HealthKit app makes it easy for patients to connect them up, and to input data directly. At the other end, hospitals using HealthKit find it a lot simpler to integrate the incoming data with their IT systems. The Ochsner Health System in

New Orleans recently announced it will use HealthKit to collect data on the weight of patients with heart failure. If their weight increases significantly, which is often a sign of fluid accumulation, they may get a call from a pharmacist about changing their drugs.

Medopad, a British medical-technology firm, has launched an app of its own for cancer patients undergoing chemotherapy, that runs on Apple's smart watch: the patients can confirm they have taken their medication, and report any symptoms, by simply tapping buttons on the app. Their doctors will be able to use the accelerometers on the watch to monitor their activity levels.

Some patients will, inevitably, still want to talk to a real, live doctor. There is an app for this too. Doctor on Demand lets people in America request a rapid video consultation with a physician. Prescriptions can be sent electronically to the patient's nearest pharmacy. The cost for this can be as little as \$40. MDlive, a competitor, also offers quick video-consultations, for \$49. It is not just the patients who gain: their health insurers and employers are also keen. UnitedHealthcare, one of America's biggest insurers, now covers patients for their use of Doctor on Demand. Comcast, America's largest cable-television provider, offers it to its workers.

Attempts to make hospitals and clinics more efficient by building huge, centralised IT systems have a sorry history—just look at the failed patient-record system for Britain's National Health Service, scrapped at a cost of around £10 billion (\$15 billion). But computing power is now being applied successfully in countless small ways, using smartphones and other diminutive devices, to make a big difference to the effectiveness of treatments. ■



No need to call

Schumpeter | A palette of plans

Choosing a strategy is a lot more complex for companies than it used to be



BUSINESSES are bombarded with advice on strategy. Many gurus urge them to discover a “blue ocean” where they can swim without competition. Others argue that this is a pipe dream—a blue ocean will immediately be turned red by competitors—and advise them to focus on flexibility. Some pundits preach the first-mover advantage; others urge firms to be fast followers. Bosses end up confused and cynical, with some lurching from one strategy to another and others concluding that they never want to hear the word “strategy” again.

The Boston Consulting Group (BCG) made its name with clever ideas about strategy, most notably the growth-share matrix, which helps firms divide their lines of business into stars, cash-cows, dogs and question-marks. Now it has brought some clarity to the current confusion with a new book, “Your Strategy Needs a Strategy”, by Martin Reeves, Knut Haanaes and Janmejaya Sinha. The BCG trio argue that business is so fast-moving and diverse these days that a single, overarching strategy will no longer do. The competitive landscape is constantly changing in many industries; businesses speed through the life-cycle from stars to dogs. So, they say, wise bosses should choose from a “strategic palette” in much the same way that artists choose from a palette of colours. The book identifies a handful of primary strategies, that bosses should be ready to switch between and, at times, blend.

It starts with the “classical” strategy that business schools have taught since the 1950s: find a good niche, develop a plan to dominate it, then muscle up. Mars, a confectionery giant, maintains its dominance through close relationships with suppliers, relentless cost control and timeless products. The Milky Way bar was invented in 1923 and the Mars Bar in 1932. Consumer-goods makers such as Procter & Gamble, retailers such as Walmart and logistics firms such as UPS all use variations of this strategy. But stable markets are getting harder to find. So companies are making more use of four other types of strategy.

One is the adaptive, evolutionary approach. This is particularly popular among technology firms. Tata Consultancy Services talks about its 4E model—explore, enable, evangelise and exploit—which in English means trying lots of small things and then backing whichever ones work. But it can also be applied in older industries. Inditex’s global success as a fashion retailer is based

on first producing its clothes in small batches, then scaling up production rapidly if they sell well.

Another is the visionary, blue-ocean approach: generate a compelling new idea—a whole new market, with you at its centre. This was Steve Jobs’s approach with Apple’s iPhone and iPad, but there are plenty of smaller examples. Anna Wojcicki, a founder of 23andMe, came up with a new health product—a kit that allows you to analyse your susceptibility to various diseases—and then focused on selling her new idea to both investors and the general public. “The average individual just didn’t know why they should get their genome,” she said. “So educating the individual and getting them excited about it was our first challenge.”

A third is the shaping approach: working with partners to create new markets. The partners could be private-sector ones. Apple and Google have worked with many small app developers to create an ecosystem of mobile services. Or they could be public-sector ones. Novo Nordisk, a Danish drugmaker, has captured 60% of the Chinese market for insulin by working closely with Chinese doctors and health authorities to raise awareness of diabetes, which had previously been under-diagnosed.

A fourth strategy—for companies on the brink—is renewal: refocus the business decisively, preserve capital, free resources to apply to areas of growth. After its government bail-out, AIG, a giant insurance conglomerate, got out of many businesses and took drastic action to stop rivalry and overlap between the rest.

Overlying all these options is the strategy of being “ambidextrous”, that is, being able to skip nimbly from one strategy to another, or to pursue several of them simultaneously. Some companies, such as PepsiCo, have two separate groups of people in each division: one whose strategy is to maximise the efficiency of the business in its current form, and another that looks for ways to disrupt it (before someone else does).

Smudging the canvas

The BCG trio’s taxonomy of strategies at least brings a bit of clarity to some of management theory’s cloudier waters. But they have little to say on how managers should apply their palette of strategies to the canvas without making a Jackson Pollock of it. The classical, niche-domination strategy often entails minimising variation to squeeze out costs; the adaptive strategy involves maximising variation so as to find out which variant works best. The shaping strategy is all about sharing between companies and others; the classical strategy is typically all about being closed and defensive. How to solve such contradictions?

Besides offering little advice on how best to pivot from one strategy to another, the authors also avoid discussing how companies can pursue a multi-strategy approach without creating battle lines between their various chiefs. It is simply assumed that the executives running the “business as usual” strategy will get along happily with those pursuing the “disrupt everything” approach. It is hard enough for businesses to switch wholesale to a new strategy without encountering resistance from managers who have tied their reputations to the old one; maintaining different teams working simultaneously on opposing strategies is a recipe for internecine warfare, and for wasting resources as the firm is pulled in opposing directions. The BCG trio are no doubt right that companies will need to become more ambidextrous if they are to survive in turbulent times. But what bosses need now is a book on how to prevent such organisations from becoming self-contradictory and conflict-ridden ones. ■



China's stockmarket bubble

A goring concern

SHANGHAI

The economic dangers of China's manic bull market

THE slowdown in China's property market has been cruel to makers of wooden flooring. After double-digit growth for much of the past decade, sales have slumped. Kemian Wood Industry, which used to boast of the quality of its composite floorboards, took radical steps to deal with the downturn. It switched its focus to online gaming and changed its name. After its rechristening as Zeus Entertainment in early March, its share price doubled in short order. This past week, though, its transition plan hit a snag. CCTV, the state broadcaster, accused it of being one of a series of companies that are "fabricating themes and telling stories" to inflate their share prices.

Zeus Entertainment denies the allegations. But the wider trend is clear. At least 80 listed Chinese firms changed names in the first five months of this year. A hotel group rebranded itself as a high-speed rail company, a fireworks maker as a peer-to-peer lender and a ceramics specialist as a clean-energy group. Their reinventions as high-tech companies appear to have less to do with the gradual rebalancing of China's economy than with the mania sweeping its stockmarket.

The Shenzhen Composite Index, which is full of tech companies, has nearly tripled over the past year. Even frothier is ChiNext, a board for startups that is now valued at 140 times last year's earnings (see chart 1 on

next page). A multiple of 50 would already be very optimistic for even the whizziest firms. ChiNext is supposed to be China's answer to NASDAQ. It does indeed closely resemble NASDAQ—but as it was in 1999, just before the dotcom bubble went pop. There is no telling when the Chinese frenzy will end, but a sharp correction seems inevitable. Such a reversal would cast a long shadow over China's economy.

As in any bubbly market, there is a debate about just how inflated Chinese stock prices are. The average price-earnings (PE) ratio on the Shanghai Stock Exchange, home to the country's biggest firms, is 23—lofty but not much higher than America's S&P 500 share index. That, however, is a skewed picture. Banks have the heaviest weighting on the Shanghai exchange and they have been largely left behind by the rally. (That is a warning sign in itself since bank shares tend to track the broader economy.) The median share in Shanghai now has a PE of 75. Chen Jiahe of Cinda Securities, a brokerage, calculates that nearly 85% of listed companies have higher valuations today than at the height of China's stock bubble in 2007—which ended in a big bust. Global investors are not buying into the mania: the shares of companies listed in both Hong Kong and Shanghai are now 30% more expensive in the latter.

Examples of excess abound. A pet-food company trades on 221 times earnings, a

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sauna-maker on 285 and a manufacturer of fans on 732. Chinese stocks have long had a tenuous relationship with economic reality, but the current rally has gone to new extremes. Growth in the first quarter fell to 7% year on year, the weakest figure since 2009. And monthly data suggest that the slowdown has deepened in the second quarter. But stocks are still racing ahead (see chart 3). Almost 8m brokerage accounts were opened in the first quarter of 2015 alone (see chart 4). A shift to monetary easing and fiscal stimulus—and expectations of more to come—help explain why the rally began. But the longer it continues, the more it looks like irrational exuberance.

One common view about the bull run is that the government is behind it, and could bring it to a halt if it chose, just like flipping a switch. The truth is that even the Communist Party, though powerful, struggles to steer the stockmarket along its desired path. Official media did talk up shares as "cheap" in the early days of the rally, but the government had tried for years without success to breathe life into the previously torpid market, cutting stock-trading taxes and freezing new listings to limit the supply of shares. In recent weeks the balance of official rhetoric has started to turn against the market, highlighting the growing risks. The report by CCTV about companies "telling stories" followed a vow by the securities regulator to crack down on ►

Applications are invited for *The Economist's* 2015 Marjorie Deane internships. Financed by the Marjorie Deane Financial Journalism Foundation, the awards are designed to provide work experience for a promising journalist or would-be journalist, who will spend three months at *The Economist* writing about economics and finance. Applicants are asked to write a covering letter and an article of no more than 500 words that they think would be suitable for publication in the Finance and economics section. Applications should be sent to deaneintern@economist.com by July 3rd. For more information, please visit www.marjoriedeane.com.

► with the GDP data last year, has plunged this spring, suggesting that the recession will deepen (see chart on next page).

The position of Greek banks is almost as untenable as the government's; it is a moot point which will buckle first. The banks have been able to cope with capital flight and cash hoarding only by borrowing from the ECB, mostly through a massive amount of "emergency liquidity assistance", which can be cut off at any point if a two-thirds majority of the ECB's governing council objects to it.

The mounting pressure on Greece is causing the government to negotiate

meaningfully after months of stalled talks. The decision in late April to sideline Yanis Varoufakis, who had alienated his fellow euro-zone finance ministers through an abrasive and confrontational approach, helped. Mr Tsipras, who is now heavily engaged in the process and has struck a broadly conciliatory tone, rallied his party behind his negotiating stance on May 24th, which includes some "red lines" that he insists must not be crossed.

Greece's plight is also goading its creditors. They are torn between two imperatives: demonstrating that club rules must apply to all members and trying to prevent

"Grexit". Although the wider risks arising from Greece leaving the euro area appear less grave than in 2012, when Grexit was last feared, the impact of such a traumatic event is incalculable. Even if the short-term injuries could be treated (under the anaesthetising effects of the ECB's purchases of sovereign bonds through its quantitative-easing programme), it would weaken the monetary union in the long run. Henceforth membership of the euro would be regarded as just another transient system of fixed exchange rates.

Though there are still difficult compromises to be made, the outlines of a deal are ►

Buttonwood | The economics of bluffing

When political leaders turn into option-writers

WILL Greece default on its debts and leave the euro? Will Britain decide to leave the European Union? Politicians in the two countries have threatened, implicitly or explicitly, to take these drastic steps if their European colleagues do not offer them inducements to stay.

Many people regard these threats as a bluff. They think that Greece does not really want to leave the euro, and that David Cameron, Britain's prime minister, does not want his country to exit the EU. When push comes to shove, Greece will do a deal (see previous story) and Mr Cameron will persuade British voters to stay in the EU in his planned referendum. But there are risks that neither outcome will turn out as planned. In both cases, political leaders are making a risky bet.

The financial analogy is with writing (selling) an option. In the markets, an option is the right to buy (a call) or sell (a put) an asset at a given price; say shares of Apple at \$130. In return for granting the buyer of the option this right, the writer receives a payment called a premium, rather like an insurance company receives a premium for protecting a homeowner against fire or theft. But if Apple shares do rise above \$130, the buyer of a call option is likely to exercise it, to the writer's cost; if they fall below it, the holder of a put option is likely to cash in.

Political leaders in Greece and Britain have in effect written an option on exit. The premium they receive is political popularity—for opposing the demands of international creditors, in the case of Greece, or for asserting Britain's sovereignty, in Mr Cameron's.

But in the financial markets, option-writing is a very risky strategy, unless the position is properly hedged. A lot of small profits can be earned from the option premia, only for all the gains to be wiped out



when an option is exercised at an unfavourable time. Of course, the buyer of an option is most likely to exercise it when the cost to the writer is greatest.

For the political leaders of Greece and Britain, the difficulty is that they do not get to decide whether the option gets exercised. The other nations within the euro zone and the EU may decide to call Greece or Britain's bluff. In Britain, the electorate also has the right to exercise the option of exit—which they might use in the referendum to protest against government policies in general rather than voting on the merits of EU membership in particular.

This leads to some complex calculations. Unlike Apple's shares, the price of Grexit or Brexit at any moment is highly uncertain; political leaders cannot be sure what the costs and benefits will be. So this is rather like an option on one of the complex securities that proliferated before 2007—a collateralised debt obligation based on subprime mortgages, for example. The uncertainty makes it less likely that Europe will exercise the option and the departure of Britain or Greece.

If that gives the bluffing states an advan-

tage, they also face a difficult trade-off. The more intransigent their demands, the more they may please their electorates (ie, the greater the "option premium"). However, such intransigence may make it more likely that the option will be exercised. European leaders may feel that making too many concessions to Greece or Britain will simply encourage other countries to make similar demands, and thus destroy the European project. In Britain, there may be a huge gap between the expectations fostered during the negotiating process and the reforms that emerge. This may create the impression that the government has failed, making the public more inclined to vote for exit.

This discrepancy between the high-flying nature of political promises and the mundane reality of policy outcomes lies at the heart of recent voter discontent. Promises may result in short-term electoral success but at the cost of increasing disillusionment in the long term. The most significant short-term influences on growth—the oil price, Federal Reserve policy, China's success in managing its economic growth—are outside the control of European politicians. National leaders are, in effect, bluffing when they say their own policies can make much difference.

Europe's failure to generate much in the way of economic or wage growth over the past decade means that voters are not just turning against the parties in power—they have lost faith with the mainstream opposition as well. The effect can be seen everywhere, from the rise of Marine Le Pen in France to the emergence of brand new parties like the Five Star Movement in Italy and Podemos in Spain. Years of short-term gains for the mainstream parties have resulted in a long-term loss.

► market manipulation. "It's like crying wolf. Because there have been repeat warnings but few serious consequences, investors pay even less attention," says Shao Yu of Orient Securities, a brokerage.

If the bubble does burst, it would undoubtedly hurt the Chinese economy. Leverage has played a big part in the rally: margin financing for share purchases has increased five-fold over the past year to more than 2 trillion yuan (\$325 billion; see chart 2). Debt has also worked its way into the market through other channels such as "umbrella trusts", which used to allow banks to lend to wealthy investors without encumbering their balance-sheets. Credit Suisse estimates that 6-9% of China's market capitalisation is funded by credit, nearly five times the average in the rich world.

The presence of so much leverage means that the eventual correction is likely to be sharp as investors race to repay loans. This is new territory for China. When its last bubble burst in 2007, the government had yet to allow margin financing. "Now, the odds are that it will inflict a much bigger loss on households," says Helen Qiao of Morgan Stanley, a bank.

Nevertheless, the immediate damage from a crash should be manageable for China. The free-float capitalisation of the stockmarket is just about 40% of GDP; in

rich countries it is typically more than 100%. ChiNext accounts for less than a tenth of GDP. Moreover, the rally has been less helpful for the economy than often imagined. A sustained slowdown in retail sales indicates that there has been little positive wealth effect from rising share prices. Some households may have even held off from buying things to put more into the market. The corollary is that a market tumble need not spell too much gloom, at least in the short term.

The longer-term repercussions of the mania are more worrisome. After the 2007 crash, investors lost faith in China's stock-market for years. Equity issuance slowed to a crawl. Companies had little choice but to tap banks for funding, one of the reasons why Chinese debt levels soared from 150% of GDP in 2008 to more than 250% today. Many hoped that the current rally would put China's financial system on a better footing by allowing companies to raise more cash through equities and reduce their reliance on debt. This is only beginning: share issuance is stronger this year but still accounts for just 4% of corporate financing. If the rally turns to rout, it would undermine that shift. "Regulators want a slow bull market," says Larry Hu of Macquarie Securities. Instead, they have a ragging beast. ■

Greece and its creditors

When the talking has to stop

ATHENS

Despite the foreboding, a deal still appears the most likely outcome

THE latest episode in Greece's long-running economic drama is coming to a head. Since the victory of the radical-left Syriza party in the election of late January, Greece's creditors and the new government headed by Alexis Tsipras have been exchanging threats. A resolution of some kind must occur in June, and sooner rather than later in the month.

It could still be a disastrous falling-out that leads to Greece defaulting on official loans, imposing capital controls, freezing deposits and tumbling out of the euro. But as time and money run out, the concentrating of minds on both sides seems likely to bring a deal.

Mr Tsipras is the one under most pressure. A recent payment to the IMF of €750m (\$825m) was made only by drawing down a special account Greece held at the fund. Next month the government is due to pay the IMF double that amount, starting with €300m on June 5th. It may not be able to: a government minister said on May 24th that the money wasn't there. Even if the first instalment can be rustled together, the government will be hard-pressed to find the €300m due on June 12th and the €600m due on the 16th; a further €300m is due on the 19th. Redemptions of €6.7 billion of bonds held by the European Central Bank (ECB) loom in July and August—an impossibility without more help from the country's creditors.

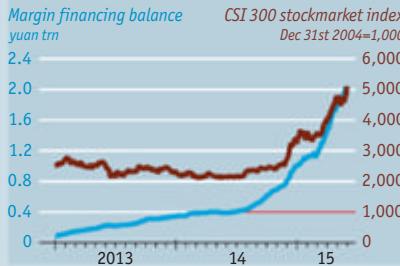
The government has been able to pay the IMF, as well as wages and pensions, only through a series of increasingly desperate manoeuvres. Local authorities have been ordered to provide the central government with their reserves. Other public-sector organisations are being raided for whatever cash they hold. Arrears are piling up as firms that have provided services to the state go unpaid and exporters wait in vain for VAT refunds.

These tactics can be deployed for only a limited time. They are also counter-productive, since they harm the private sector and thus depress tax receipts. Greece has already fallen back into recession, aborting the recovery that got under way in the first nine months of 2014. The economy shrank by 0.4% in the final quarter of 2014 and a further 0.2% in the first quarter of 2015. The European Commission forecast in May that the economy would grow by just 0.5% this year; it had forecast growth of 2.9% in November. A broad measure of economic sentiment, which had improved in line ►

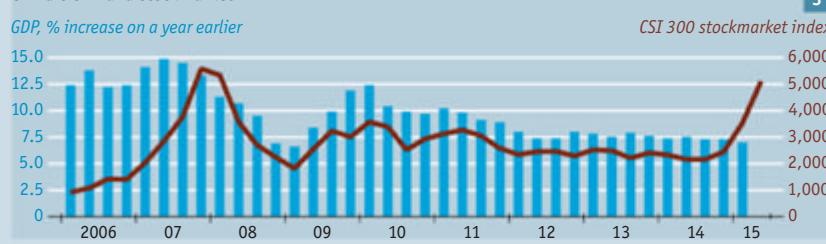
Exuberance exemplified



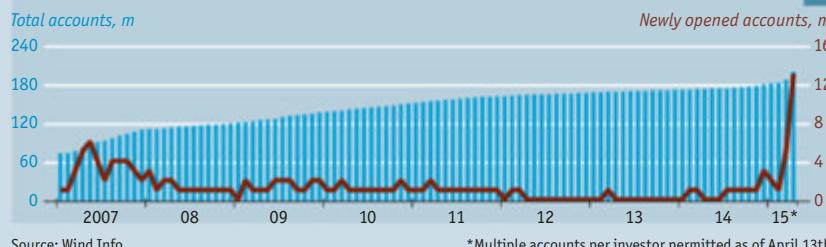
China's margin financing and stockmarket performance



China's GDP and stockmarket



Chinese A-share trading accounts

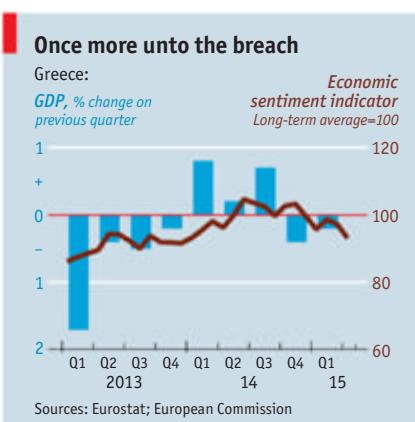


Source: Wind Info

coming into focus (even if claims by the Greek government that one was being drafted this week were promptly denied by European officials). The dire condition of the economy means that the previous objective for a primary budget surplus (ie, excluding interest payments) of 3% of GDP this year is no longer attainable. Planned future surpluses of over 4% will also have to be reduced.

Greece's negotiators, for their part, have accepted the need to simplify its VAT system, which could yield extra revenue of up to 1% of GDP. That should help offset the damage from the downturn. The government has toned down its anti-privatisation rhetoric and is pressing ahead with the sale of its stake in Greece's biggest port. It will have to accept more privatisations, not least since they yield revenue. Even Mr Tsipras's "red lines"—no further cuts in pensions or public wages—are smudgeable. Creditors are not calling for cuts in public wages and pension spending can be reduced in a variety of indirect ways, such as reducing the scope for early retirement.

With so much to lose on both sides and little to gain (other than painful assertions of principle), a deal still appears the most



likely outcome despite the fraught nature of the negotiations. An agreement will not immediately unlock new money since disbursements will require parliamentary approval in creditor countries such as Germany. But it would enable the ECB to help overcome the immediate cash crisis by temporarily raising the amount of short-term debt the Greek government can issue. That, however, will only pave the way for the next episode in the drama: negotiating a whole new bail-out agreement. ■

Rating agencies

Undue credit

NEW YORK

Regulation is helping the very firms it is designed to tame

DAVID EINHORN, a hedge-fund manager, saw the financial crisis coming and made a fortune from it. But not all his predictions have been as prescient. Asked in 2012 about rating agencies, which, unlike him, had failed to discern the impending disaster, Mr Einhorn said, "It's a matter of time before they all disappear."

After all, the three big rating agencies, Fitch, Moody's and Standard and Poor's (S&P), had all judged Lehman Brothers a safe bet until the morning of the day it defaulted; they also gave high ratings to securities based on subprime mortgages that turned out to be toxic. "Deeply disappointing," was how Ray McDaniel, the boss of Moody's, described its performance.

In response, politicians vowed to change the industry beyond recognition. They handed the job of regulating them to new outfits: a special unit of the Securities and Exchange Commission (SEC) in America and the European Securities and Markets Authority in the European Union. A provision of America's Dodd-Frank financial-reform law, enacted in 2010, states that any requirements in regulation for a security to be rated should be expunged. For



good measure, America's Department of Justice began investigating S&P for fraud, claiming it deliberately distorted its ratings to win more business.

The result? Rating agencies are thriving. Demand has been so strong, according to Bill Bird of FBR Capital Markets, a broker, that they have been able to raise their prices by about 4% a year since 2010. Revenues are at record levels. The shares of Moody's, the sole stand-alone agency, are

up more than sixfold since 2009. Its board was not, apparently, so disappointed by its poor performance during the crisis: it kept Mr McDaniel in the job and paid him \$14m last year. S&P settled with the Department of Justice in February, paying \$1.4 billion but not admitting any wrongdoing.

The main boost to the business has come from ultra-low interest rates, which have prompted a surge in bond issuance. Trying to sell a bond without a rating remains really hard, says Mr Bird; reselling one is even tougher. That is because investors cannot hope to assess the creditworthiness of the hundreds of thousands of bonds in circulation: at the end of 2013 S&P had ratings on 1.1m issues, Moody's on 900,000. Many big investors, such as CalPERS, an enormous public pension fund, do not allow those managing its money to invest in any unrated securities.

Scraping legal mandates to have securities rated has also proved difficult. The SEC, for one, still stipulates what ratings the assets held by money-market funds should have, despite Dodd-Frank's injunction to the contrary. It has proposed changing this rule to make the use of ratings voluntary, but in a way that implies that the funds it regulates will continue to rely on them. By the same token, the Basel Committee, an international club of regulators which sets global rules for banks, still uses ratings to judge the quality of their assets.

The big three agencies, despite their dire record in the crisis, have maintained a near-lock on the market (see chart). A few smaller firms provide competition in certain niches, such as A.M. Best, for ratings of insurance firms, and Kroll, for ratings of commercial mortgage-backed securities. But in corporate bonds, the big three have a market share of over 90%.

The heavy regulation of rating agencies appears to be part of the problem. Far from damaging the incumbents' prospects, the rules seem to shield them from competition. To issue new ratings, a firm must qualify as a "nationally recognised statistical rating organisation" (NRSRO)—a process several potential new rivals to the big three have struggled with. Since 2011, for instance, the SEC has been reviewing the application of R&R Consulting, a firm established by two former employees of big agencies. Rather than try to change ratings as infrequently as possible, the conventional approach, R&R constantly adjusts them in response to new economic data, changes in interest rates and the performance of the underlying assets. This innovation has been popular with clients, and drawn interest as far afield as China. But it seems to have flummoxed the SEC, says Ann Rutledge, a founding partner.

Another problem is the cost of becoming an NRSRO, which involves exhaustively documenting the methodology behind each rating and ensuring that commercial

► staff have not influenced the work of analysts. The activity of certain employees must be monitored even after they have left the company. Such cumbersome procedures favour incumbents, which can divide the cost of compliance among a bigger pool of customers.

According to James Gellert, the boss of RapidRatings, another new agency with barely 50 employees, becoming an NRSRO would double its operating costs. RapidRatings has nonetheless won business from investment firms and companies looking into the solvency of counterparties thanks to its innovative techniques. It crunches 73 ratios for every security it covers, adjusting for 24 industry models, to compute a rating. Updates are generated automatically as new financial information is disclosed.

Many of RapidRatings' clients use it precisely because it is not an NRSRO, says Mr Gellert, and so is not bound by the ossified systems that entails. It is not even bothering to apply for the title, which means its ratings cannot be used by money-market funds or banks, and do not pass muster with the likes of CalPERS. That cannot be the outcome that policymakers were hoping for when they dreamed of changing the industry beyond recognition. ■

Reinsurance

Compacts of god

The market for risk is changing

INSURANCE only works if reinsurance works, those in the business say. An insurer that would face crippling losses if, say, a hurricane struck an island where it had covered lots of property against extreme weather, would typically insure itself against such an event with a reinsurer. But the \$425 billion industry is under threat as insurers increasingly offload risk directly to capital markets instead. This month Warren Buffett, who has investments in reinsurance, dismissed it as a "fashionable asset class" whose prospects have "turned for the worse".

Two things have made life more difficult for reinsurers. First, as insurance companies merge into fewer, global players, the share of policies they seek to reinsurance has declined rapidly over the past decade, says James McPherson of PwC, a consultancy. A Slovenian insurer that used to take out reinsurance against a big snowstorm, for example, no longer needs to do so if it is part of a global insurance firm that can offset the risk with unrelated policies in other parts of its portfolio. Technological ad-

vances and regulatory pressures have also made insurers better at understanding and controlling the risks on their books.

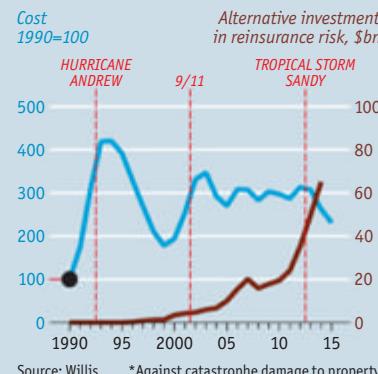
Second, there is now far more competition in the industry, as hedge funds and pension funds muscle in on reinsurers' turf. The most well-known way to invest is via "catastrophe bonds" issued by insurance firms, which pay regular interest unless a specified disaster occurs, in which case the issuer gets to keep the principal and use it to pay claims. Last year a record \$8 billion of cat bonds were issued. Around \$65 billion of "alternative" capital has now been pumped into the sector (see chart); Aon Benfield, a broker, expects that to reach \$150 billion by 2018.

Investors are attracted by tax breaks, the relatively high yields on offer and the fact that returns are uncorrelated with other assets (Wall Street and the weather do not usually have much to do with one another). In a sign of the times BlackRock, an asset manager, and ACE, an insurer, have bypassed reinsurers altogether in a new joint venture.

Several reinsurers are working with the new money to offload some of their own risks: Everest Re issued around \$1 billion of cat bonds last year, for example, while Hannover Re agreed €3 billion (\$3.3 billion) of "collateralised reinsurance" deals, which are simpler, smaller cousins of cat bonds. Yet the new competition makes it harder for reinsurers to raise premiums. In the aftermath of hurricane Katrina in 2005, some reinsurers put their prices up by as much as 50-100%. In contrast, the string of expensive disasters in 2011, including the Tohoku earthquake and tsunami in Japan and the Christchurch earthquake in New Zealand, did not lead to a rise in market-wide premiums, despite costing the insurance industry \$116 billion, much of it reinsurance. Catastrophe reinsurance prices have fallen in seven of the past ten years. Willis, a broker, says that the price for protection against disasters—normally the highest-margin part of the business—fell by 10% last year on a like-for-like basis.

Premiums at a discount

Reinsurance*, worldwide



Let's hope they issued cat bonds

Some see the repackaging of risk in nifty new financial instruments as worryingly similar to the financial engineering that helped precipitate the credit crunch. In a new book, Paula Jarzabkowski of Cass Business School and her colleagues worry that ill-informed investors may be taking on risks they do not understand, and that the flow of capital could easily dry up if they suffer unexpected losses. Regulators fear that price wars might lead both conventional reinsurers and the upstarts to take on more risk than is prudent. The various alternative instruments remain largely untested, points out Brian Schneider of Fitch, a rating agency.

Distributing risk more widely, others retort, is no bad thing, particularly as the industry consolidates into a few global firms. Supporters also point out that there is a natural limit on the growth of the market. Issuers of cat bonds only benefit in the event of an (inherently rare) natural disaster: that means there is little incentive for speculators to sell cat bonds as well as buy them. And cheaper reinsurance should cut the price of insurance for consumers too.

That may have consequences beyond the rich world. The developing world remains lamentably underinsured. Less than 1% of the estimated damage from the recent earthquakes in Nepal, for instance, was covered by an insurance policy, compared to 80% in the Christchurch earthquake, according to Swiss Re, a reinsurer. The more capital available for reinsurance, the faster the insurance market can grow in such places. Rather than fighting over crowded and shrinking markets in America and Europe, reinsurers would be wise to broaden their horizons—provided the pension funds don't get there first. ■

The yuan

Feeling valued

SHANGHAI

The IMF changes its tune on China's currency

THREE was a time when virtually all the ills of the world economy were blamed on the yuan. Critics charged that China's intervention to suppress its currency had led to anaemic imports from Europe and America, to a savings glut that flooded America with cheap credit and even to the global financial crisis, since the cheap credit enabled irresponsible lending. The allegations were exaggerations. But it was evident that China had held its exchange rate down, boosting its companies at the expense of others. So it was a notable shift when the International Monetary Fund declared this week that the yuan was "no longer undervalued".

Not everyone agrees. Jack Lew, America's treasury secretary, was quick to say that he still sees the yuan as undervalued. With China in their sights, American senators passed a bill earlier in May that could lead to sanctions against foreign countries deemed to manipulate their currencies. The IMF's previous assessment that the yuan was too cheap had lent a veneer of intellectual credibility to such drives. Its new language strips that away.

The change was a long time in coming. The IMF had signalled for months that it was likely to soften its stance. After all, over many years, the Chinese authorities have allowed a persistent, if gradual, appreciation. The yuan has climbed by a third against the dollar in the decade since it was formally de-pegged. More striking has been its climb against other currencies, especially over the past year. By staying basically level with the dollar during a period when the greenback has been appreciating strongly, the yuan has gained 14% against a trade-weighted basket of currencies since mid-2014, according to the Bank for Intern-

national Settlements (see chart).

That has had an impact. Roughly \$300 billion, a record amount, flowed out of China via its capital account over the past two quarters. In part that is because some firms thought that, with the economy slowing, the yuan might depreciate. That in itself is a sign that it is more fairly valued than in the past: investors disagree about whether it ought to go up or down.

Yet China has not abandoned currency intervention altogether. Although the central bank has stepped back, traders say it is still the biggest player in the local foreign-exchange market. The direction of its intervention has changed, however. Left to its

own devices, the yuan would in all likelihood have depreciated in recent months. The central bank appears to have propped it up. Analysts say it has wanted to send a signal of confidence about the economy.

The IMF recognises that more reform is needed, calling on China to implement a truly floating exchange rate within three years. But for American lawmakers who propose import duties against countries that suppress their exchange rates, Chinese actions to bolster the yuan raise an awkward question. Would they acquiesce to subsidies to help Chinese exporters which are being hurt by their government's strong-currency policy? ■

Danish mortgages

Homeowning Hamlets

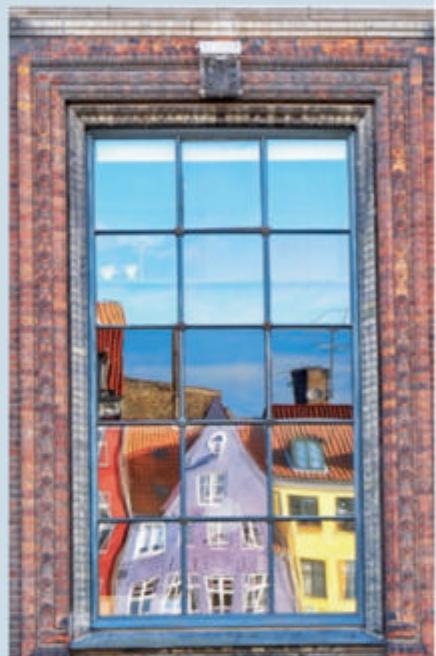
To refinance or not to refinance

IN A world of fully rational human beings, people would all be constantly checking the financial markets for profitable opportunities. But often they ignore a chance to save money even when it is right under their noses.

That conclusion is clear from a new study of the Danish mortgage market.* Danish homeowners tend to use fixed-rate mortgages, which they can refinance at any time without penalty. This refinancing can occur even when borrowers are in negative equity (meaning that they owe more than their house is worth) or when their creditworthiness has deteriorated; restrictions only apply when the homeowner tries to increase the size of the loan.

As rates on long-term mortgages fell from more than 7% to around 4% in the aftermath of the financial crisis, some Danes were quick to refinance loans taken out at higher interest rates. The academics dub these people "levelheads"—the kind of rational agents beloved by economic models. But a second group, nicknamed "woodheads", were slow to refinance, either because they were not paying attention or because of inertia (they could not be bothered or perhaps, like Elsinore's most famous son, they could not decide what to do).

There were enough levelheads around to ensure that, as a group, homeowners showed signs of rationality. Almost three times as many homeowners refinanced in 2010, after rates had fallen sharply, than did in 2011 (when rates briefly spiked higher again). But there were plenty of woodheads: in 2010, only 44% of those with a mortgage rate of more than 6% refinanced their loans even though rates of nearly 4% were available. On average woodheads paid an extra 1.5

**The market is distorted**

percentage points of interest as a result of their lassitude.

The academics found that levelheads tended to be younger, better educated and had higher incomes. Woodheads were older, poorer and less educated. There was one other wrinkle: those whose wealth in shares, bonds and the like was high relative to the value of their home were less likely to refinance. When you are very rich, what's the odd extra point on your mortgage rate?

The only yuan that counts

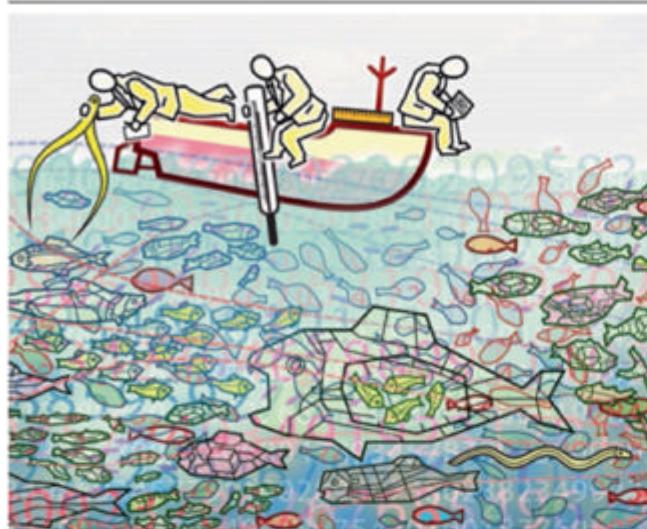
Chinese yuan, January 2013=100



* "Inattention and Inertia in Household Finance: Evidence from the Danish Mortgage Market", by Steffen Andersen, John Y. Campbell, Kasper Meisner Nielsen and Tarun Ramadorai

Free exchange | A weighting game

Pacific trade talks expose the limits of economic modelling



THE Trans-Pacific Partnership (TPP), a putative trade agreement, would ease commerce between America, Japan and ten other countries that between them account for two-fifths of global GDP. But how beneficial would it be to these economies? Advocates claim it would boost their output by nearly \$300 billion in a decade. Critics say it would make little or no difference.

The disagreement reflects the difficulty of gauging the impact of free-trade agreements. Almost all economists accept the benefits of free trade as laid out in the early 1800s by David Ricardo. Countries do well when they focus on what they are relatively good at producing. But Ricardo looked at only two countries making two products, at a time when few non-tariff barriers such as safety standards existed. This renders his elegant model about as useful for analysing contemporary free-trade deals as a horse and carriage are for predicting the trajectory of an aircraft.

Instead, most economists use what is known as computable general equilibrium (CGE) analysis. CGE models are built on top of a database that seeks to describe economies in full, factoring in incomes, profits and more. Researchers line things up so that the model yields the same output as a real benchmark year. Once that is achieved, they "shock" the model, adjusting trade barriers to see how outcomes shift, both immediately and over time.

There is much to recommend CGE. It is the only trade model broad enough to encompass services, investment and regulations, all of which lie at heart of the TPP debate. It also generates predictions that policymakers want: which sectors will do well and how incomes will change. But CGE has big drawbacks. First, it is dependent on data, which can be very patchy in some areas. Second, faulty assumptions can quickly lead forecasts astray.

Studies of TPP illustrate these strengths and weaknesses. The most influential, by Peter Petri, Michael Plummer and Fan Zhai, for the East-West Centre, a research institute, forecasts that the deal would raise the GDP of the 12 signatories by \$285 billion, or 0.9%, by 2025. It is their numbers that America's government cites when it says TPP will make the country \$77 billion richer. Their model tries to avoid some of the common failings of CGE. Their assumptions are transparent, include a range of scenarios and are often conservative—for example, they expect only slow and partial implementation. That makes the results more credible.

Yet subjective elements of the model have a huge impact. The authors use a new approach to predict that more firms will become exporters as the costs of trade decrease. That may be an improvement over previous theories, which assumed a constant number of exporters, but this one tweak greatly changes results: it makes the benefits some 70% bigger, according to a study for Canada's C.D. Howe Institute by Dan Ciuriak and Jingliang Xiao.

Some assumptions are also debatable. The researchers calculate that increased protection of intellectual property (IP) is beneficial for all countries. A review of studies of TPP funded by the British government, by Badri Narayanan, Mr Ciuriak and Harsha Vardhana Singh, questions that. Stronger protection for IP should spur more investment by producers. But it can also raise costs for consumers beyond what is necessary to encourage innovation and slow the spread of technology to developing nations.

That also points to one of the many blind spots in CGE models. Most use figures from Purdue University's Global Trade Analysis Project, the best database available. But since it was initially developed for agriculture, it is skewed. It has separate categories for raw milk and dairy products, but lumps pharmaceuticals into one overarching category for chemicals—a problem for models since TPP deals extensively with drugmakers' IP. Given the uncertainty, Messrs Ciuriak and Xiao exclude any impact from enhanced protection of IP. They also use a more conventional model for exports. They calculate that TPP will raise the GDP of the 12 countries by just \$74 billion by 2035, a mere 0.21% higher than baseline forecasts. Others see an even smaller impact. In a paper for the Asian Development Bank Institute, Inkyo Cheong forecasts that America's GDP will be entirely unchanged by TPP.

Why bother?

That raises the question of whether TPP is worth pursuing at all. As complex as the CGE studies are, they are just models, peering into the future through a haze of assumptions. It is thus important to buttress them with studies of completed deals. The Asia-Pacific region is an ideal laboratory because it went from five free-trade agreements in 1990 to more than 200 in 2015. A new Asia-Pacific Economic Cooperation study finds that, in the five years after an agreement, participants' exports increased on average by nearly 50% relative to the five prior years. The researchers then control for factors such as GDP and distance, isolating free-trade deals as a variable. Those with the biggest impact share certain features: they have more members, bring together developed and developing economies, and aim at non-tariff barriers as well as tariffs.

This suggests that the gains to be had from freeing trade, even if diminishing, are far from exhausted. But that does not necessarily make TPP the right way forward. Almost all studies agree that its principal limitation is size: it is not big enough. Specifically, the exclusion of China is costly. The Petri study concludes that a more inclusive Pacific free-trade deal with weaker rules on state-owned firms and intellectual property would lift income gains for the original 12 TPP members, including America, to \$760 billion—more than double the boost from TPP. Such precise CGE forecasts ought to be taken with a pinch of salt. But the moral is clear enough. The objective should be to bring more countries into the tent, not to push for overly strict rules. ■

* Studies cited in this article can be found at www.economist.com/cge15



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Astrobiology

Waterworlds

Never mind planets. The solar system's icy moons may well be the best places to hunt for aliens

FOR decades, researchers looking for life elsewhere in the solar system have stuck to a simple rule: "follow the water". The stuff is essential to life on Earth, and its peculiar properties mean those hunting aliens think the same will be true elsewhere. This is one reason that Mars has received so much of their attention. Mars has water vapour in its atmosphere, and water ice in the shining cap at its north pole. Liquid water—which is the form life needs—may well exist underground, and may still sometimes be seen at the surface, where dried-up rivers and lakes suggest it was once commonplace. Orbiting spacecraft have seen mysterious dark channels appear on crater walls; recent results from *Curiosity*, the newer of the two American rovers now exploring Mars, suggest these could be trickles of brine, kept liquid in the bitter cold by their high salt content.

But for all that, Mars is at best a desert with a few wet patches. Farther from the sun there are a number of icy bodies that seem to boast whole oceans of liquid water beneath their solid surfaces. Even by the standards of space exploration, this water—billions of kilometres away and hidden from direct inspection—is a challenging subject for study. But there are plans afoot to meet that challenge. On May 26th NASA announced the suite of scientific

instruments it has selected for *Europa Clipper*, a \$2 billion mission which could be launched in the early 2020s. Despite its nicely nautical name, it will not actually sail the seas of Europa, an icy moon of Jupiter. But it might be able to find out something of their chemistry—and, just possibly, their biochemistry.

From the desert to the ocean

It is biochemistry—evidence of molecules made by life—that Mars has failed to provide. Four decades ago two *Viking* probes landed and subjected samples of its surface to various chemical tests as a way of looking for life. The results were frustrating; not quite what was expected from lifelessness, but not seemingly compatible with life. For all the satellites and rovers that have studied Mars since, there has been no sign of so much as a bacterium.

It is thus hardly surprising that interest in water elsewhere has risen. And it has turned out that Enceladus, a small moon of Saturn (illustrated above) and Europa have it in abundance: Enceladus may have as much as Lake Superior. Europa may have more than the whole Earth.

That may sound odd. Jupiter and Saturn are much farther from the sun than Mars is. The average temperature on Europa is a chilly -171°C. But sunlight is not the

only way to heat an astronomical body. Gravity can do it, too. To most Earthlings, the tides produced by the gravity of the moon and sun matter only to sea levels. But the tides that a huge planet like Jupiter or Saturn can produce in an orbiting moon are powerful enough to knead the rocks of the moon's core, warming them up via friction. Such heating from below allows both Enceladus and Europa to harbour oceans under their cold, icy surfaces.

In the case of Enceladus bits of this ocean have been observed escaping into space. A probe called *Cassini*, which has been orbiting Saturn for more than a decade, has spotted jets of water shooting up from near the moon's south pole. Europa, too, may spew out water on occasion. In 2013 the *Hubble* space telescope spotted what seemed to be plumes erupting from the moon's surface.

Life cannot live by water alone. Other elements are needed—notably carbon and nitrogen. And that is what makes Enceladus and Europa so tantalising. There is evidence that the oceans on both are in contact with a rocky seafloor that can provide the elements life needs. For Europa, that evidence comes indirectly, from computer modelling of its interior and analysis of the brown streaks that cross its surface, which are thought to be salt deposits discoloured by solar radiation.

For Enceladus, by contrast, the evidence is solid. Soon after *Cassini* spotted the plumes coming from the moon's surface, its controllers directed it to plunge through one of them. Although it had not been designed for such a mission, the craft was able to capture some of the spray and analyse it. It turned out to be full of exactly the sorts of complicated carbon-based mole-

►cules that might serve as precursors to life.

Whether they have actually given rise to life is, of course, another question. But the more researchers look, the more intriguing the Saturnian moon becomes. On March 12th, Sean Hsu of the University of Colorado and his colleagues published a paper in *Nature* analysing tiny silicate grains spewed out by the plumes. They concluded these were almost certainly produced at the bottom of a salty, alkaline ocean in hydrothermal vents—structures that form when mineral-laden water circulates through hot rocks on an ocean's floor. Such hydrothermal vents are found in Earth's oceans too, and are a strong candidate for being the site of the origin of life. Laboratory experiments have shown that tiny pockets inside them can act like primitive cells, concentrating organic chemicals inside and maintaining a voltage difference across the “cell” wall that could drive chemical reactions. These things are both, literally, vital features of living cells.

The wrong moon?

Europa and Enceladus are not the only solar-system bodies likely to have oceans. In March researchers led by Joachim Saur of Cologne University, in Germany, announced that Ganymede, Jupiter's biggest moon, has a subterranean ocean; so may a number of other satellites of Jupiter, Saturn and even distant Neptune. Indeed so could Ceres, a dwarf planet in the asteroid belt, and Pluto, a dwarf planet even farther off than Neptune. But it is on Europa and Enceladus that, for the moment, attention is focused.

If NASA moves forward with *Europa Clipper*, the suite of instruments just announced will allow it to learn a lot about Europa—which it will repeatedly skim past as it orbits Jupiter—and its remarkably tenuous atmosphere. If it is lucky, and a plume of water like those seen by the *Hubble* in 2013 appears, it will be able to fly right through it and learn about the ocean itself. If it is not, though, direct examination of the ocean's water will have to be deferred to some far more ambitious landing-and-drilling effort decades hence.

Enceladus is a lot farther away than Europa, but in many ways it is both a more promising and a more realistic target. Chris McKay, a planetary scientist at NASA's Ames research centre, in California, points out that, as *Cassini* has already demonstrated, the water jets make a mission easy. All you have to do is fly through one and bring whatever you capture back to Earth. That might not necessarily be an organism. Proteins, or even, under some circumstances, just the amino-acid building blocks from which they are made, would be greatly suggestive by themselves.

Dr McKay hopes that the very ease of bringing back a sample from Enceladus may prove the idea's saviour. NASA has

been approached by JAXA, Japan's space agency, with a view to a joint mission. The Japanese, like the Americans, have experience with sample-return of this sort, having flown a probe called *Hayabusa* that retrieved dust from the plume of a comet in 2010. And if the Japanese picked up half the cost, then a trip to Enceladus could just about sneak into NASA's budget alongside the one to Europa.

The advantage of going to Enceladus, says Dr McKay, is that a single space mission could address the question of whether the moon is actually inhabited, rather than merely habitable. Amino-acid building blocks can be produced by both living and non-living chemistry. But many of them are “chiral”, which means the same components can be arranged in two different ways, just as four fingers and thumb can be arranged to make a left hand or a right hand. Straightforward chemistry tends to make things in both right- and left-handed flavours. Biochemistry on Earth—and, it seems very likely, anywhere else—has a very marked preference for the production of left-handed ones. If a probe flying through a watery plume picked up a cargo of left-handed amino acids, that would pretty much close the case on whether there are aliens on Enceladus. ■

Ecology

Pack power

The wolves of Yellowstone provide some surprising survival lessons

LIKE people, wolves have found that there are benefits to be had living in a group. Together they can more effectively take down large prey, raise families and defend their territory. The received wisdom is that there are also costs to group living, not least a greater risk of death from catching a contagious disease. Now a team of ecologists working in Yellowstone National Park in Wyoming have found evidence that for wolves, at least, that is not always the case.

Wolves were driven to extinction by hunting in the Yellowstone region in the early 20th century, but were reintroduced in 1995 and have been closely monitored ever since by the National Park Service. This includes tranquilising 25 or so wolves a year and fitting them with radio collars so they can be tracked. Among the wealth of information this effort has produced, in 2007 researchers were alerted to a conta-



Coping with adversity

Snap a wheel off a robotic vacuum cleaner and it will circle hopelessly. For a rover plonked onto a distant planet or a search-and-rescue robot sent into perilous surroundings, the consequences of damage can be more dire. A fixed number of contingency plans can be programmed into the device, but a research effort reported this week in *Nature* aims to teach robots how to compensate for any kind of damage. Antoine Cully at Paris-Sorbonne University in France and his colleagues have developed software that permits a robot to build a three-dimensional map of every motion it can carry out, assigning a value to each—for not every joint and movement is as crucial to the machine's motion, or can be as easily compensated for, as every other. Guided by this understanding of their physical selves, robots tested by the team could adapt to all manner of injuries. A six-legged robot reduced to five legs, as in the picture, or a robotic arm broken in any of 14 different ways, discovered how to carry on their missions in less than two minutes of adjusting to their new limitations.



Don't let the grey hair fool you

► gious illness creeping into the population.

Known as mange, the disease is caused by parasitic mites that burrow into the flesh of wolves, causing an extreme allergic reaction and driving them to scratch to the point of losing large amounts of their fur. Left untreated, the mites weaken the animals they infect, making them vulnerable to starvation and more diseases.

The researchers, led by Emily Almberg of Pennsylvania State University, expected to see mange appear with greater frequency in large wolf packs rather than small ones. The larger packs, after all, had more wolves roving across the landscape, and thus a greater chance of one of their number coming into contact with the mites and spreading the disease to the others. But that is not what the researchers found.

Wolves living in large packs were no more likely to become infected by the mites than those in small packs or living on their own, the team report in *Ecology Letters*. Why this is so remains to be determined, but Dr Almberg suspects that it has something to do with territorial behaviour. The wolves avoid contact with other packs which, in turn, limits opportunities for disease transmission.

More intriguing, though, was the discovery that wolves living in a large group were better at fending off the disease. Wolves living in packs were five times less likely to die from mange than wolves that caught it whilst living on their own. "We saw wolves missing hair on over half of their bodies in the middle of winter surviving the season just as well as uninfected wolves, so long as they were living in a large group," says Dr Almberg. She thinks this is due to other wolves being available to help the ill ones find and catch food.

When it comes to fighting for territory, another study has found the composition

Multilingualism

Do you see what I see?

Children exposed to several languages are better at seeing through others' eyes

HUMAN beings are not born with the knowledge that others possess minds with different contents. Children develop such a "theory of mind" gradually, and even adults have it only imperfectly. But a study by Samantha Fan and Zoe Liberman at the University of Chicago, published in *Psychological Science*, finds that bilingual children, and also those simply exposed to another language on a regular basis, have an edge at the business of getting inside others' minds.

In a simple experiment, Dr Fan and Dr Liberman sat monolingual, bilingual and "exposure" children aged between four and six with a grid of objects placed between them and an experimenter. Some objects were blocked from the experimenter's sight, a fact the children could clearly see. With a large, a medium and a small car visible to the child, but the small car hidden from the adult, the adult would ask "I see a small car" and ask the child to move it. Both bilingual and those in the exposure group moved the medium-sized car (the smallest the experimenter could see) about 75% of the time, against 50% for the monolinguals. The successful children were less likely even to glance at the car the experimenter could not see.

This study joins a heap of others suggesting that there are cognitive advantages to being bilingual. Researchers have found that bilinguals have better executive function (control over attention and the planning of complex tasks). Those that suffer dementia begin to do

of the pack matters as well as its size. A team of ecologists led by Kira Cassidy of the University of Minnesota report in *Behavioral Ecology* that in an analysis of 121 conflicts between Yellowstone wolves, larger packs (with an average of 9.4 wolves) were, as might be expected, more likely to win over a small pack (5.8 wolves). Nevertheless, two factors could change the outcome considerably.

The first was that males matter. Wolf packs with a greater proportion of adult males, even if the pack itself was smaller than those they took on, stood a good chance of defeating their rivals. Statistically, Ms Cassidy was able to work out that having one more adult male than a rival pack of a similar size increased the chances of victory by 65%.

The second finding was that the presence of a wolf (of any gender) that was aged six or older has a bigger impact on the

so, on average, almost five years later than monolinguals. Full bilinguals had previously been shown to have better theory-of-mind skills. But this experiment is the first to demonstrate that such benefits also accrue to those merely exposed to other languages.

It has become fashionable to consider multilingualism as a kind of elite mental training. The question is not settled, though, for many studies have not been successfully replicated. Nor is it yet clear precisely which kinds of language skills and exposure make people better at exactly which tasks. For example, in Dr Fan's and Dr Liberman's experiment the bilingual children had better executive function than the exposure ones, while all three groups had similar vocabularies, fluid intelligence (the ability to reason quickly and think abstractly) and non-verbal visual-spatial skills. This makes it surprising that the exposure group resembled the bilinguals more than the monolinguals when it came to taking the experimenter's point of view.

If the bilingual advantage is to hold up, more clever research design is needed. Some advantages may accrue only to bilinguals who switch languages often. Some may apply only to those who live in mixed communities. While some advantages, such as lack of dementia, appear late in life, others may appear early only to disappear thereafter. Research on multilingual minds is, itself, still in a kind of adolescence, but it is a promising one.

odds of victory than a straightforward numerical advantage. Ms Cassidy found that in a fight between two packs without any of these older wolves, one with five members and the other six, the larger group would be 140% more likely to win. If two packs of equal size went head-to-head, the presence of an older animal in one group would increase the chance of that pack winning by a very useful 150%.

As the average lifespan of a wolf in Yellowstone is four years, once infant mortality is excluded, the old wolves that appear to tip the balance during battles are at least two years past their prime. It seems unlikely that they lend brawn to the fight as much as some sort of experience. Whether that is by imparting improved combat tactics to their packmates or because they are more effective fighters due to years of practice is unclear. There are more lessons to be learned from Yellowstone's wolves. ■



The multiple symbolisms of Palmyra

Stones that speak

Syria's famous ruined Roman city has meant many things to many people

YOU don't notice it at first. But all over the archaeological site at Palmyra you see the same symbol—on architraves and lintels, and especially on the magnificent Bel temple. The line of carved stone eggs, each one separated by a dart or arrow pointing downwards, was first used by the Greeks on the Erechtheum behind the Acropolis. It was brought to Syria by the Romans, who built Palmyra and decorated its monuments with the egg, meaning life or rebirth, and the arrow, war or death. For centuries the two were carved together, signifying the duality of human existence.

The jihadists of Islamic State (is) understand the meaning of symbols better than most. Over the past year they have projected fear across Iraq and Syria, posting footage of people they have beheaded. In February they released videos of ancient statues being smashed in the museum at Mosul in northern Iraq and, later, the bulldozing of the ancient Assyrian capital, Nimrud, 20 miles (32km) away. Is wants to do away with "false idols", promising instead an Islamic caliphate that threatens to be as extreme as it is thuggish.

So when is overran Palmyra on May 20th, many expected the worst. Within days social media were flooded with pictures, endlessly repeated, of young men who had been decapitated in Tadmur, the

name Syrians use for the ruins and the tiny town nearby. Their hands had been tied behind their backs, blood pooling in the street. A single black is flag was raised on the citadel that overlooks the Roman ruins, one of the site's few medieval Islamic buildings. The jihadists were reported to have entered the local museum, smashed two statues, both plastercasts as the originals had been removed, and posted their own guards outside. Western archaeologists were afraid to call their Syrian colleagues for fear of putting their lives at risk.

Palmyra's symbolism is powerful, and



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not lost on is. At its height the city was the centre of an empire that covered, among other territories, all of modern Syria and Israel and parts of Iraq and Saudi Arabia. It is still one of the most impressive archaeological sites in the Middle East, with a small theatre, temples, monumental gateways, a long colonnaded street, a crossroads monument known as a tetrapylon, and, at the city limits, extensive necropolises with Roman-era tombs. Approaching visitors see a mirage in the distance, the salt pans of the oasis with its feathery palms, and then the luminous ruins slowly taking physical shape out of the plain. They are, an early traveller wrote: "The most glorious structures in the world."

An oasis on the route between the Mediterranean and the Euphrates, Palmyra was always important. Having been allowed by Hadrian, the Roman emperor, to take charge of its own finances in 129AD, the city made its money from taxes levied on goods from the western Roman empire that were traded for imports from the Arabian peninsula, India and China. Third-century Syria was also a maelstrom of religions, as pagan cults thrived alongside monotheistic religions, some worshipping the sun. Jews and Christians had settled there, too, and Christian doctrine was the subject of much debate. In 269 Palmyra's Queen Zenobia, taking advantage of a moment of Roman weakness, invaded Egypt to the south-west and then occupied Anatolia to the north, cleaving the Roman empire in two. But within a short time a new, tougher emperor, Aurelian, retaliated. In 272 Palmyra was forced to surrender.

Years of tumult were interspersed with periods in which Palmyra was largely ignored. When the Muslim Umayyad ►

empire reached the city in the mid-seventh century, the main trade routes had shifted north and Palmyra had become a back-water. The Umayyads adopted and absorbed the city's Roman and Byzantine infrastructure and made contributions of their own. A mihrab, showing the direction of Mecca, was built in the Bel temple, indicating that for a time it was a mosque. But carved reliefs of veiled women suggest that many images now regarded as Islamic in fact have roots that are far older.

Zenobia features in the writings of medieval Arab chroniclers, such as Muhammad ibn Jarir al-Tabari. But the earliest surviving picture of the ruins was painted only in 1691, and nearly another century would pass before two British architects, James Dawkins and Robert Wood, published a magnificent folio volume of drawings, "The Ruins of Palmyra", that would revolutionise architectural taste in England. The egg-and-dart motif became a stalwart of late-Georgian decoration, and the famous Palmyrene rose began to appear on the ceilings of many a grand English country house. Over the next century, Queen Zenobia's story was repeated and embellished as she slowly morphed into the *Braveheart* of the Arab world.

Queen of the desert

Edward Gibbon wrote that she had large black eyes that "sparkled with uncommon fire, tempered by the most attractive sweetness". Giovanni Battista Tiepolo painted her, and so, later, did Herbert Gustave Schmalz, who, despite his name, was an Englishman. When Lady Hester Stanhope, the niece of William Pitt, became the first European woman to visit Palmyra in 1813, she rode in on horseback, dressed in Arab

robes, which made her forever known in Britain as "the Queen of the Desert", thus explicitly cementing the link to Zenobia. The story of Palmyra's sovereign spoke to a society that would soon be ruled by a queen of its own.

Although the uprising that Zenobia led lasted no more than three years, her symbolism lived on, growing ever more exaggerated. Some saw her as a proto-Christian or even a proto-Jewish legend. In recent times she has personified Arab insurrection against the West. As is entered Palmyra, among the many losses reported was the disappearance of the last surviving northern bald ibis in the Middle East (pictured). The bird had been named Zenobia.

If Palmyra inspired European fantasies about the "romance" of Arabia, 20th- and 21st-century Syrian mythology about the city has been of a much darker hue. After taking power in 1970 the Assads, first Hafez then after 2000 his son Bashar, carefully constructed the identity of Syria around their family rather than national treasures such as Palmyra. Their faces were plastered on billboards and car stickers with slogans such as *al-Assad ila al-abad* (Assad for eternity). On sale in the souks of Damascus there are more fridge magnets featuring the Assads than Palmyra or Krak des Chevaliers, the Crusader fortress that T.E. Lawrence once described as the "most wholly admirable" castle in the world.

Nonetheless, Syria's tourism ministry rebranded the country the "cradle of civilisation" and looked to Palmyra and other archaeological sites as a source of money. Foreign tourists would marvel at having the place to themselves as they clambered over the open ruins. Syrians in nearby Tadmur catered to their needs, selling postcards or running small cafés selling mint tea and, in later years, pancakes.

So today Syrians worry about the threat of Palmyra being demolished, but less than outsiders might expect. That is not only because they are more concerned with the humanitarian toll that has left over 200,000 of their countrymen dead. "The Syrian memory of Tadmur is black," says Omar al-Abdullah, a Syrian journalist who now lives in Turkey. He recites, as every Syrian can, the tale of the Tadmur prison massacre. In June 1980 the Muslim Brotherhood, then in the middle of an uprising, narrowly failed to assassinate President Hafez Assad. At dawn the following day paramilitary forces went into the prison, a famously brutal jail that housed hundreds of prisoners—criminal, political and Islamist—and opened fire. An unknown number, likely to be in the hundreds, died. "We know Tadmur prison more than we know Zenobia," another exiled Syrian says. Palmyra is on a knife edge. As Syrians wait and prepare to advance on Damascus, it is not clear which side of the egg-and-dart motif will prevail. ■



Also under threat

American fiction

Size matters

Dietland. By Sarai Walker. Houghton Mifflin Harcourt; 320 pages; \$26

IN A small café, surrounded by the temptations of baked goods, Plum plumps herself and her laptop down each day to answer e-mails from a thousand teenage girls. Girls who cut themselves, girls with broken hearts, girls who make themselves throw up every night. She does so on behalf of a magazine editor who maintains she is too busy to write herself. Plum works in the café because she is too fat for the slender magazine journalists, who feel ill at ease with her in their glamorous office.

Sarai Walker's first novel, "Dietland", is a curious concoction—part exploration of the way society treats the female body, part thriller. Using Plum's desperate efforts to shed her bulk, Ms Walker unpicks the way in which women are encouraged literally to take up less space. Joining a weight-loss programme, Plum longs to erase her own edges, to shrink into acceptability: "I wanted to become smaller so I wouldn't be seen. If I was smaller they wouldn't stare. They wouldn't be mean."

Alongside Plum's anguish runs the story of a guerrilla feminist group which takes aim at society's ingrained patriarchs with brutal effect. A dozen men accused of rape, including footballers and pornographers, are kidnapped and dropped to their deaths from a skydiving plane. In response to threats, a newspaper replaces its topless page-three girls with naked full-frontal photos of men. A chain of newsagents replaces lads' mags with soft-core gay porn. The proliferation of penises is bad for business. Bare breasts are fine because women know their place, "but with men it wasn't as simple". The discrepancy between the way that male and female nakedness is treated is hardly a new theme, but Ms Walker's light touch makes it feels fresh.

Her writing can spit with venom, at the rigid expectations of women's weight and sexuality. Plum gives that voice, articulating the word "fat" with relish: "It had the same thrust as *fuck* and the same power—an illicit f-word, the top teeth digging into the bottom lip, spewing the single syllable."

As a social commentary, "Dietland" is no shrill tirade. Ms Walker captures the misery of failing to fit in, to fit into the right clothes, to fit in with the right people and their expectations.

New Algerian fiction

Stranger and stranger

The Meursault Investigation. By Kamel Daoud. Translated by John Cullen. Other Press; 143 pages; \$14.95. To be published in Britain by Oneworld in July.

WHEN Albert Camus first published his best known work, "L'Étranger" in 1942, Algeria was still a colony of France, and "the Arab" killed by the book's anti-hero, Meursault, had no name. Seventy years on, that omission is rectified in a scorching debut novel that is sure to become an essential companion to Camus's masterpiece. He was called Musa.

"The Meursault Investigation" by Kamel Daoud, an Algerian journalist, is a biting, profound response to French colonialism. It is also a lamentation for a modern Algeria gripped by pious fundamentalism. And it has earned the author both the 2015 Prix Goncourt for best first novel and a Facebook fatwa from a minor Muslim cleric calling for his death.

The book starts as a caustic, rambling monologue told by an old man in a bar to an appropriately nameless French expat. The narrator is Musa's younger brother, Harun; he says he and his mother are "the only genuine heroes of that famous story". Night by night he unwinds his version of the tale Camus told, seeking justice for Musa, condemning the "insulting brevity" of a scene in which the victim did not even merit a name.

To Musa's brother, the murderer and the famous writer are one and the same; in his telling, reality and fiction slip and collide. The book's brilliance lies in the gradual way Mr Daoud reveals Harun to be a perfect mirror: the tragic double of Meur-

sault/Camus. The plot of his story is similarly twinned with that of Camus's work. Harun's own crime and the consequent condemnation set off reverberating echoes. "Maman died yesterday," Camus's the original opening line, becomes "Mama's still alive today."

The reader begins to grasp that Harun is as much a stranger in his liberated country as Meursault once was. Both men are consumed by the violence of colonialism and its legacy. Harun has no use for the imams of his neighbourhood. "Religion", he quips, "is public transportation I never use." In Mr Daoud's story Harun is duly hounded, not by the priest who harangues Meursault, but by "a whole pack of religious fanatics". When the ghost of Camus sidles up from the back of the bar, the old man wryly notes: "Ha, ha, I'm his Arab. Or maybe he's mine."

If Camus's writing is "capable of giving air facets like diamonds", as Harun says, Mr Daoud's prose is propulsive and charged. The pages glitter with memorable phrases. This brave book is a vertiginous response to a century of trauma. But read the Frenchman's version first. ■

Saul Bellow

Early days yet

The Life of Saul Bellow: To Fame and Fortune, 1915-1964. By Zachary Leader. Knopf; 812 pages; \$40. Jonathan Cape; £35

CHIMING with the centenary of the birth of Saul Bellow and the tenth anniversary of his death comes a biography drawing on a wealth of previously restricted material and new interviews. "The Life of Saul Bellow", by Zachary Leader, is the first in a two-part portrait of a writer whom Mr Leader calls "the most decorated...in American history". This volume charts his initial struggles, burgeoning talent and first big artistic achievements, finishing with the publication in 1964 of "Herzog", which many believe to have been Bellow's masterpiece.

Mr Leader, an academic at the University of Roehampton in London, takes the reader through Bellow's early years in Canada and his relationship with his Russian immigrant parents, particularly a "tyrannical" father who deplored his son's "dreamy side". Two formative events stand out. Aged eight, Bellow develops appendicitis and from his hospital bed becomes a reader. A year later the family is "smuggled" across the border by bootlegging associates of Bellow's father and settle in Chicago, where relations run a baking business. Family life in the early 1930s is



Celebrated centurion

"crowded, tense, loving, fractious". The reader encounters Bellow away from home, studying anthropology and becoming a Trotskyist, enjoying long friendships and evanescent flings, before finally marrying the first of his five wives.

In the 1940s a move to New York introduces new friends and rivals within Jewish intellectual circles. The decade also brings long-sought-after literary acclaim. Bellow's debut novel, "Dangling Man" (1944), garners positive reviews; his second, "The Victim" (1947), reprises that critical success, but does not sell. "Black and bitter", Bellow sails to Paris, swings from political left to right, and divides his time between exploring Europe as "a reluctant sightseer" and diligently writing "The Adventures of Augie March" (1953).

In a chapter where Bellow visits Mexico (in need of "barbarism, colour, glamour, and risk" after "weary, stale, flat, and unprofitable Chicago") Mr Leader shows how his subject's trips into the mountains to watch an eagle hunting became material for a bizarre episode in "Augie March". This considered analysis of Bellow's work, together with a knowledgeable display of how his life informed his art, sets Mr Leader's book apart from previous biographies. James Atlas's "Bellow: A Biography" (2000) was marred by both an ingrained resentment of its subject and an uninspired critical examination of his fiction. In contrast, Mr Leader paints a more nuanced portrait. Though warts-and-all, it does not linger or moralise over the blemishes; laudatory, it does not veer towards panegyric, even as it impresses with Mr Leader's forensic readings.

Sometimes, however, by enumerating Bellow's many "mimetic pleasures", Mr Leader unwittingly slows down his narrative. Bellow is not even born until chapter two. A thumbnail-sketch of the writer's mother leads to a catalogue of the traits and foibles of various mothers in his fic- ►



tion. At other times the detail feels too intricate: icicles hanging outside the young Bellow's hospital window have fictional counterparts in "Herzog". The nanny who chews Bellow's meat for him before putting it in his mouth is likened to young Artur in "Mr Sammler's Planet" (1970) coughing into his servant's hand.

The Bellow that emerges is a serial adulterer, a negligent father and a surprisingly lacklustre public speaker. But he also turns

out to be a good friend to many literary luminaries such as Ralph Ellison, Bernard Malamud and John Berryman, and a "famed noticer" who channelled his gimlet-eyed observations to create enduring, innovative, award-winning fiction. Fittingly, Mr Leader has produced a meticulous and masterful first-part biography. He ends with Bellow arriving at "the pinnacle of American letters" and leaves readers hungry for the next instalment. ■

"The Lobster", took a more delightful form. In Yorgos Lanthimos's absurdist satire, single men and women are confined to a regimented resort hotel where they must find mates within 45 days. Those who fail are transformed into animals and abandoned in the wild; the only escape option is a colony of loners in the forest.

The arbitrary rules and parodic vision of speed-dating might ring a little bell with un hitched viewers. Mr Lanthimos's hopeless characters speak in stilted fashion, seeking matches by advertising their distinguishing characteristics. Colin Farrell, bespectacled and potbellied, tamps down his usual rangy energy to play a loser who tragically pretends to be someone he's not; Olivia Colman has a minor but hilariously deadpan turn as the hotel manager. Mr Lanthimos's romantic comedy, winner of the Jury Prize, the third-most-prestigious award, turns darker, and even violent, but to oddly affecting results.

Like "Son of Saul", "The Lobster" is slated for public release. But part of the fun at Cannes lies in discovering the films that may never see the light of the local cinema. This year "Arabian Nights", a three-part pastiche by Miguel Gomes that reworks the classic for today's Portugal, fits that bill. Drawing on interviews with countrymen stricken by the economic crisis, Mr Gomes fashions a series of stories with characters ranging from laid-off dockworkers to captains of industry. They blend documentary-like portions, wry commentary and antic comedy in unpredictable ways. The highlight is a court scene in an outdoor amphitheatre, where every other boorish observer proves to have some involvement in the rapidly multiplying crimes up for judgment. One of a kind, "Arabian Nights" is a distinctly Cannes-esque art film that responds to a complicated world with an extravagantly rendered realm of its own. ■

Cannes film festival

Beachcombing

The best moments from a small party in the south of France

VISITORS to the Cannes film festival have come to expect taboos to be broken and cinematic forms to be twisted into new shapes. A typical winner might be a three-hour Turkish adaptation of Chekhov, a Thai journey through reincarnation, or (clutch those pearls) an explicit French romance between two women. The 68th edition of the festival ended on May 24th with many calling it an off-year, but it still had films that could impress, and even shock, with their force and originality.

The Palme d'Or went to Jacques Audiard's "Dheepan", a relatively conventional drama about a Tamil fighter from Sri Lanka who starts life anew in a French housing project. The win seemed to reflect France's concerns over its immigrant population as much as any dramatic achievement. For true éclat it was necessary to look to "Son of Saul", a piece of high art imagining a low point of humanity, which won the Grand Prix—essentially the second prize. This debut feature directed by Laszlo Nemes, a Hungarian, depicts a seemingly unapproachable subject—the Auschwitz-Birkenau concentration camp—with extraordinary formal invention and moral complexity.

Holocaust films have come to seem an exhausting and exhausted endeavour. They are associated with emotional manipulation and dismissed *a priori* by many as profane. Mr Nemes makes his film as if none had ever been made before. In its radical technique, the mobile camera rarely leaves its protagonist, Saul (played by Geza Rohrig—pictured), a member of the Sonderkommando, the cadre of Jewish prisoners forced to dispose of gas-chamber victims and their belongings. The activity of others is left in the blurry background. The extended shots are dominated by Saul's grey figure as he hustles about the camp, possessed with the notion that one of the bodies belongs to a lost son.

The disorienting effect of the camerawork makes it hard to see the camp's horrors completely. But Mr Nemes is creating a meaningful difficulty. Instead of familiar cinematic panoramas of emaciated prisoners struggling to survive, his wrenching film plunges viewers straight into Saul's life in camp and demands a visceral struggle to comprehend. The New York Times called the film "intellectually repellent", but Claude Lanzmann, the director of a landmark Holocaust documentary, "Shoah", praised Mr Nemes for making the "anti-'Schindler's List'".

Mr Lanzmann congratulated Mr Nemes personally inside Cannes's Grand Théâtre Lumière, the event's main temple. The incongruous contiguity of the grim and the glorious is typical of a festival where screenings take place amid red-carpet glamour and beneath Mediterranean sun. The perversity of another standout film,



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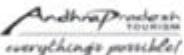
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APTDC has been designated as the Nodal Agency for the development of KAKINADA-HOPE ISLAND-KONASEEMA in Andhra Pradesh in India as a World Class Coastal & Eco Tourism Circuit. APTDC invites proposal from Firms / Consortia of Firms for Architectural & Design Consultancy Services for preparation of a Tourism Master Plan for the circuit along with detailed Architectural & Engineering Services for the project components identified for implementation through the APTDC.

Interested parties may download the documents from the website www.aptdc.gov.in from **30/05/2015** onwards

IMPORTANT DATES:
Pre-Bid Conference: **16/06/2015**
Proposal Due Date: **30/06/2015**

For Further Details, please contact Project Advisors:
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Economic data

% change on year ago

	Gross domestic product	Industrial production	Consumer prices	Unemployment rate, %		Current-account balance	Budget balance	Interest rates, %	Currency units, per \$	
	latest	qtr*	2015†	latest	2015†	latest 12 months, \$bn	% of GDP 2015‡	% of GDP 2015†	May 27th	year ago
United States	+3.0 Q1	+0.2	+2.6	+1.9 Apr	-0.2 Apr	+0.3	5.4 Apr	-410.6 Q4	-2.3	-2.5
China	+7.0 Q1	+5.3	+6.9	+5.9 Apr	+1.5 Apr	+1.4	4.1 Q1§	+291.5 Q1	+2.8	-2.8
Japan	-1.4 Q1	+2.4	+0.8	-1.7 Mar	+2.3 Mar	+0.7	3.4 Mar	+68.5 Mar	+1.9	-6.9
Britain	+2.4 Q1	+1.2	+2.5	+0.6 Mar	-0.1 Apr	+0.3	5.5 Feb††	-161.3 Q4	-4.3	-4.4
Canada	+2.6 Q4	+2.4	+2.0	+1.6 Feb	+0.8 Apr	+1.1	6.8 Apr	-39.3 Q4	-2.7	-1.8
Euro area	+1.0 Q1	+1.6	+1.5	+1.8 Mar	nil Apr	+0.2	11.3 Mar	+297.7 Mar	+2.6	-2.2
Austria	+0.4 Q1	+0.7	+1.0	+0.8 Mar	+1.0 Apr	+0.9	5.6 Mar	+3.2 Q4	+1.5	-2.1
Belgium	+0.9 Q1	+1.2	+1.2	+1.8 Mar	+0.3 Apr	+0.2	8.5 Mar	+7.4 Dec	+0.6	-2.6
France	+0.7 Q1	+2.2	+1.1	+1.3 Mar	+0.1 Apr	+0.1	10.6 Mar	-21.8 Mar‡	-0.9	-4.1
Germany	+1.0 Q1	+1.1	+2.0	-0.1 Mar	+0.5 Apr	+0.4	6.4 Apr	+289.7 Mar	+7.5	+0.7
Greece	+0.1 Q1	-0.9	+1.4	+5.0 Mar	-2.1 Apr	-0.9	25.4 Feb	+1.3 Mar	+2.7	-3.6
Italy	nil Q1	+1.3	+0.6	+1.5 Mar	-0.1 Apr	+0.1	13.0 Mar	+46.9 Mar	+1.9	-2.9
Netherlands	+2.4 Q1	+1.6	+1.6	+1.7 Mar	+0.6 Apr	+0.1	9.0 Apr	+90.2 Q4	+9.3	-1.9
Spain	+2.6 Q1	+3.6	+2.6	+4.7 Mar	-0.6 Apr	-0.5	23.0 Mar	+11.9 Feb	+0.5	-4.4
Czech Republic	+1.2 Q4	+11.7	+2.9	+6.2 Mar	+0.5 Apr	+0.2	6.7 Apr§	+1.4 Q4	-0.5	-1.7
Denmark	+1.5 Q4	+2.1	+1.7	+4.9 Mar	+0.5 Apr	+0.7	4.9 Feb	+22.4 Mar	+5.7	-2.9
Norway	+1.5 Q1	+1.0	+0.9	+1.5 Mar	+2.0 Apr	+1.5	4.1 Feb††	+42.5 Q4	+11.5	+6.7
Poland	+3.1 Q4	+4.1	+3.4	+2.3 Apr	-1.1 Apr	+0.2	11.2 Apr§	-3.5 Mar	-1.6	-1.5
Russia	-1.9 Q1	na	-4.0	-4.3 Apr	+16.4 Apr	+15.4	5.8 Apr§	+57.1 Q1	+4.3	-2.6
Sweden	+2.6 Q4	+4.6	+2.8	+0.3 Mar	-0.2 Apr	+0.2	8.3 Apr§	+35.7 Q4	+5.7	-1.3
Switzerland	+1.9 Q4	+2.4	+0.8	+2.7 Q4	-1.1 Apr	-0.9	3.3 Apr	+49.1 Q4	+8.0	+0.2
Turkey	+2.6 Q4	na	+3.2	+4.9 Mar	+7.9 Apr	+6.7	11.2 Feb§	-45.5 Mar	-4.6	-1.7
Australia	+2.5 Q4	+2.2	+2.4	+3.3 Q4	+1.3 Q1	+1.7	6.2 Apr	-40.1 Q4	-3.2	-2.3
Hong Kong	+2.1 Q1	+1.5	+2.4	-3.6 Q4	+2.9 Apr	+3.2	3.2 Apr‡‡	+5.4 Q4	+2.6	-0.1
India	+7.5 Q4	+4.0	+7.6	+2.1 Mar	+4.9 Apr	+5.3	8.6 2014	-27.4 Q4	-0.9	-4.1
Indonesia	+4.7 Q1	na	+5.1	+6.7 Mar	+6.8 Apr	+5.9	5.8 Q1§	-25.2 Q1	-3.1	-1.9
Malaysia	+5.6 Q1	na	+5.5	+6.9 Mar	+1.8 Apr	+2.6	3.0 Mar§	+11.3 Q1	+3.4	-4.4
Pakistan	+5.5 2015**	na	+5.7	+4.6 Mar	+2.1 Apr	+4.2	6.2 2013	-2.0 Q1	-0.6	-5.1
Philippines	+5.2 Q1	+1.2	+6.6	+13.6 Mar	+2.2 Apr	+2.9	6.6 Q1§	+12.7 Dec	+3.9	-1.9
Singapore	+2.6 Q1	+3.2	+3.1	-8.7 Apr	-0.5 Apr	+0.4	1.8 Q1	+66.3 Q1	+21.8	-0.7
South Korea	+2.4 Q1	+3.1	+3.1	-0.1 Mar	+0.4 Apr	+1.1	3.9 Apr§	+97.5 Mar	+6.7	+0.5
Taiwan	+3.4 Q1	+2.7	+3.9	+1.1 Apr	-0.8 Apr	+0.6	3.8 Apr	+72.4 Q1	+12.6	-1.2
Thailand	+2.2 Q4	+7.1	+3.9	-1.8 Mar	-1.0 Apr	+1.3	1.0 Mar§	+15.9 Q1	+2.2	-1.9
Argentina	+0.4 Q4	+0.1	-0.7	-1.5 Apr	— ***	—	7.1 Q1§	-5.1 Q4	-1.5	-3.1
Brazil	-0.2 Q4	+1.3	-1.2	-3.5 Mar	+8.2 Apr	+8.0	6.4 Apr§	-100.2 Apr	-4.1	-5.3
Chile	+2.4 Q1	+4.2	+2.9	-3.2 Mar	+4.1 Apr	+3.7	6.1 Mar‡‡	-1.3 Q1	-1.4	-2.0
Colombia	+3.5 Q4	+2.9	+3.6	-0.1 Mar	+4.6 Apr	+4.1	8.9 Mar§	-19.8 Q4	-6.4	-2.1
Mexico	+2.5 Q1	+1.6	+2.8	+1.7 Mar	+3.1 Apr	+3.2	4.2 Mar	-25.5 Q1	-2.3	-3.4
Venezuela	-2.3 Q3	+10.0	-3.7	na	+68.5 Dec	+69.5	7.9 Jan§	+10.3 Q3	-1.8	-16.3
Egypt	+4.3 Q4	na	+4.2	-0.1 Mar	+11.0 Apr	+9.8	12.8 Q1§	-5.8 Q4	-1.3	-10.7
Israel	+2.4 Q1	+2.5	+3.5	+11.6 Mar	-0.5 Apr	-0.3	4.9 Apr	+9.0 Q4	+4.8	-3.0
Saudi Arabia	+3.5 2014	na	+2.6	na	+2.0 Apr	+2.7	6.0 2014	+81.2 Q4	-2.3	-11.3
South Africa	+2.1 Q1	+1.3	+2.1	+3.2 Mar	+4.5 Apr	+4.6	26.4 Q1§	-19.1 Q4	-5.4	-3.8

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, Apr 26.8%; year ago 40.26%. ¶¶Dollar-denominated bonds.

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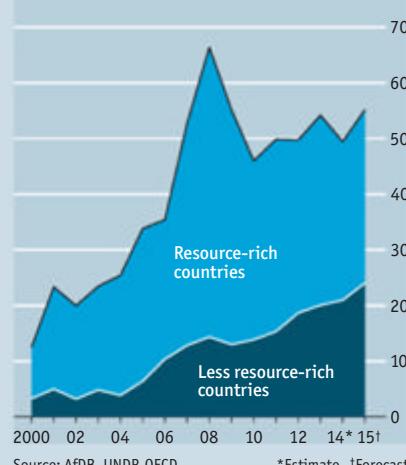
Markets

	% change on			
	Index May 27th	one week	Dec 31st 2014 in local currency terms	in \$
United States (DJIA)	18,163.0	-0.7	+1.9	+1.9
China (SSEA)	5,175.5	+11.2	+52.7	+52.8
Japan (Nikkei 225)	20,472.6	+1.4	+17.3	+13.6
Britain (FTSE 100)	7,033.3	+0.4	+7.1	+5.3
Canada (S&P TSX)	15,110.5	+0.2	+3.3	-4.2
Euro area (FTSE Euro 100)	1,222.6	-0.1	+17.9	+6.0
Euro area (EURO STOXX 50)	3,682.9	nil	+17.0	+5.2
Austria (ATX)	2,614.6	-1.4	+21.0	+8.8
Belgium (Bel 20)	3,761.1	+0.2	+14.5	+2.9
France (CAC 40)	5,182.5	+1.0	+21.3	+9.0
Germany (DAX)*	11,771.1	-0.7	+20.0	+7.9
Greece (Athex Comp)	851.8	+1.4	+3.1	-7.3
Italy (FTSE/MIB)	23,861.1	+0.4	+25.5	+12.8
Netherlands (AEX)	503.5	+0.3	+18.6	+6.6
Spain (Madrid SE)	1,157.6	-1.3	+11.0	-0.2
Czech Republic (PX)	1,030.2	-0.1	+8.8	-1.1
Denmark (OMXCB)	892.5	+1.5	+32.2	+18.6
Hungary (BUX)	22,482.8	+1.1	+35.2	+24.1
Norway (OSEAX)	695.5	-0.8	+12.2	+8.1
Poland (WIG)	55,862.1	-1.9	+8.6	+1.6
Russia (RTS, \$ terms)	1,012.2	-1.9	+10.6	+28.0
Sweden (OMX30)	1,664.1	+1.6	+13.6	+4.5
Switzerland (SMI)	9,396.2	+0.8	+4.6	+9.2
Turkey (BIST)	84,292.0	-4.0	-1.7	-13.3
Australia (All Ord.)	5,724.2	+2.0	+6.2	+0.6
Hong Kong (Hang Seng)	28,081.2	+1.8	+19.0	+18.9
India (BSE)	27,564.7	-1.0	+0.2	-1.2
Indonesia (JSX)	5,253.4	-0.7	+0.5	-5.7
Malaysia (KLCSE)	1,755.1	-3.0	-0.4	-4.2
Pakistan (KSE)	32,842.6	+0.7	+2.2	+0.8
Singapore (STI)	3,424.9	-0.4	+1.8	-0.3
South Korea (KOSPI)	2,107.5	-1.5	+10.0	+9.4
Taiwan (TWI)	9,693.5	+0.1	+4.2	+7.5
Thailand (SET)	1,500.8	-1.3	+0.2	-2.5
Argentina (MERV)	10,924.8	-6.8	+27.3	+20.1
Brazil (BVSP)	54,236.3	-1.2	+8.5	-9.3
Chile (IGPA)	19,615.9	-0.4	+4.0	+2.3
Colombia (IGBC)	10,215.9	-3.8	-12.2	-18.4
Mexico (IPC)	44,682.6	-1.3	+3.6	-0.7
Venezuela (IBC)	10,848.0	+72.7	+181	na
Egypt (Case 30)	8,966.7	+1.6	+0.4	-5.9
Israel (TA-100)	1,461.3	-1.0	+13.4	+13.7
Saudi Arabia (Tadawul)	9,801.4	+0.7	+17.6	+17.7
South Africa (JSE AS)	52,933.3	-2.3	+6.4	+1.6

Investment in Africa

Africa's economy is growing steadily. Last year average growth was 3.9% and it is set to accelerate this year, according to a report by the African Development Bank. Foreign direct investment (FDI) is helping to spur growth. It is expected to reach \$55 billion in 2015, 20% higher than in 2010. Inflows of capital are increasingly focused on less resource-rich countries, as investors target the continent's booming middle classes. The amount of investment into technology, retail and business services increased by 17 percentage points between 2007 and 2013. Foreign investment is also becoming more of a two-way affair. Last year Africa's outward investment hit \$11.4 billion, up by nearly two-fifths since 2011-12.

Foreign direct investment, \$bn



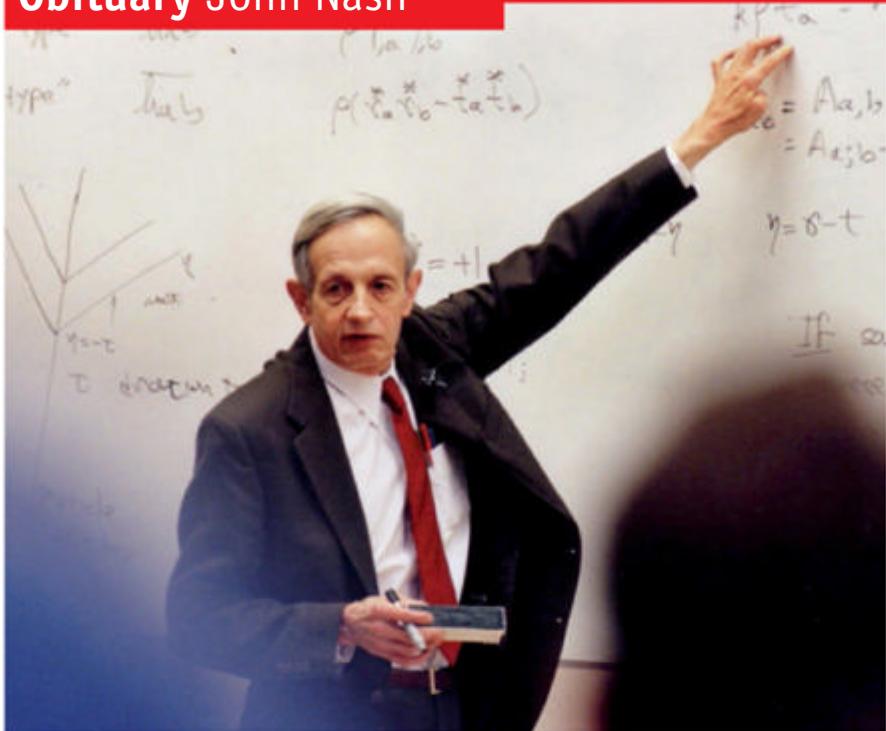
The Economist commodity-price index

	2005=100		% change on	
	May 19th	May 26th*	one month	one year
Dollar Index				
All Items	143.9	141.0	-1.5	-18.6
Food	158.7	155.0	-2.2	-22.4
Industrials				
All	128.5	126.5	-1.8	-13.3
Nfa†	124.2	125.0	+2.8	-14.9
Metals	130.3	127.2	-3.6	-12.6
Sterling Index				
All items	168.8	166.7	-1.9	-11.1
Euro Index				
All items	160.8	160.9	-0.7	+1.7
Gold				
\$ per oz	1,208.5	1,189.3	-1.9	-6.2
West Texas Intermediate				
\$ per barrel	57.5	58.1	+3.6	-44.2

Sources: Markit; Thomson Reuters. *Total return index.
†Credit-default-swap spreads, basis points. §May 22nd.

Indicators for more countries and additional series, go to: Economist.com/indicators





Lost and found

John Nash, a mathematical genius, died on May 23rd, aged 86

STUDENTS called him the "phantom": an elusive, furtive figure who haunted Princeton's libraries and lecture halls. The garbled formulae he scrawled on blackboards, uninvited and unread, evinced a scholarly background. Other jottings made even less sense: "Mao Tse-Tung's Bar Mitzvah was 13 years, 13 months and 13 days after Brezhnev's circumcision." Sometimes he banged his head in mental agony. Myths abounded. Had maths broken his mind? Or a love affair his heart?

The numerology, conspiracies and supernatural beings arrived in John Nash's mind with the same sparkling clarity as his insights into the isometric embeddability of abstract Riemannian manifolds in Euclidean spaces. Those thoughts had made him one of America's most promising young mathematicians. So he took the other ones seriously, too.

His gift was insight, not theory—he solved problems first, finding out how he had done so later. His work on manifolds (crudely: proving that a line drawn on a multidimensional idealised piece of paper remains the same length no matter how tightly it is crumpled) could have won him the greatest mathematical prize, the Fields Medal, had an unknown rival not reached the same conclusion. But in a profession where ability often peaks by 30, his genius

seemed not quite great or early enough. Arrogance and oddness (notable even by academic standards) did not help either. Favourite insults included "bubble", "trivial" and "hack". The outside world added stress to setbacks. His wife was pregnant. The abandoned mother of another child was hassling him. It all helped trigger schizophrenia, "the cancer of the mind".

On New Year's Eve 1959 he was (by his standards; and it was a fancy dress party) normal enough, wearing a nappy and sash, mutely sitting on his wife Alicia's lap and alternately sucking a dummy and swigging a bottle of milk. Only days later he declined a longed-for plum position, saying he was about to become "Emperor of Antarctica". What actually awaited him was psychiatric incarceration, with torturous insulin comas to burn "excess sugars" from the brain.

He felt "captured like a chessman", but the brief, fragile remissions were unwelcome too. "I was forced to accept normal thinking. But when I returned to delusional thinking I felt I was escaping from the thought police." Friends' attempts to help brought more bizarre jaunts and upsets. Even the besotted Alicia divorced him.

Recovery from schizophrenia is rare, but calm, friendly surroundings can help—which is what Alicia provided when,

homeless after his mother died, he begged her to take him in. "Being taken care of and not too much pressure", she said, was what he needed. It worked. Gradually, he recalled later, he "began to intellectually reject some of the delusionally influenced lines of thinking" as a "hopeless waste of intellectual effort."

During his illness, his groundbreaking work on game theory, largely neglected when he published it in 1950, had become one of the most important ideas of the century. The idea of equilibrium in the behaviour of firms and individuals is central to economics. Adam Smith's idea of the invisible hand had stoked the belief that rational, competitive interaction necessarily brings the best outcome. But Mr Nash's mathematics, in what was then the arcane sub-discipline of game theory, showed something else, more useful in practice. In a "non zero-sum" game (ie, in which mutual benefit is possible), he worked out what happens when players compete not in isolation, but in anticipation of and in response to others. Such a game, he proved, ends in a result where no player can gain by changing his strategy.

The implications, once fully understood, were stunning. In the real world of less-than-perfect competition, a "Nash equilibrium" may well be stable, but not optimal. Avoiding that outcome requires careful intervention—for example, to encourage co-operation. This framework now influences rules about markets, mergers and auctions (notably of the radio spectrum), and offers insights in fields from evolutionary biology to nuclear strategy and politics. Yet outside his old stamping grounds of Princeton and MIT, its author was forgotten, even presumed dead.

Beautifully minded

The Swedish Royal Academy of Sciences (which awards an economics prize cheekily named after, but not endorsed by, Alfred Nobel) hesitated before it awarded Mr Nash, and two other game theorists, the honour in 1994. He was too mad, too obscure, too risky. In the event, he epitomised courtesy and convention, and thereafter relished his sanity, solvency and further acclaimed mathematical work. He treated the media, saccharine and prurient by terms, with studied politeness. The Oscar-nominated Hollywood version of his life, "A Beautiful Mind", was, he said, "helpful" in changing attitudes towards mental illness, albeit inaccurate: he had auditory, not visual hallucinations.

He and Alicia remarried in 2001 (they died in the same car crash, returning from yet another honours ceremony). Lately he advocated an index-linked "ideal money", to be as unchanging as a metre or kilogram. That was unorthodox. But nobody dared dismiss it as mad. ■

intelligent life

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